

# Agenda

## Canterbury Water Management Strategy Waimakariri Zone Committee

Monday 1 July  
at 4pm

Rakahuri Room  
215 High Street, Rangiora

**Members:**

Claire Aldhamland  
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 RAKAHURI ROOM, 215 HIGH STREET, RANGIORA ON MONDAY 1 JULY 2024 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.*

5-7

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

**3. REPORTS**

3.1 **WDC Stormwater Drainage Watercourse Protection Bylaw Consultation – Update – Murray Griffin (CWMS Facilitator- Waimakariri)**

8-73

*RECOMMENDATION*

**THAT** the CWMS Waimakariri Zone Committee:

(a) **Receives** this update with consideration to the Committee's 2021-2024 CWMS Acton Plan and Community Engagement Priorities.

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

4.1 **Waimakariri Water Zone Committee Working Groups.**

4.2 **Environment Canterbury Reports.**

4.3 **Waimakariri District Council Updates.**

4.4 **Ministry for the Environment – Our Land 2024 Report.**

4.5 **Parliamentary Commission for the Environment – Going with the grain: Changing land uses to fit a changing landscape.**

4.6 **Action points from the previous Zone Committee meetings.**

RECOMMENDATION

74-78

THAT the CWMS Waimakariri Zone Committee:

- (a) **Receives** these updates for information.

5. **REPORTS FOR INFORMATION**

5.1 **Soil Health and Water Quality Workshop invite – 9 July.**

5.2 **Water Quality Gap Analysis in the Waimakariri – Report by Aqualinc.**

5.3 **Our Land and Water Case Study Overview – Waimakariri Landcare Trust.**

5.4 **Private Well Study Results 2023.**

5.5 **Rangiora stormwater monitoring programme 2021-23 annual report.**

5.6 **Rangiora stormwater monitoring programme 2022-23 water quality results.**

5.7 **Zone Implementation Programme Addendum (ZIPA) Capital Works Programme 2024-25.**

RECOMMENDATION

79-245

THAT the CWMS Waimakariri Zone Committee:

- (a) **Receives** these reports for information.

6. **COMMITTEE SCHEDULE AND PRIORITIES FOR 2024**

6.1 **Zone Committee Schedule and Priorities – Review Discussion– Murray Griffin (CWMS Facilitator- Waimakariri)**

RECOMMENDATION

246

THAT the CWMS Waimakariri Zone Committee:

- (a) **Review** its schedule and confirm priorities for the remainder of 2024.

7. **CONFIRMATION OF MINUTES**

7.1 **Minutes of the Canterbury Water Management Strategy Waimakariri Zone Committee Meeting – 6 May 2024**

RECOMMENDATION

247-315

THAT the CWMS Waimakariri Zone Committee:

- (a) **Confirms** the Minutes of the Canterbury Water Management Strategy Waimakariri Zone Committee meeting, held on 6 May 2024, as a true and accurate record.

8. **GENERAL BUSINESS**

## **KARAKIA**

### **NEXT MEETING**

The next meeting of the CWMS Waimakariri Water Zone Committee is scheduled for Monday 2 September 2024 at 4pm.

<b>AGENDA ITEM NO: 1.1</b>	<b>Register of Interests</b>
<b>Waimakariri Water Zone Committee</b>	<b>MEETING DATE: 1 July 2024</b>

# WAIMAKARIRI WATER ZONE COMMITTEE

## Register of Interests – at 20 June 2024

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."<sup>1</sup>

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.

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

Name	Committee Member Interests
<b>Claire Aldhamland</b>	- Teacher – Rangiora High School
<b>John Cooke</b>	<ul style="list-style-type: none"> <li>- Director/Shareholder – Executive Limousines 2015 Limited</li> <li>- Director/Shareholder – Express Hire Limited</li> <li>- Director/Shareholder – Testpro Limited</li> <li>- Director/Shareholder – Acropolis Wedding and Event Hire Limited</li> <li>- Director/Shareholder – Pines Beach Store Limited</li> <li>- Director/Shareholder – Coastal Dream 2005 Limited – 4Ha property, Kaiapoi</li> <li>- Interim Trustee – Section 6 Survey Office Plan 465273 Ahu Whenua Trust</li> <li>- Member – Kaiapoi Club executive</li> <li>- Trustee on several Māori land blocks, all located in Otago</li> </ul>
<b>Ruby Gill-Clifford</b>	<ul style="list-style-type: none"> <li>- Student at University of Canterbury</li> <li>- 2023/24 summer work at Tūhaitara Coastal Part Trust</li> </ul>
<b>Cr Tim Fulton</b>	<ul style="list-style-type: none"> <li>- Waimakariri District Councillor</li> <li>- Freelance Writer in the agricultural business sector</li> <li>- Contracted to write a book on Central Plains Water Scheme</li> </ul>
<b>Erin Harvie</b>	<ul style="list-style-type: none"> <li>- Director – Bowden Consultancy Limited, trading as Bowden Environmental</li> <li>- Co-ordinator – Waimakariri Landcare Trust</li> <li>- Member – NZ Hydrological Society</li> <li>- Member – NZ Institute of Primary Industry Management</li> <li>- Involvement with Cust River Water User Group</li> </ul>
<b>Martha Jolly</b>	<ul style="list-style-type: none"> <li>- Veterinary surgeon (Companion animal)</li> <li>- PhD Student in Water Resource Management (2nd year)</li> <li>- Volunteer assistant the Styx Living Laboratory Trust</li> <li>- Volunteer educator Vets for Compassion</li> <li>- Volunteer clinician SPCA NZ</li> <li>- Member – Forest and Bird NZ</li> </ul>
<b>Carolyn Latham</b>	<ul style="list-style-type: none"> <li>- Farmer – Sheep and Beef</li> <li>- Director – Latham Ag Ltd Consulting</li> <li>- Shareholder – Silver Fern Farms, Farmlands</li> <li>- Registered Member – New Zealand Institute of Primary Industry Management</li> </ul>
<b>Cr Claire McKay</b>	<ul style="list-style-type: none"> <li>- Canterbury Regional Councillor</li> <li>- Dairy grazing</li> <li>- Ihenga Holdings – Partner (with spouse)</li> </ul>

	<ul style="list-style-type: none"><li>- McKay Family Trust – Trustee (spouse also a Trustee)</li><li>- Shareholder – Waimakariri Irrigation Limited, Ravensdown Ltd, Fonterra, and Farmlands</li><li>- Member – Federated Farmers, Irrigation NZ</li><li>- Water take and use consents CRC: 050222.1</li></ul>
<b>Arapata Reuben</b>	<ul style="list-style-type: none"><li>- Trustee – Tuhono Trust</li><li>- Member – National Kiwi Recovery Group</li><li>- Rūnanga Rep – Christchurch/West Melton Water Zone Committee</li><li>- Rūnanga Rep – Ashburton Water Zone Committee</li></ul>

<b>AGENDA ITEM NO: 3.1</b>	<b>SUBJECT MATTER:</b> WDC Stormwater Drainage Watercourse Protection Bylaw Consultation – update	
<b>REPORT TO:</b> Waimakariri Water Zone Committee	<b>MEETING DATE:</b> 1 July 2024	
<b>REPORT BY:</b> Murray Griffin, ECan Facilitator		

## PURPOSE

This agenda item provides the Water Zone Committee with an update on the consultation and options for the Stormwater Drainage Watercourse Protection Bylaw.

## RECOMMENDATION

### That the Zone Committee

**Receives** this update with consideration to the Committee’s 2021-2024 CWMS Acton Plan and Community Engagement Priorities.

## BY WHO

This update is provided by:

- **Janet Fraser, Infrastructure Planner, Waimakariri District Council**
- **Jason Recker, Stormwater and Waterways Manager, Waimakariri District Council**

## BACKGROUND

### Stormwater Drainage Watercourse Protection Bylaw Consultation

The Waimakariri District Council is publicly consulting this draft Bylaw, which once finalised will replace the existing Stormwater Drainage and Watercourse Protection Bylaw 2018.

The Bylaw is being amended in 2024 to ensure the Council can meet requirements of the Canterbury Land and Water Regional Plan, including accounting for and assuming responsibility for the quality and quantity of all stormwater discharges into and from its reticulated stormwater systems.

### Key changes to the 2024 version of the Bylaw include:

- Additional Bylaw objectives recommended for inclusion by Ngai Tuahuriri
- Stormwater discharge, Site-Specific Stormwater Management Plans and Pollution Prevention Plan approvals for “high-risk” sites
- Site-specific spill prevention and spill response procedures and other requirements for high-risk sites
- New controls and sampling methods to manage discharges of sediment into stormwater or waterways in accordance with stormwater monitoring programmes
- Reference to a risk assessment process for “high-risk” site stormwater discharges from potentially contaminated land

As context, the Bylaw controls stormwater and land drainage discharges and manages activities in and near watercourses to prevent harm to operator or public health or to the environment. The Bylaw protects the public infrastructure investment by controlling access to reticulation and facilities and requiring approval for any works on or interference with Council systems.

The Bylaw protects the public from flood hazard through preventing interference with watercourses, stop banks, overland flow paths or flood plains. It protects the environment by



specifying provisions to avoid contaminants from discharging into or from the stormwater or land drainage systems.

A copy of the draft bylaw, together with the officer's report to Council, Statement of Proposal and original 2018 Bylaw are attached as agenda item 3.1-1, for your reference.

The period for submissions is **Thursday 20 June to Monday 29 July 2024**.

You can forward your submissions to us at:

Stormwater Drainage and Watercourse Protection Bylaw Submissions  
Waimakariri District Council  
Private Bag 1005  
Rangiora 7440  
Attention: Janet Fraser, Infrastructure Planner

Or email them to: [records@wmk.govt.nz](mailto:records@wmk.govt.nz)

We need to receive your submission no later than Monday 29 July 2024.

Please state if you would like your submission to be heard in person by a hearing panel of elected Councillors. The likely hearing date is Wednesday 25 September 2024 (to be confirmed).

Please contact either Janet Fraser, or Jason Recker (Stormwater and Waterways Manager) on 0800 965 468 for all technical enquiries.

**WAIMAKARIRI DISTRICT COUNCIL**

**REPORT FOR DECISION**

**FILE NO and TRIM NO:** BYL-60-03/ 240328049935

**REPORT TO:** UTILITIES AND ROADING COMMITTEE

**DATE OF MEETING:** 18 June 2024

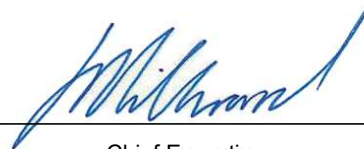
**AUTHOR(S):** Janet Fraser, Infrastructure Planner  
Jason Recker, Stormwater and Waterways Manager

**SUBJECT:** Commence Public Consultation on Amended Stormwater Drainage and Watercourse Protection Bylaw 2024

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



General Manager



Chief Executive

**1. SUMMARY**

- 1.1. This report seeks Utilities and Roading Committee approval to undertake public consultation on the amended Waimakariri District Council Stormwater Drainage and Watercourse Protection Bylaw 2024, using the Special Consultative Procedure.
- 1.2. Changes are required to the current 2018 version of the Bylaw to make it consistent with Canterbury Land and Water Regional Plan (CLWRP) policies and rules which require the Council to control all discharges into and from its reticulated stormwater networks by 1 January 2025. The changes proposed in this report form an early review and update of the Bylaw, which would otherwise be required to be reviewed by the mandated 10 year timeline set out in the *Local Government Act 2002*, with a review completed by 2028.
- 1.3. Some new environmental controls are proposed to assist the Council to manage discharges from a wider range of activities than those presently managed through the Bylaw. The amendments include a proposed Council approval process for stormwater discharges from high-risk sites. The changes include the following:
  - Stormwater discharge, Site-Specific Stormwater Management Plans and Pollution Prevention Plan approvals for “high-risk” sites
  - Site specific spill prevention and spill response procedures and other requirements for high-risk sites
  - New controls and sampling methods to manage discharges of sediment into stormwater or waterways in accordance with stormwater monitoring programmes
  - Reference to a risk assessment process for “high-risk” site stormwater discharges from potentially contaminated land
- 1.4. The Council has added additional Bylaw objectives, as outcomes, which were recommended for inclusion by Ngai Tuahuriri in the attached Cultural Advice Report (TRIM 240409054566). These are:
  - To provide for improvement in the quality of waterways;
  - To provide for protection and enhancement of waterways, mahinga kai, indigenous species and habitat;

- To provide for the protection of wahi tapu, wahi taonga, wai tapu and wai taonga.
- 1.5 Waterway water quality and indigenous species habitat is not only protected but is also enhanced by removal of contaminant discharges which supports rehabilitation, improvement and enhancement of waterways. The discharge of fewer contaminants will improve the health and abundance of indigenous aquatic species in waterways. The Bylaw provides a set of controls over private property discharges that are intended to reduce the inflow of contaminants into Council systems and waterways, to help meet these objectives and outcomes.
- 1.6 The Stormwater Drainage and Watercourse Protection Bylaw applies across the Waimakariri District. Its purpose is to control stormwater discharges and manage activities in and near watercourses to prevent harm to operator or public health or to the environment. The Council will continue to improve its systems and processes in line with changes to the Bylaw, including implementing new systems for scheduling high-risk site risk assessments and tracking approvals of high-risk site discharges into the stormwater networks which will be approved through the Bylaw. The Council has recently employed additional staff who have a responsibility to assess and provide the approvals for high-risk site discharges now mandated through the Bylaw, alongside other activities.

Attachments:

- i. Draft Stormwater Drainage and Watercourse Protection Bylaw 2024 for public consultation (TRIM 240328049939).
- ii. Statement of Proposal to adopt the Stormwater Drainage and Watercourse Protection Bylaw 2024 for public consultation (TRIM 240402050528).
- iii. Stormwater Drainage and Watercourse Protection Bylaw 2018 (operative since 1 May 2018 (TRIM 180504048735).
- iv. Memorandum of Understanding Between Waimakariri District Council and Environment Canterbury Stormwater Discharge Approvals on Contaminated Land CRC184601 (TRIM 230925149963).
- v. Assessment Criteria for HAIL Sites from 1 January 2025– LLUR HAIL for Memorandum of Understanding Stormwater Discharge Approvals on Contaminated Land (TRIM 230412051135).
- vi. Stormwater Drainage and Watercourse Protection Bylaw Review 2024 - Cultural Advice Report to Waimakariri District Council from Mahaanui Kurataiao Limited (TRIM 240409054566).

**2. RECOMMENDATION**

**THAT** the Utilities and Roading Committee:

- (a) **Receives** Report No. TRIM 240328049935.
- (b) **Approves** the attached proposed Stormwater Drainage and Watercourse Protection Bylaw 2024 and Statement of Proposal for public consultation using the Special Consultative Procedure outlined in the Local Government Act 2002.
- (c) **Appoints** Councillor Williams (portfolio holder), Councillor ..... and Councillor ..... to hear submissions on the proposal and to recommend decisions to the Council.
- (d) **Notes** the proposed hearing / submissions deliberations date is Wednesday 25 September 2024.
- (e) **Notes** that upon adoption, the Bylaw will be renamed the Stormwater Drainage and Watercourse Protection Bylaw 2024, to reflect the date of its last review.

- (f) **Notes** that, once adopted, the Stormwater Drainage and Watercourse Protection Bylaw 2024 will not be required to be formally reviewed for another 10 years, however it will be able to be reviewed in the intervening period, if required.
- (g) **Circulates** this report to the Community Boards for their information.

### 3. **BACKGROUND**

- 3.1. The Stormwater Drainage and Watercourse Protection Bylaw 2024 is intended to update and replace the 2018 version. The present review of the Bylaw is occurring prior to the usual mandatory 10 year review requirement. This will enable the Council to meet regional plan requirements by enabling it to authorise and control a wider range of discharges into and from the stormwater networks than are covered by the current Bylaw. The reviews in 2018 and 2024 are updates to the original Stormwater Bylaw which was adopted in 2011. Over time, the 2011 Bylaw has been updated to control a wider range of activities to ensure the Council has legal mechanisms to manage stormwater to comply with changing policies and rules in the Canterbury Land and Water Regional Plan (CLWRP).
- 3.2. Prior to adoption of the Stormwater Bylaw in 2011 there was no local legislation in place to control the quality of stormwater discharges into the Council's reticulation or receiving environment. The Bylaw has been developed for the primary purpose of protecting public health and safety and improving the quality of the environment.
- 3.3. The Bylaw also assists the Council to respond to common issues experienced during the operation and maintenance of the Council's stormwater and land drainage systems. These include avoiding activities which interfere with Council systems or watercourses managed by the Council, including vehicle or stock damage or excess spraying of open drains. Some provisions are to avoid nuisance associated with operating private stormwater systems.
- 3.4. The Bylaw including the latest proposed amendments will protect the public infrastructure investment by controlling access to reticulation and facilities, and requiring approval for any works on or interference with Council systems. In addition, the Bylaw protects the public from flood hazard through preventing interference with watercourses, stop banks, overland flow paths or flood plains. It protects the environment by specifying provisions to avoid contaminants from discharging into or from the stormwater or land drainage systems.
- 3.5. The existing form of the Bylaw in force from 2018 is no longer considered to be appropriate. The 2018 version does not cover all of the operating situations encountered by the Council in managing its systems. It also does not enable the Council to provide sufficient direction to the community in order to implement the stormwater network discharge consents required under the CLWRP which set out requirements for the Council to manage the water quality and quantity of all discharges into and from its networks. The Council is required to approve all discharges into its stormwater networks by 1 January 2025, including discharges from high-risk sites. The proposed updates to the Bylaw will enable it to legally manage these activities.
- 3.6. The Bylaw makes new provision for the Council to approve discharges from high-risk sites into and from its networks. In context, "high-risk" discharges may be from either "operating-phase" or "construction-phase" activities, if a Hazardous Activities and Industries List (HAIL) activity is currently or has historically occurred at the site. High-risk site operating phase discharges are identified by the Council as sites where hazardous substances are being handled, used or processed within the site, when there is a risk of that substance becoming entrained in site runoff that could discharge into stormwater drains.

- 3.7 For operating phase discharges, high-risk activities are defined in Schedule 1 of the Bylaw as those listed within the CLWRP HAIL list, except that the Council deems several activities described in the HAIL to be “medium-risk” so that it can apply less stringent requirements for them within the site Pollution Prevention Plan (PPP). This aligns the approval process for medium-risk sites to the level of risk to stormwater quality from the discharge.
- 3.8 There are proposed less prescriptive PPP requirements for operating phase medium-risk sites in the Bylaw. This is because any hazardous substances used within a medium-risk site should, through the nature of the activity, be contained within a building's interior systems, with any waste draining to purpose-built waste disposal systems or to trade waste (wastewater). Medium-risk sites are a lower priority for risk assessment and approval via the PPP's. The separate definitions provided of high and medium-risk sites in the Bylaw are intended to enable the Council to prioritise the risk assessments for activities that pose the highest risk to the quality of the stormwater discharges.
- 3.9 The Council also now has a procedure in place to require a risk assessment and if appropriate, approve stormwater discharges into the reticulated stormwater networks from potentially contaminated sites during earthworks, or alternatively refer these discharge approvals onto Environment Canterbury for consent. These construction phase discharges may pose a risk to stormwater quality due to the HAIL activity (historic or current) as well as sediment discharging during the earthworks. Construction activities are managed separately from operating phase high-risk activities in the Bylaw because the construction could cause contaminated material in land that is disturbed to be released into the environment, as well as risking sediment in site runoff affecting discharge quality. It is noted that consent for land disturbance may also be required from the Waimakariri District Council under the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NESCS) alongside the required approval through the Bylaw or consent from Environment Canterbury for the stormwater discharge into the reticulated network.
- 3.10 The management approach and risk assessment for these sites is set out in the following documents: “*Memorandum of Understanding Between Waimakariri District Council and Environment Canterbury Stormwater Discharge Approvals on Contaminated Land CRC184601*” (TRIM 230925149963 – attachment iv) and the “*Assessment Criteria for HAIL Sites from 1 January 2025 – LLUR HAIL for Memorandum of Understanding Stormwater Discharge Approvals on Contaminated Land - 12 April 2023*” (TRIM 230412051135 – attachment v.). These Memorandum of Understanding commitments for management of discharges from potentially contaminated land are referenced in the Bylaw in order to provide a trigger for the Council to require an applicant to arrange the required risk assessment and site investigations. Decisions on contaminated land risks and discharge approvals or site referrals to Environment Canterbury will be applied through the MOU process.
- 3.11 There are proposed new standards or limits in the new Schedule 2 of the Bylaw outlining requirements for construction phase discharges. These are based on the consent limits within the stormwater network discharge consents relating to discharge of sediment and requirements of the stormwater network consent monitoring programmes. The Council is now able to apply these various measures during activities when it is responsible for approving the quality of the discharge from the site into its systems.

- 3.12 The construction phase discharge requirements from Schedule 2 of the Bylaw will need to be implemented through coordination among the 3 Water's Unit, Environmental Services Unit and could involve collaboration with the Building Unit. This could enable the Council to manage sediment discharges from individual building sites when a Waimakariri District Council earthworks consent is not required. Processes to implement these new construction management approaches will be confirmed in coming months and tested on sites where discharges are being approved into the Council networks, from the date of adoption of this Bylaw.
- 3.13 The stormwater network discharge consents in place for Rangiora and Kaiapoi and further pending consents for Oxford and Woodend, which should be granted within the next month, require the Council to, over time, achieve water quality standards which now are mandatory for discharges from the stormwater networks into the receiving environment. The updated Bylaw will be the legal mechanism enabling the Council to apply the network consent requirements where they affect discharges from private properties. The Bylaw will authorise the Council management of the quality of these discharges through Pollution Prevention Plans, Site-Specific Stormwater Management Plans and Erosion and Sediment Control Plans.

#### 4. **ISSUES AND OPTIONS**

- 4.1. The purpose of this report is to seek approval of the Utilities and Rooding Committee to undertake public consultation on the Stormwater Drainage and Watercourse Protection Bylaw 2024 using the Special Consultative Procedure. The *Local Government Act 2002*, section 160, provides for the use of the Special Consultative Procedure outlined in section 83 to review and amend the Bylaw.
- 4.2. Following public consultation, the 2024 Bylaw version including any further amendments made as a result of consultation, will replace the Stormwater Drainage and Watercourse Protection Bylaw 2018.
- 4.3. The draft Bylaw, following consultation and receipt of submissions, will be forwarded to a hearing panel for consideration. The hearing panel will consider and hear submissions and then make recommendations about the Bylaw for approval by the Council.
- 4.4. The draft Bylaw has some proposed revisions from the existing 2018 version. The Bylaw content including proposed changes are similar in intent to other territorial local authority bylaws in place throughout Canterbury, which are also required to assist each Council to meet Canterbury Land and Water Regional Plan policies and rules controlling all stormwater discharges into and from each stormwater network through the region. However some clauses are specific to the Waimakariri District to align with the Stormwater Network Discharge Consent conditions, network management approaches and monitoring programme requirements which are all unique to the Waimakariri District. Key proposed changes in the updated version include:
- Additional Bylaw objectives recommended for inclusion by Ngai Tuahuriri
  - Stormwater discharge, Site-Specific Stormwater Management Plans and Pollution Prevention Plan approvals for "high-risk" sites
  - Site specific spill prevention and spill response procedures and other requirements for high-risk sites
  - New controls and sampling methods to manage discharges of sediment into stormwater or waterways in accordance with the Council network consent stormwater monitoring programmes

- Reference to a risk assessment process for “high-risk” site stormwater discharges from potentially contaminated land
  - Other minor changes for clarification or to align with operational practices.
- 4.5 In carrying out the review of its 2018 Bylaw, the *Local Government Act 2002*, section 155 requires the Council to determine whether the Bylaw is still the most appropriate way of addressing the perceived problem, whether it is the most appropriate form of Bylaw and whether it gives rise to any implications under the *New Zealand Bill of Rights Act 1990*. These assessments are made within the attached Statement of Proposal (see TRIM 240402050528).
- 4.6 The Council has the option of revoking the Stormwater Drainage and Watercourse Protection Bylaw 2018 and relying on other legislation to manage the quality and quantity of stormwater and land drainage discharges in the district. However, the Bylaw has been developed in order to protect Council infrastructure, public health and safety and the environment. It achieves this by clearly specifying the requirements and obligations of all parties, and the rules and conditions to be met by each activity or person generating a discharge into a Council system.
- 4.7 Enforcement of the Bylaw can only occur through a prosecution process for offences through the courts. This has an estimated cost to Council of at least \$10,000 to \$15,000 per prosecution and an average processing time of at least 6 months per offence. These court prosecutions would only seem warranted in the event of major Bylaw breaches or a repeat offender. For minor Bylaw offences, infringement notices cannot be issued by the Council because there are no national regulations in place which would authorise these.
- 4.8 Therefore it is likely that the most effective enforcement approach for the wider range of activities to be managed under the amended Bylaw is for the Council to, if necessary, rescind any granted approvals for non-complying activities discharging into the Council networks. The Council can require the property owner to obtain a consent for their activity from Environment Canterbury if it is not otherwise required to manage these discharges itself to comply with its stormwater network discharge consent conditions. A process for the Council to withdraw previously granted approvals for non-complying discharges which present an unacceptable risk to the receiving environment is set out in the network consent conditions. This process enables the Council to refer these activities to Environment Canterbury for separate consenting, management and enforcement, in certain circumstances. This proposed compliance approach is agreed with Environment Canterbury and is consistent with the compliance framework applied within the stormwater network discharge consents.
- 4.9 The Council can refer pollution issues within its networks to Environment Canterbury to enforce directly via its own infringements system, if the discharge contravenes Section 15 of the *Resource Management Act 1991*, subject to agreement of Environment Canterbury that the process for the Council to manage the discharge under its network consents has been fully complied with in accordance with the consent conditions. Environment Canterbury has direct enforcement capabilities to manage non-complying discharges that have an unacceptable level of environmental risk, including issue of abatement notices and infringement fines under the *Resource Management Act 1991*.
- 4.10 Updating and adopting the Stormwater Drainage and Watercourse Protection Bylaw 2024 means the Council does not have to rely on the cooperation of the customer to ensure either: (a) the acceptable quality of stormwater and land drainage discharges into its systems; or (b) that it can avoid the adverse effects of flood flows that may result from harmful or damaging private activities.

- 4.11 It means the Council can make the public aware of the requirements by publishing its Bylaw and providing enforcement in circumstances where a customer does not voluntarily agree to meet the requirements. It provides the Council with an enforcement option for circumstances when a customer intentionally or repeatedly ignores the Bylaw provisions.
- 4.12 The Bylaw is therefore the appropriate mechanism to protect public health and the environment and the network infrastructure from damage or misuse. The Bylaw is still considered to be the most appropriate mechanism for managing the quality and quantity of discharges into and from the Council's systems and into the receiving environment. It provides an open and transparent process for the community to provide input into the preparation and adoption of the rules that will be applied.
- 4.13 The Bylaw has been reviewed by Council asset managers, engineering, environmental specialists and policy staff and compared with other local authority Bylaws. The revised version is consistent with the Waimakariri District Council's other Bylaws and is drafted in anticipation of meeting requirements of the Canterbury Land and Water Regional Plan as far as is practicable.
- 4.14 The Council will continue to improve its systems and processes, including implementing new systems for scheduling high-risk site risk assessments and tracking approvals of high-risk site discharges into the stormwater networks which will be approved through the Bylaw. The Council has recently employed additional staff who have a responsibility to assess and provide the approvals for high-risk site discharges now mandated through the Bylaw, alongside other activities.

#### **Implications for Community Wellbeing**

- 4.15 There are implications on community wellbeing by the issues and options that are the subject matter of this report. Community wellbeing is supported by having in place clear standards to control discharges and activities affecting stormwater and waterways. The Bylaw will protect public safety around drainage channels and natural waterways and reduce damage or interference that could result in unanticipated flooding or contamination events.
- 4.16 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. Consultation on the draft Bylaw with Ngāi Tūāhuriri was undertaken via Mahaanui Kurataiao Limited. The response is set out in a "*Cultural Advice Report to Waimakariri District Council*" received on 5 April 2024 (see TRIM 240409054566-attachment vi.).

The Cultural Advice Report includes recommended Bylaw objectives which have been added into the draft Bylaw Section 3 Objectives, explained as stated outcomes of the Bylaw.

These Bylaw stated outcomes are:

- To provide for improvement in the quality of waterways;
- To provide for protection and enhancement of waterways, mahinga kai, indigenous species and habitat;
- To provide for the protection of wahi tapu, wahi taonga, wai tapu and wai taonga.



Waterway water quality and indigenous species habitat is not only protected but is also enhanced by removal of contaminant discharges. Reducing contaminants supports rehabilitation, improvement and enhancement of waterways. This includes improving the health and abundance of indigenous aquatic species which can be viewed as improving the quality of waterways and providing for their enhancement as well as their protection. The Bylaw provides a set of controls over private property discharges that are intended to reduce the inflow of contaminants into Council systems and waterways, to meet these objectives and outcomes.

The Cultural Advice Report also makes the following key comments:

- The discharge of contaminants to waterways is not supported.
- Minimisation of impervious surface area and onsite solutions are recommended.
- All stormwater should be treated prior to discharge into natural or manmade waterways.
- Compliance with rules within the Bylaw should be monitored and enforced.

These comments are intended to be addressed through the Bylaw and amendments. The likelihood of achieving these Ngāi Tūāhuriri recommendations depends on practical actions by Council staff implementing the Bylaw and wider community action on reducing discharges of contaminants into stormwater or waterways.

## 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. Consultation letters will be sent to key agencies and organisations including contractors responsible for operating the stormwater and drainage networks, residential building contractors, Environment Canterbury, adjoining local authorities, the Community and Public Health Canterbury office and the Waimakariri Zone Water Management Committee prior to 21 June 2024. One month is allowed for consultation as required by the Special Consultative Procedure.

## 5.3. Wider Community

The wider community is likely to be affected by, or to have an interest in the subject matter of this report. Community consultation is undertaken for this review through the Special Consultative Procedure from the *Local Government Act 2002*. The following table summarises the consultation proposal for the review of the Bylaw.

Tuesday 18 June 2024	The Utilities and Roothing Committee approves the draft Bylaw for consultation.
Thursday 20 June 2024	Public submission period opens (first public notice) Notification letters sent to key agencies and organisations Bylaw documents available in Council service centres and libraries
Monday 29 July 2024	Submission period closes
Wednesday 25 September 2024 (9am to 3pm)	Hearings and deliberations <i>Times to be confirmed with Councillors</i>
4 November 2024	Hearings panel recommendations to full Council Bylaw comes into force

Public consultation will include the following steps:

- Public notices/advertisements in newspapers, on the Council's website and via social media (including Facebook)
- Statement of proposal and draft Bylaw available to view on the Council's website and in service centres and libraries.
- The extended timeframe between the close of submissions (29 July) and proposed hearings / deliberations date (25 September) is to allow a sufficient period of time for staff to consider and respond to submissions and if necessary obtain legal advice to finalise the Bylaw in response to points raised in submissions. This long review period is provided in anticipation of the Bylaw having a potentially significant effect on some community sectors discharging stormwater and on future staff work programmes to provide the required approvals.

## 6. **OTHER IMPLICATIONS AND RISK MANAGEMENT**

### 6.1. **Financial Implications**

There are financial implications of the decisions sought by this report. The budget to review the Stormwater Drainage and Watercourse Protection Bylaw 2018, including advertising costs and implementation of the Bylaw by existing staff is included in the Annual Plan/Long Term Plan.

There will be operating cost increases to the Council over time as a result of implementing the current requirements and proposed amendments. These will be incurred in order to:

- Roll out a process to assess, approve and review Site-Specific Stormwater Management Plans and Pollution Prevention Plans throughout the District, from both high and medium-risk sites
- Provide approvals for the current and proposed wider range of activities which can now be managed under provisions of the updated Bylaw
- Increased monitoring and assessment of activities now covered by the Bylaw

Staff will monitor the potential risks of cost increases arising from public consultation feedback and then during the ongoing implementation of these additional activities. Further budget allocation will be requested if required through future Annual Plans and Long-Term Plans. Alternatively further funding can be made available through addition of any further fees payable by applicants through the Fees and Charges Schedule to cover all activities that will be approved through the Bylaw.

Funding needed to implement the new approval processes outlined in the Bylaw is already incorporated within current budgets and fees for approvals specified within the current Fees and Charges Schedule. Additional staff have been recently appointed to provide approvals now mandated through the Bylaw.

For instance, fees are now payable by applicants who request staff approval of Pollution Prevention Plans or any other related stormwater discharge approval which may be imposed through the Bylaw. These fees are currently set out in the Fees and Charges Schedule.

## 6.2 Sustainability and Climate Change Impacts

The recommendations in this report have sustainability and/or climate change impacts. The Bylaw provides a legally enforceable environmental protection tool for the district, providing a basis for managing activities that protect and support sustainable management of waterways.

## 6.3 Risk Management

There are risks arising from the adoption/implementation of the recommendations in this report. The Bylaw needs to be fit for purpose, with adequate rules to control public activities around waterways in order to provide for public safety and environmental and flood protection. The effective implementation of the Bylaw will reduce risks to public safety or the environment.

## 6.4 Health and Safety

There are health and safety risks arising from the adoption/implementation of the recommendations in this report. Including effective controls within the Bylaw will reduce risks to public safety or the environment associated with contaminated discharges and waterway access and use.

## 7 CONTEXT

### 7.1 Consistency with Policy

The proposed Bylaw changes are considered to be a matter of significance in terms of the Council's Significance and Engagement Policy. For instance, Section 5.1 of the Policy states "...*The Council will consider each issue, proposal or decision on a case-by-case basis to determine whether the decision is significant by applying the criteria and procedures and consider the thresholds set out in this policy. It will also consider each of the following:*

- *The effect on parties who are likely to be particularly affected by or particularly interested in this issue, decision or proposal.*
- *The scale of any proposed change to levels of Council service.*

The proposed Bylaw changes are considered significant as some property owners discharging into the Council networks will be subject to new requirements of the Bylaw in future requiring them to meet environmental limits specified in stormwater network discharge consents and / or the Bylaw, rather than being subject to requirements of individual Environment Canterbury consents for their site discharges.

In addition, responsibility to control the quality and quantity of all stormwater discharges into and from each network will transfer from Environment Canterbury to the Council on 1 January 2025, which is a new role for the Council. It is a more extensive level of service for the management of stormwater discharge quality and quantity than is provided by the Council at present.

Policy 4.16A of the Canterbury Land and Water Regional Plan requires:

*"Operators of reticulated stormwater systems implement methods to manage the quantity and quality of all stormwater directed to and conveyed by the reticulated stormwater system, and from 1 January 2025 network operators account for and are responsible for the quality and quantity of all stormwater discharged from that reticulated stormwater system".*

This policy requires the Council, from 1 January 2025, to manage all discharges into the Council stormwater systems including from high-risk activities. At the present time the Council approves discharges from medium, but not high-risk sites. This Bylaw update gives effect to the policy by providing a legal avenue for the Council to accept responsibility for high as well as medium-risk discharges into its stormwater networks.

## 7.2 Authorising Legislation

The *Local Government Act 2002*, section 158, requires the first review of a Bylaw made under the Act to be undertaken no later than five years after the Bylaw was made, if the Bylaw was made after 1 July 2003. S 159 then requires a further review of that Bylaw no later than 10 years of the date of the previous review. The legislated review date for the Stormwater Drainage and Watercourse Protection Bylaw 2018 which was adopted on 1 May 2018 is therefore 1 May 2028. Any Bylaw that is not reviewed within the specified timeframe is revoked two years after the last date on which it should have been reviewed. The Bylaw will therefore be revoked on 1 May 2030, if not reviewed prior to this date. This 2024 review, intended to be completed prior to 1 January 2025 is therefore an early review which meets the requirements for Bylaw review timeframes within the *Local Government Act 2002*.

The Stormwater Drainage and Watercourse Protection Bylaw is established under Section 145 and 146 of the *Local Government Act 2002* and is being consulted through this review under Sections 82, 83, 86, and 156.

The proposed amended Bylaw assists the Council to align its activity management with the purpose and intent of the *Health Act 1956* and the *Resource Management Act 1991*. This is in terms of assisting the Council to improve its management of contaminated discharges into the stormwater and land drainage systems and downstream receiving environment, and in so doing improve health and safety for people and the quality of the environment.

## 7.3 Consistency with Community Outcomes

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

The review of the Stormwater Drainage and Watercourse Protection Bylaw 2018 promotes the following community outcomes:

- People are supported to participate in improving the health and sustainability of our environment
- Infrastructure and services are sustainable, resilient and affordable

## 7.4 Authorising Delegations

The Utilities and Roading Committee has delegated responsibility from the Council for land drainage, waterways and stormwater activities and to administer Bylaw's for the Committee's activities including to recommend to the Council any amendments, reviews, or new Bylaws (refer S-DM:1024).



# STORMWATER DRAINAGE AND WATERCOURSE PROTECTION BYLAW 2024

This Stormwater Drainage and  
Watercourse Protection Bylaw 2024  
was adopted at a Council Meeting held on  
XXX

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Chief Executive

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Governance Manager

**WAIMAKARIRI DISTRICT COUNCIL**  
**STORMWATER DRAINAGE AND WATERCOURSE PROTECTION BYLAW 2024**

**1 TITLE, AUTHORITY AND COMMENCEMENT**

- 1.1 This bylaw shall be known as the *Waimakariri District Council Stormwater Drainage and Watercourse Protection Bylaw 2024*.
- 1.2 This bylaw shall come into force on XXX Date.
- 1.3 This Bylaw supersedes and revokes the Stormwater Drainage and Watercourse Protection Bylaw 2018.
- 1.4 The Council resolved to review the Stormwater Drainage and Watercourse Protection Bylaw 2018 on 18 June 2024. The revised Bylaw was confirmed following a special consultative procedure by resolution at a meeting on XXXX 2024.

**2 INTRODUCTION**

- 2.1 This bylaw is made by the Waimakariri District Council in exercise of the powers and authority vested in the Council by Section 146 of the *Local Government Act 2002*.
- 2.2 This bylaw applies and operates throughout the Waimakariri District.
- 2.3 This bylaw applies to the following:
  - Council stormwater systems;
  - Council managed land drainage systems or watercourses;
  - Privately managed stormwater systems, land drainage systems, watercourses, flood plains, overland flow paths or stop banks.
- 2.4 This bylaw does not derogate from the Building Act 2004, the Hazardous Substances and New Organisms Act 1996, the Health Act 1956 and the Resource Management Act 1991 and any of those Acts' subsequent amendments or applicable Regulations.

*Explanatory Note: This bylaw interacts with the Waimakariri District Council Wastewater Bylaw in seeking to reduce wastewater overflows. The Wastewater Bylaw seeks to prevent stormwater inflow into the wastewater systems by addressing defects in the wastewater reticulation, non-complying wastewater or stormwater connections and poorly designed gully traps. These steps all assist to prevent wastewater overflows that can adversely affect the receiving environment.*

*The Stormwater Drainage and Watercourse Protection Bylaw 2024 supports these provisions by requiring effective operation and maintenance of Council and private stormwater and land drainage systems and separate operation of the stormwater and wastewater systems.*

### 3 **OBJECTIVES**

- 3.1 The purpose of the bylaw is to provide a mechanism to assist the Council to achieve the following key objectives:
- a. Control the discharge of contaminants into any Council stormwater system or land drainage system;
  - b. Prevent the unauthorised discharge of stormwater into any Council stormwater or land drainage system;
  - c. Enable the Council to meet relevant objectives, policies and standards specified within the Canterbury Land and Water Regional Plan and any consent condition with which the Council is required to comply, which controls the quality or quantity of discharges from any Council system into the receiving environment;
  - d. To protect the land, structures and infrastructure of Council and private stormwater and land drainage systems;
  - e. To define the obligations and responsibilities of the Council, private property owners and occupiers and the public in matters related to the discharge of stormwater and land drainage water, and the management of stormwater systems and land drainage systems;
- 3.2 The above objectives will assist the Council to contribute to the following broader outcomes for waterways in the District:
- a. To provide for improvement in the quality of waterways;
  - b. To provide for protection and enhancement of waterways, mahinga kai, indigenous species and habitat;
  - c. To provide for the protection of wahi tapu, wahi taonga, wai tapu and wai taonga.

### 4 **INTERPRETATION**

- a. In this bylaw:
  - i. **“Approval or approved”** means approval or approved in writing by Waimakariri District Council either by resolution of Council or by a Council officer.
  - ii. **“Best Management Practice(s)”** means the best method(s) for preventing or minimising the adverse effects of any stormwater discharge on the environment.
  - iii. **“Catchment Management Plan”** is a plan providing an overview of the stormwater system(s) and water quality issues within a catchment to provide a framework for future stormwater management.
  - iv. **“Connection”** means an approved discharge from a premises of stormwater into a Council stormwater system or land drainage water into a Council land drainage system that is subject to Council’s approved and applicable rates and charges.
  - v. **“Construction activities”** means any activities involving the disturbance of the surface of any land but excludes farming and forestry activities.
  - vi. **“Contaminant”** includes any substance (including gases, odorous compounds, liquids, solids, and micro-organisms) or energy (excluding noise) or heat, that either by itself or in combination with the same, similar, or other substances, energy or heat:
    - a. when discharged into water, changes, or is likely to change the physical, chemical, or biological condition of the water into which it is discharged, or

- b. when discharged onto or into land or into air, changes or is likely to change the physical, chemical or biological condition of the land or air onto or into which it is discharged.
- vii. **“Council”** means the Waimakariri District Council.
- viii. **“Council system”** means a land drainage or stormwater system which is under the control of the Council.
- ix. **“Customer”** means the person discharging stormwater or land drainage water into the Council system.
- x. **“District Plan”** means the Waimakariri District Plan.
- xi. **“District”** means the Waimakariri District.
- xii. **“Environment Canterbury”** means the Canterbury Regional Council.
- xiii. **“Environmental standards and/or limits”** means the standards or limits which apply in the receiving environment or at a stormwater network discharge point and which control quantities of any contaminant which is authorised or approved to be discharged through any National Environmental Standard, Regional or District Plan or consent condition.
- xiv. **“Erosion and Sediment Control Plan”** means a plan that has been prepared in accordance with the Environment Canterbury Erosion and Sediment Control Toolbox for Canterbury.
- xv. **“Flood plain”** means an area which is predicted to flood in a storm event.
- xvi. **“Ground soakage system”** means a system that provides for stormwater to soak into the ground.
- xvii. **“Hazardous Substances”** as defined by Section 2 of the Hazardous Substances and New Organisms Act 1996, Ministry of Environment.
- xviii. **“High-Risk Activities”** are those activities defined as High-Risk in Schedule 1 of this Bylaw.
- xix. **“Land drainage system”** means any combination of surface or subsurface pipes, channels, drains or canal systems that have been constructed for the primary purpose of collecting or draining water from agricultural or rural land and ancillary structures; or controlling or permanently lowering the water table; and which conveys and discharges that water to the receiving environment.
- xx. **“Land drainage water”** means water arising from the drainage of water from the soil profile, or excess surface water from agricultural or rural land. It excludes stormwater, which is separately defined.
- xxi. **“Medium-Risk Activities”** are those activities defined as Medium-Risk in Schedule 1 of this bylaw.
- xxii. **“Mixing Zone”** means a Mixing Zone as defined in Schedule 5 of the Canterbury Land and Water Regional Plan.
- xxiii. **“Natural servitude”** means a state where low-lying land is obliged to receive surface water which drains naturally from land situated at a higher gradient (surface water includes all naturally occurring water which results from rainfall or water flowing onto the site, including percolating water). “
- xxiv. **“NTU”** means Nephelometric Turbidity Unit, which is the unit used to measure the turbidity of a fluid or the presence of suspended particles in water.
- xxv. **“Nuisance”** has the same meaning as Section 29 of the *Health Act 1956*, and includes a person, thing, or circumstance causing stress or annoyance or unreasonable interference. In the context of this bylaw the term nuisance includes, but is not limited to:
- a. Danger to life;
  - b. Danger to public health;
  - c. Flooding of any building floor or sub-floor, or public roadway;



- d. Damage to property;
  - e. An effect on the efficient operation of a stormwater or land drainage system;
  - f. Damage to any facet of a stormwater or land drainage system;
  - g. Erosion or subsidence of land;
  - h. Long or short term adverse effects on the environment; or
  - i. Adverse loss of riparian vegetation; or
  - j. Wastewater overflow to land or water; or
  - k. Anything that causes a breach of any stormwater discharge consent condition binding Council.
- xxvi. **“Offence”** includes any act or omission in relation to this bylaw or any part thereof for which any person can be prosecuted.
- xxvii. **“Owner/occupier”** means any persons acting in general management or control of the land, or any plant or machinery on that land.
- xxviii. **“Overland flow path”** means any secondary flow path that is:
- a. illustrated in a catchment management plan or on any Council drainage plan or record; or
  - b. the overland route taken by any concentration of, or significant sheet flow of stormwater or land drainage water on its way to a flood plain, stormwater system, land drainage system or watercourse.
- xxix. **“Person”** includes an individual person (corporation sole) and also a body of persons, whether corporate, incorporate or non-corporate.
- xxx. **“Point of connection”** means the point on the Council system that marks the boundary of responsibility between the customer and the Council, at which the customer(s) private system connects to and discharges stormwater or land drainage water into the Council system.
- xxxi. **“Pollution Prevention Plan”** means a plan which identifies actual or potential pollution risks relating to the discharge of contaminants from a specific site or operation, and the management strategies implemented or proposed to mitigate these risks.
- xxxii. **“Premises”** means either:
- a. A property or allotment which is held under a separate certificate of title or for which a separate certificate of title may be issued and in respect to which a building consent has been or may be issued, or
  - b. A building that has been defined as an individual unit by a cross-lease, unit title or company lease and for which a certificate of title is available, or
  - c. Land held in public ownership (e.g. reserve) for a particular purpose.
  - d. Individual units in a building which are separately occupied and/or leased.
- xxxiii. **“Private system”** means any land drainage system or stormwater system that drains water from a privately owned premises to a receiving environment or up to the point of connection with a Council system. For the purposes of the bylaw, drains that are managed by the New Zealand Transport Agency, KiwiRail or Environment Canterbury are deemed to be part of a private system.
- xxxiv. **“Receiving environment”** means any surface water body, land, groundwater or coastal marine area into which stormwater or land drainage water is conveyed.
- xxxv. **“Site discharge”** means a discharge from any site into a Council stormwater system.

- xxxvi. **“Site-Specific Stormwater Management Plan”** means a site-specific plan for high-risk sites that details the management and treatment of stormwater on site. See section 10 of the Bylaw.
  - xxxvii. **“Stop bank”** means an embankment to prevent flooding.
  - xxxviii. **“Stormwater”** means runoff that has been channelled, diverted, intensified or accelerated by human modification of the land surface or rainfall runoff from the external surface of any structure as a result of precipitation, and excludes land drainage water, which is separately defined.
  - xxxix. **“Stormwater system”** means the system provided by the Council or private property owner/occupier for the management of stormwater runoff, which includes any combination of open channels, drains, underground pipes and basins, ponds, wetlands, kerb, channel and swales up to and including the point of discharge, but excluding the receiving environment.
  - xl. **“Stormwater Management Plan”** is a plan to improve the management of water quality and water quantity in a defined area.
  - xli. **“The Act”** means the *Local Government Act 2002* and its amendments.
  - xlii. **“Watercourse”** means every open river, stream, creek, floodway, culvert, channel and open drain through which stormwater or land drainage water commonly flows, whether continuously or not, and which may be either managed by the Council or privately managed.
  - xliii. **“WDC”** means the Waimakariri District Council.
- b. Terms and expressions defined in the Act shall, when used in this bylaw, have the same meanings as those in the Act, unless they are alternatively defined in this bylaw.
  - c. If any requirement in relation to any person or activity specified in this bylaw differs from a requirement in any other legislation, regulation, consent condition, standard or Regional or District Plan provision then the more stringent requirement shall apply.

## **PART 1: ACCEPTANCE, DESIGN AND CONNECTIONS**

### **5 ACCEPTANCE OF STORMWATER AND LAND DRAINAGE WATER**

- 5.1 Every person seeking a new or altered connection to a Council system shall be entitled to have the stormwater or land drainage water from the premises accepted by the Council subject to:
  - a. The premises being located within a drainage rated area (designated in accordance with the *Local Government Act 2002*) which is serviced by a Council stormwater or land drainage system;
  - b. The owner of the premises has prior written approval from the Council for the new or altered connection(s), with such approvals assessed subject to requirements of Sections 5.1 and 6.1 of this bylaw;
  - c. There being sufficient capacity within the Council system to accommodate the additional new or altered connection(s);
  - d. The additional new or altered connection(s) must be at least cost neutral to the existing scheme members and annual rates generated from the additional connection(s) must be sufficient to cover the life cycle costs of the new assets and the variable costs of the service;
  - e. Fulfillment of the requirements of this bylaw, including obtaining any relevant consent, implementing any pollution prevention plan that the customer is required

to obtain, and meeting all requirements of the *Resource Management Act 1991*, *Building Act 2004* or any other acts or regulations;

- f. Payment of the appropriate fees and charges applicable to the connection(s).

*Explanatory Note: A premises within a drainage rated area will either have a direct connection to a council system, or will have a private system that discharges to a council system within the drainage rated area. The customer is required to maintain the private system prior to the point of connection to the Council system.*

*In the areas outside of drainage rated areas, the principles of natural servitude apply and stormwater and land drainage water that discharge to a private system or receiving environment are subject to the applicable clauses within section 17 and to the Building Code.*

*An altered connection refers to an increase in the quantity of, or contaminant loading within, stormwater being discharged from the site.*

5.2 If an application to connect to a Council system does not meet the requirements of clauses 5.1 (c), (d) or (e) then the Council may:

- a. Require an upgrade to the system at the cost to the customer(s); or
- b. Require that an alternative stormwater or land drainage system is provided within the premises in accordance with section 6; or
- c. Decline the application and advise the customer(s) of the reason(s) why the application was declined.

## **6 DESIGN**

- 6.1 Any proposed new stormwater or land drainage system and any proposed alteration to any existing system must be designed, constructed and operated in accordance with:
- a. Council's Engineering Code of Practice;
  - b. Any relevant Catchment Management Plan prepared by Environment Canterbury or Waimakariri District Council;
  - c. Any relevant Stormwater Management Plan prepared and approved by the Waimakariri District Council;
  - d. The Waimakariri District Plan;
  - e. The Canterbury Land and Water Regional Plan;
  - f. The Regional Coastal Environment Plan for the Canterbury Region;
  - g. The Environment Canterbury Erosion and Sediment Control Toolbox for Canterbury;
  - h. Any approved pollution prevention plan that has been provided in accordance with Section 9 or section 10;
  - i. Any resource, building or other consents relevant to the proposed works including use of best management practices within the site that are necessary to meet consent conditions and environmental standards and limits;
  - j. Any written conditions imposed by Council when approving the works;
  - k. Waimakariri District Council standard construction specifications.
- 6.2 As-built plans showing details of all new or altered systems must be provided to Council within the timeframe specified in Council's written approval or Engineering Code of Practice.
- 6.3 For existing sites being redeveloped, Council may require retrofit stormwater mitigation and/or implementation of site-specific management plans or practices to treat and/or retain stormwater runoff from all or some part of existing impervious areas, in order for Council to comply with consent conditions which control the quality or quantity of discharges from any Council system into the receiving environment. This may include a requirement to treat as much of the first flush as reasonably practicable within the site and/or take any other action required by the Council to minimise any discharge of contaminants from the activity or property.
- 6.4 The Council may specify areas in the District, or may impose controls on any premises, whereby stormwater disposal must be undertaken by ground soakage, unless site conditions prevent it.

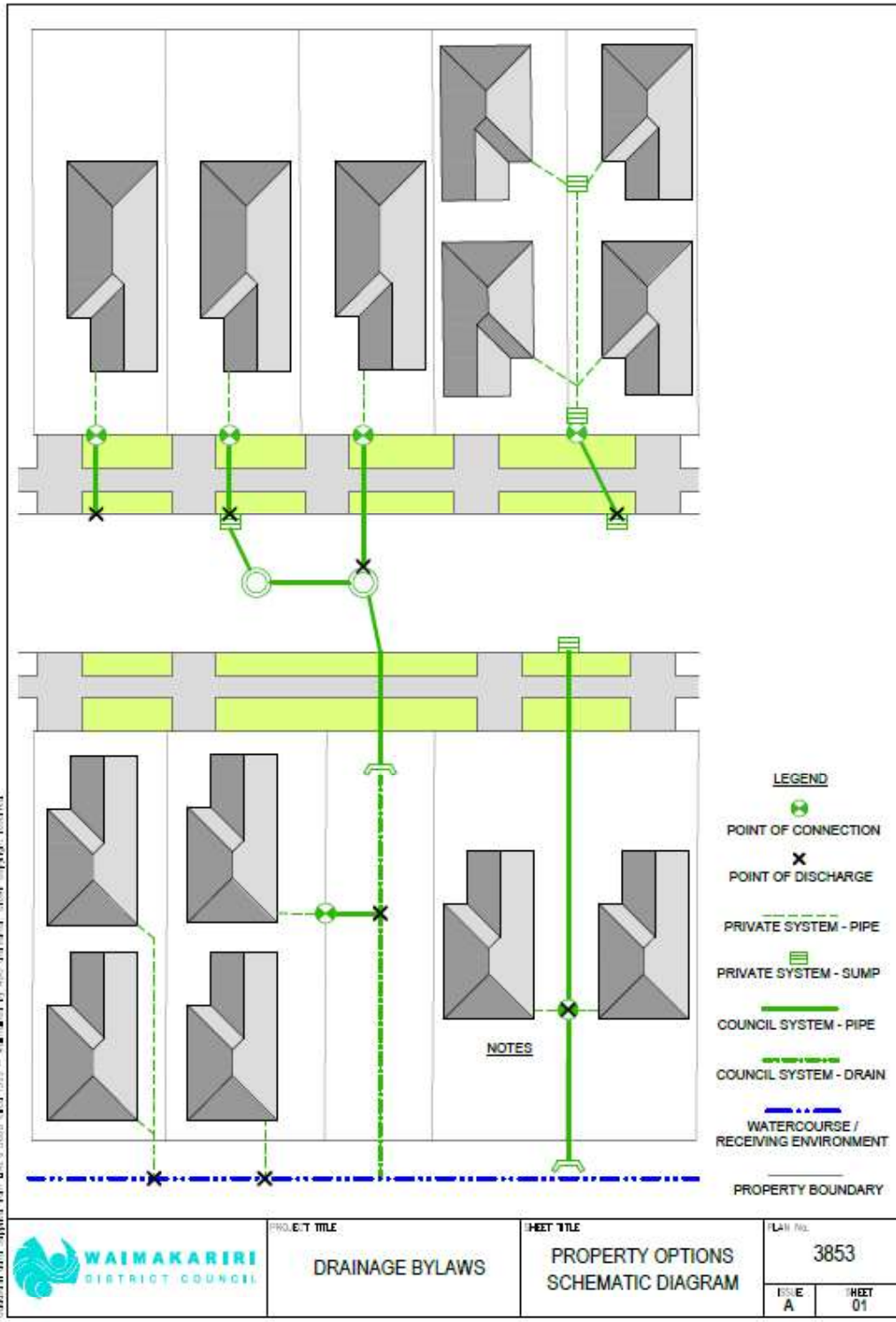
## **7 POINT OF CONNECTION**

- 7.1 The point of connection to the Council's system is shown in Figure 1. There may be only one point of connection for each premises unless prior written agreement is provided by the Council.
- 7.2 The Council is responsible for the maintenance and all repairs to the Council system, including any pipe and fittings up to the point of connection, except:
- a. The customer is responsible for clearing of blockages or repairing damage from trees on the customer's own property, up to the point of discharge.
- 7.3 The customer is responsible for the maintenance and all repairs to the private stormwater or private land drainage system within the customer's property and on the

customer's side of the point of discharge. Except where the private system is within public land, the following applies:

- a. The Council is responsible for any damage to the system caused by a Council contractor or a Council asset (such as a street tree).

**Figure 1: Stormwater Drainage Point of Connection Examples**



## PART 2: MANAGEMENT OF CONTAMINANTS

### 8 DISCHARGE OF CONTAMINANTS

- 8.1 No person or premises may discharge directly or indirectly a contaminant into a Council system, including by way of private system to a Council system, if the discharge is likely to cause nuisance or adversely affect the operation of the system or receiving environment, including having an adverse effect on aquatic life, unless the discharge is approved by the Council or is expressly authorised by an operative resource consent.

*Explanatory note: Contaminants as defined in Section 4 of this bylaw include (but are not limited to) sediment, concrete, cement slurry, sewage, effluent, solvents, paint, oil, hydrocarbons, soap, detergents, dissolved metal, hazardous material, fungicide, herbicide, insecticide, litter and green waste.*

- 8.2 The Council may require premises that do not comply with clause 8.1 to implement the following controls, which, where required, shall be provided at the expense of that customer:
- a. The modification of the premises to reduce or avoid the discharge of the contaminant;
  - b. The installation and use of treatment and mitigation measures or devices;
  - c. The proactive maintenance of the private system, including the provision of and compliance with a Site-Specific Stormwater Management Plan approved by Council.
- 8.3 Any owner, occupier or person who is present on a premises subject to a control made under clause 8.2 must comply with that control, and which, where required shall be provided at the expense of that customer.

## PART 2A: OPERATING PHASE DISCHARGES

### 9 MEDIUM-RISK ACTIVITIES / SITES

- 9.1 The owner/occupier undertaking any new medium-risk activity on any site as defined in Schedule 1 that connects to a Council system shall prepare and implement a Pollution Prevention Plan. This plan shall be provided to the Council upon request. The Council may audit the site and Pollution Prevention Plan at any time.
- 9.2 The owner/occupier undertaking any existing medium-risk activity on any site as defined in Schedule 1 and that connects to a Council system shall, if requested by the Council, prepare and implement a Pollution Prevention Plan. This plan shall be prepared and implemented on site no later than six months after being requested by the Council, or such later date as agreed with Council. The Council may audit the site and Pollution Prevention Plan at any time.
- 9.3 The Pollution Prevention Plan if required under 9.1 or 9.2 above shall be prepared with reference to the information set out on the Council website <https://www.waimakariri.govt.nz/services/3-waters/stormwater-and-drainage/> specified for "Pollution Prevention Plan Requirements".

- 9.4 Records of evidence of ongoing compliance with any Pollution Prevention Plan shall be retained on the site by the owner/occupier and shall be provided to the Council upon request.
- 9.5 Any Pollution Prevention Plan prepared pursuant to this section shall be reviewed and updated by the owner/occupier or operator of the activity to which the plan relates when there have been significant changes to an activity and / or to any structural or procedural controls on site. The review shall identify any changes to the matters covered in clause 9.3, and with a timeframe of action. The Council may undertake an audit of a Pollution Prevention Plan and include further terms and conditions within the revised Pollution Prevention Plan to ensure the activity is being undertaken in accordance with clauses 9.3 and 8.1.
- 9.6 A medium-risk site owner or occupier that has an approved connection to the reticulated stormwater system and whom stores or uses hazardous substances on the property, shall retain a spill kit onsite, or have spill mitigation measures in place, that are capable of absorbing or capturing and containing the quantity of hazardous substances that may be stored on site at any one time.

*Explanatory note – For further information on preparing a site-specific spill prevention and spill response plan and spill mitigation measures required on site including bunding requirements for hazardous substances storage, please refer to <https://www.waimakariri.govt.nz/services/3-waters/stormwater-and-drainage/> to view applicable fact sheets, guidelines and standards.*

## **10 HIGH-RISK ACTIVITIES / SITES**

- 10.1 For high-risk sites a written approval for discharge will be required. This may include a requirement for a site-specific stormwater treatment system which shall be installed on the site to manage and treat stormwater discharge from the site prior to discharge into the Council stormwater system for any contaminants identified within the site. This treatment system, when required, shall be designed in accordance with Section 6 and Section 8 of this Bylaw and must be approved by the Council and fully implemented within the timeline required by the Council.
- 10.2 The owner/occupier undertaking any new high-risk activity on any site as defined in Schedule 1 that connects to a Council system shall prepare and implement a Site-Specific Stormwater Management Plan that includes a Pollution Prevention Plan. This plan shall be submitted to and approved by the Council and fully implemented prior to connecting into the Council system.
- 10.3 The owner/occupier undertaking any existing high-risk activity on any site as defined in Schedule 1 and that connects to a Council system shall, if requested by the Council, prepare a Site-Specific Stormwater Management Plan that includes a Pollution Prevention Plan. This plan shall be submitted for Council approval no later than six months after being requested by the Council, or such later date as agreed with Council. The plan shall be fully implemented within six months of being approved by the Council.
- 10.4 The Site-Specific Stormwater Management Plan shall include the information set out on the Council website <https://www.waimakariri.govt.nz/services/3-waters/stormwater-and-drainage/> specified for “Pollution Prevention Plan Requirements” and the following additional information:

- a. Identification of the environmentally hazardous substances associated with the industrial or trade activity and any other contaminants arising from the site and the methods to be used to avoid discharges of environmentally hazardous substances or other contaminants from the site onto or into land or water;
  - b. A site layout drawing showing boundaries, the location of any onsite hazardous substances, any onsite or adjacent environmental receptors such as streams, drains or rivers, private stormwater and drainage systems including point of connection to the Council system;
  - c. The purpose of; and design specifications for any site-specific stormwater treatment system that will manage and treat stormwater discharge from the site into the Council stormwater system and identify why the selected system is the best solution for the management of discharges from the site;
  - d. A description of the maintenance procedures in place for the stormwater treatment system, the maintenance schedule and who is responsible for ensuring maintenance is carried out;
  - e. A description of training and awareness for employees on the purpose and implementation of the Site-Specific Stormwater Management Plan.
  - f. An assessment method to report on the effectiveness of the Site-Specific Stormwater Management Plan being implemented.
- 10.5 Records of evidence of ongoing compliance with any Site-Specific Stormwater Management Plan shall be retained on the site by the owner/occupier and shall be provided to the Council upon request.
- 10.6 Any Site-Specific Stormwater Management Plan prepared pursuant to this section shall be reviewed by the owner/occupier or operator of the activity to which the plan relates, at five yearly intervals after implementation. The review shall identify any changes to the matters covered in clause 10.4, and with a timeframe of action. The reviewed plan shall be forwarded to the Council for approval, upon request. The Council may include further terms and conditions within the revised plan to ensure the activity is being undertaken in accordance with clauses 10.4 and 8.1. Once approved, the plan shall become binding.
- 10.7 Notwithstanding clause 10.6, the Council may require that any Site-Specific Stormwater Management Plan shall be revised where there have been significant changes to an activity, procedural and or structural controls, hazardous substances use and or storage, or failure to meet any requirement of clause 8.1.
- 10.8 A high-risk site owner or occupier that has an approved connection to the reticulated stormwater system and whom stores or uses hazardous substances on the property, shall retain a spill kit onsite, or have spill mitigation measures in place, that are capable of absorbing or capturing and containing the quantity of hazardous substances that may be stored on site at any one time.

*Explanatory note – For further information on preparing a site-specific spill prevention and spill response plan and spill mitigation measures required on site including bunding requirements for hazardous substances storage, please refer to <https://www.waimakariri.govt.nz/services/3-waters/stormwater-and-drainage/> to view applicable fact sheets, guidelines and standards.*



## PART 2B: CONSTRUCTION PHASE DISCHARGES

### 11 CONSTRUCTION ACTIVITIES

- 11.1 An Erosion and Sediment Control Plan must be prepared and implemented by the owner/occupier of any premises where construction activities are occurring where there is a discharge, either directly or indirectly, into any Council system. This plan shall be fully implemented prior to discharging into the Council system and shall be submitted to the Council on request.
- 11.2 The Erosion and Sediment Control Plan required under clause 11.1 must be prepared and implemented in accordance with the current version of the Environment Canterbury Erosion and Sediment Control Toolbox for Canterbury.
- 11.3 Any site or customer that discharges into a Council system must comply with the environmental standards, limits and other requirements set out in Schedule 2.
- 11.4 The owner/occupier undertaking a construction activity on any site which would discharge stormwater into any Council system, where that construction is on:
- a) any site where an activity listed in the Canterbury Land and Water Regional Plan Schedule 3 “Hazardous Industries and Activities List” is occurring or has historically occurred; and/or
  - b) Any site on the Environment Canterbury Listed Land Use Register; and/or
  - c) Any new development site, or re-development of an existing site, that is not permitted under the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011;

shall have the risk associated with the proposed stormwater discharge assessed in accordance with the “Memorandum of Understanding Between Waimakariri District Council and Environment Canterbury: Stormwater Discharge Approvals on Contaminated Land” and the “Assessment Criteria for HAIL Sites” (refer <https://www.waimakariri.govt.nz/services/3-waters/stormwater-and-drainage/>).

Following the assessment of risk, the owner/occupier shall meet any requirements specified by the Council for a discharge that is approved into the reticulated stormwater network, or, if requested by the Council, shall apply for and obtain a resource consent from Environment Canterbury for the discharge.

*Explanatory note: Construction phase discharges referred to in clause 11.4 refer to construction activities on sites where there may be potentially contaminated land on all or part of the site that is discharging construction phase stormwater into the Council system. Sites are considered to be potentially contaminated if contaminants in or on the site are above background concentrations (see Canterbury Land and Water Regional Plan Schedule 3 and “potentially contaminated” definition).*

*The Council may require the site owner/occupier to verify the risks posed by discharges from potentially contaminated sites by requiring them to arrange investigations in accordance with the “Contaminated Land Management Guidelines No. 1: Reporting on Contaminated Sites in New Zealand (Revised 2021)” and the “Contaminated Land Management Guidelines No.5: Site Investigation and Analysis of Soils (Revised 2021)” published by the Ministry for the Environment. These investigations, when required by the Council, shall be arranged and funded by the*

*owner/occupier and must be undertaken and reported by a SQEP for contaminated land.*

*It is noted that Schedule 1 of the bylaw (defining sites as either high-risk or medium-risk) does not directly apply to assessment of risk posed by sites generating construction phase discharges.*

## **PART 2C: SITES WITH UNACCEPTABLE RISK**

### **12 UNACCEPTABLE RISK FROM ACTIVITIES / SITES**

12.1 The Council may determine that the discharge from a site poses an unacceptable level of risk to the receiving environment when:

- a) The site or activity does not comply with its approved Site-Specific Stormwater Management Plan and/or Pollution Prevention Plan;
- b) The site or activity does not comply with its approved Erosion and Sediment Control Plan;
- c) The site causes a nuisance, adversely affects the stormwater system or adversely affects aquatic life;
- d) The site previously had an existing consent with Environment Canterbury and the conditions for this consent were not met or any applicable environmental standards or limits were exceeded, and / or the site did not receive a compliance grading from Environment Canterbury within 12 months prior to its expiry date;

in which case the Council may cease authorising the discharge from that connection into the Council system and require the site owner/occupier to obtain a resource consent from Environment Canterbury for the discharge into the Council system.

12.2 Any owner/occupier whom is required to obtain a resource consent from Environment Canterbury under clause 12.1 shall comply with all requirements of that consent and all requirements of this bylaw.

## **PART 3: PROTECTION OF SYSTEMS AND WATERCOURSES**

### **13 ACTIVITIES REQUIRING APPROVAL**

13.1 Approval in writing must be obtained from the Council before any of the following occur:

- 13.1.1 Any works on a Council system or a watercourse managed by the Council;
- 13.1.2 Any modification to a bank structure, including widening, deepening, damming, diverting or planting or removing any vegetation from any part of a Council system or from the banks of any watercourse managed by the Council, including use of herbicide in such a way as to impede the flow of water or destabilise the bank structure; or
- 13.1.3 The erection of a structure, or placement of any material or planting of any vegetation (e.g. tree or hedge) where these impede access by machinery or apparatus used to clean, maintain or improve any part of a proposed or existing Council system; or

13.1.4 The erection of any new vehicle or stock crossing over a watercourse managed by the Council.

13.2 The following activities are forbidden:

13.2.1 Any alteration, interference with or obstruction of any Council system;

13.2.2 Allowing any stock or vehicles to do anything that damages or is likely to cause damage to any Council system or watercourse managed by the Council.

#### **14 WORKS IN PROXIMITY TO SYSTEMS**

14.1 Any person who proposes to undertake any works or activities that may result in damage to any part of a Council system, including excavation works, must obtain Council's approval before beginning such works.

14.2 The person undertaking the works or activities is responsible for locating any buried services.

14.3 Any person who damages or causes disruption to any Council system is liable for the full costs of any repairs and associated costs incurred as a result of the damage or disruption. Any possible damage or disruption to any Council system must be reported to the Council immediately.

14.4 Following any works in proximity to a Council system, bedding and backfill must be reinstated in accordance with the Engineering Code of Practice.

### **PART 4: ACCESS, MAINTENANCE AND MONITORING**

#### **15 SYSTEM ACCESS**

15.1 An owner/occupier shall allow Council access to and about all facets of all Council systems for the purposes of monitoring, testing and maintenance in accordance with Sections 171-173 and 182 of the Local Government Act 2002 (or other such notice as otherwise arranged with any owner/occupier).

15.2 In emergency conditions, or for the purpose of ascertaining whether a stormwater or land drainage system is being misused or this bylaw is not being complied with, an owner/occupier shall allow Council access to and about all facets of the system in accordance with sections 171-173 and 182 of the Local Government Act 2002.

#### **16 WATER QUALITY MONITORING**

16.1 Council may independently monitor, sample and analyse discharged stormwater or land drainage water and recover costs from the property owner/occupier, where failure to comply with any Site-Specific Stormwater Management Plan and/or Pollution Prevention Plan or Erosion and Sediment Control Plan relating to the property is evident.

16.2 Where it is suspected that any discharge within the District is in breach of any part of sections 8 to 12, the Council may independently monitor, sample and analyse discharged stormwater or land drainage water, and where an offence is proven, may recover the costs of investigating, sampling and analysing the discharge, from the property owner/occupier.

## **PART 5: PRIVATE SYSTEMS**

### **17 PRIVATE SYSTEM MAINTENANCE**

- 17.1 All private systems must be designed, constructed, managed and maintained by the owner/occupier, at the owner/occupier's expense or by some other arrangement acceptable to the Council.
- 17.2 The owner/occupier of a private system must ensure that it is maintained in good operating condition and does not cause or contribute to nuisance.
- 17.3 The owner/occupier of a premises on which there is a watercourse, stop bank, overland flow path or flood plain must maintain that watercourse, stop bank, overland flow path or flood plain in an operational state which does not cause or contribute to nuisance.

*Explanatory note – the alteration or construction of works on a watercourse, overland flow path, flood plain or stop bank may require a consent from Environment Canterbury in accordance with the Canterbury Land and Water Regional Plan. Activities within the beds of lakes and rivers may be subject to rules in regional plans in accordance with Section 13 of the Resource Management Act 1991.*

## **PART 6: OFFENCES, PENALTIES AND ENFORCEMENT**

### **18 OFFENCES**

- 18.1 Every person who breaches this bylaw commits an offence and is liable on summary conviction to a fine not exceeding \$20,000.00 as set out in section 242 of the Local Government Act 2002.

### **19 FEES AND CHARGES**

- 19.1 The Council may in accordance with the Local Government Act 1974 and Local Government Act 2002 set charges or fees to recover the cost of any of the following:
- a. Processing the assessment of Site-Specific Stormwater Management Plans and / or Pollution Prevention Plans, their review, approvals and monitoring of compliance with the plans;
  - b. Processing the assessment of any other approval, consent, plan, or any other monitoring, investigation, sampling or analysis charge that is required under any part of this bylaw;
  - c. Processing the assessment, approval or monitoring of any Erosion and Sediment Control Plan or any other approval required under this bylaw.

### **20 REMEDIES**

- 20.1 In the event of a breach of statutory or other legal requirements including this bylaw, the Council may serve notice on the owner/occupier advising the nature of the breach and the steps to be taken within a specified period to remedy it. If after the specified period, the owner/occupier has not remedied the breach, the Council may charge a re-inspection fee.
- 20.2 At any time after the specified period in 20.1 has elapsed, the Council may carry out any remedial work required in order to make good the breach, and recover from the

owner/occupier all reasonable costs incurred in connection or associated with the remedial work together with any resulting damages.

- 20.3 If however the breach is such that public health or safety considerations or nuisance, or risk of consequential damage to council assets is such that delay would create or be likely to create unacceptable results, the Council may take immediate action to rectify the defect, and recover all reasonable costs and damages from the owner/occupier.

**SCHEDULE 1 – MEDIUM-RISK AND HIGH-RISK ACTIVITIES AND SITES (OPERATING PHASE DISCHARGES)**

**A) High-Risk** activities and sites include sites where an activity is occurring that is described in the current version of the Canterbury Land and Water Regional Plan Schedule 3 “*Hazardous Industries and Activities List*”, unless any such activity or site is specifically identified as “medium-risk” in Schedule 1B of this bylaw.

**B) Medium-Risk** activities and sites include any of the following:

- i. Aggregate and material storage/stockpiled yards,
- ii. Commercial analytical laboratory sites,
- iii. Construction and maintenance depots (that exclude areas used for refueling or bulk storage of hazardous substances),
- iv. Demolition yards that exclude hazardous wastes,
- v. Dry cleaning premises,
- vi. Engineering workshops with metal fabrication,
- vii. Engine reconditioning workshops,
- viii. Food and beverage manufacturers,
- ix. Motor vehicle workshops,
- x. Any other activity or premises that has failed to meet the requirements of Section 8, including wash down areas, unless that activity or site is otherwise defined as a “high-risk” in Schedule 1(A).

**C) Change to a Risk Classification**

Any site in Schedule 1(B) that the Council deems to be operating in a manner that is non-compliant with Section 8 or Section 9 of this Bylaw may be re-classified by the Council as a “high-risk” site under Schedule 1 (A) above.

**SCHEDULE 2 – REQUIREMENTS FOR CONSTRUCTION PHASE DISCHARGES**

- A) Any site or customer that discharges into a Council system must comply with the following requirements.
- i) The site discharge shall contain no greater than 50g/m<sup>3</sup> of total suspended solids; and;
  - ii) The site discharge into the Council system shall be no greater than 50 NTU, measured by turbidity meter; or
  - iii) The site discharge shall be no greater than 5 NTU above the NTU measured in the receiving environment, when the receiving environment NTU in the receiving watercourse is equal to or less than 50 NTU, measured by turbidity meter; or
  - iv) The site discharge shall not cause a turbidity increase that is greater than 10% in the receiving environment, when the receiving watercourse NTU is greater than 50 NTU, measured by turbidity meter.
- B) Measurements undertaken under SCHEDULE 2 (A) (iii), or (iv) may allow for a mixing zone for measurements required in the receiving environment and the measurement timing intervals and locations must be undertaken as directed by the Council.



**STATEMENT OF PROPOSAL TO REVOKE THE WAIMAKARIRI DISTRICT COUNCIL  
STORMWATER DRAINAGE AND WATERCOURSE PROTECTION BYLAW 2018 AND CREATE THE  
STORMWATER DRAINAGE AND WATERCOURSE PROTECTION BYLAW 2024**

### **Introduction**

This Statement of Proposal is prepared for the proposed *Waimakariri District Council Stormwater Drainage and Watercourse Protection Bylaw 2024*, and is made under sections 83, 86, 145, 146 and 156 of the *Local Government Act 2002* (the Act).

The documents relating to this proposal are attached to this Statement of Proposal. Copies of the Statement of Proposal are also available on the Council's website at [waimakariri.govt.nz](http://waimakariri.govt.nz) and at all Council Service Centres and district libraries during the consultation period which runs from 20 June to 29 July 2024.

Consultation will include notification of a number of affected organisations, public notices in local newspapers and information about the review on the Council's website.

Any questions can be referred to Janet Fraser on 0800 965 468.

You can forward your submissions to the Council at:

Stormwater Drainage and Watercourse Protection Bylaw Submissions  
Waimakariri District Council  
Private Bag 1005  
Rangiora 7440

Attention: Janet Fraser, Infrastructure Planner

Or email them to: [records@wmk.govt.nz](mailto:records@wmk.govt.nz).

We need to receive your submission no later than **Monday 29 July 2024**.

All submitters have the opportunity to present their views to the hearing panel of Councillors in person. The likely hearing date is Wednesday 25 September 2024 (to be confirmed).

### **Nature of Proposal**

The Council proposes to revoke the current *Stormwater Drainage and Watercourse Protection Bylaw 2018* and replace it with an amended bylaw called the *Stormwater Drainage and Watercourse Protection Bylaw 2024*. As part of this bylaw making process the Council invites members of the public to comment on the draft 2024 amended bylaw.

The proposal to make this bylaw is made under the provisions of the *Local Government Act 2002*:

Section 145 – “A territorial authority may make bylaws for its district for 1 or more of the following purposes:

- a) *protecting the public from nuisance:*



- b) *protecting, promoting, and maintaining public health and safety:*
- c) *minimising the potential for offensive behaviour in public places.”*

Section 146 - *“Without limiting section 145, a territorial authority may make bylaws for its district for the purposes-*

- b) *of managing, regulating against, or protecting from, damage, misuse, or loss, or for preventing the use of, the land, structures, or infrastructure associated with 1 or more of the following:*

- (iii) *wastewater, drainage, and sanitation:*

- (iv) *land drainage:*

The *Stormwater Drainage and Watercourse Protection Bylaw 2018* and earlier *Stormwater Bylaw 2011* were prepared to provide a mechanism to control the discharge of contaminants into public drains. The bylaw was developed to ensure that the Council could maintain the aquatic health of its drains and meet the appropriate standards relating to its discharges from communal stormwater systems.

The original 2011 bylaw included provisions for managing discharges of contaminants into drains and managing discharge of sediment into the stormwater systems from construction activities. It also introduced the use of Pollution Prevention Plans within the Southbrook Outline Development Plan area for medium-risk activities. The 2018 version covered more operating situations which are encountered by the Council in managing its systems and offered more protection against damage to the receiving environment. For example, the revised 2018 version extended Pollution Prevention Plan requirements throughout the whole district to better address the quality of discharges into the networks from medium-risk activities / sites.

The above provisions of the bylaw are consistent with the purpose of the *Resource Management Act 1991* in terms of seeking to maintain and enhance the quality of the environment by reducing discharges of harmful contaminants into the receiving environment.

The discharge of contaminants into the environment will continue to be reduced or prevented by the implementation of the 2024 version. The 2024 review proposes to extend coverage of the bylaw to manage discharges into the Council stormwater networks from high-risk sites.

It also includes updated provisions to enable the Council to provide sufficient direction to the community in order to implement the stormwater network discharge consents which it has been required to obtain under the Canterbury Land and Water Regional Plan (CLWRP). These consents form part of the local approach to progressing the objectives and policies of the National Policy Statement for Freshwater Management (NPSFM) 2020.

As with previous versions, the 2024 bylaw version also controls activities which interfere with Council systems and requires maintenance of privately managed flood protection infrastructure. It seeks to reduce common issues such as vehicle or stock damage to watercourses or excess spraying that damages open drains.

The bylaw is also intended to address some of the effects of managing private stormwater or land drainage systems. This is so that the bylaw can support the role of the Council in resolving situations where the actions of one party affect other properties and downstream Council systems or the receiving environment.

### **Reasons for this Proposal**

Under section 158 of The Act, the Council is required to review its bylaws at five and then ten yearly intervals. The 10 year review timeframe for the WDC Stormwater Drainage and Watercourse Protection Bylaw 2018 is 1 May 2028. Under section 160A, a bylaw remains in force for a further two years from that date, at which point it lapses. This review is being completed in advance of the required timeline as the Bylaw provisions currently do not enable the Council to meet requirements of the CLWRP to manage the quality and quantity of all stormwater discharges from its networks by 1 January 2025.

Section 156 of The Act requires a Council to consult the public using a special consultative procedure if (1) (ii) *“the local authority considers that there is, or is likely to be, a significant impact on the public due to the proposed bylaw or changes to the bylaw”*.

The proposed revised 2024 bylaw is significantly changed in content and provisions from the previous 2018 version. The Bylaw is being amended so that it will most effectively support the Council to control all stormwater discharges from the stormwater networks and ensure that all discharges meet environmental standards which now apply in the receiving environment. The Council has therefore decided to use the special consultative procedure to provide opportunity for public input.

The reason for developing this bylaw is to avoid nuisance from operating stormwater and land drainage systems, protect Council infrastructure, public health and safety and the quality of the environment. The provisions of the 2018 bylaw have been expanded in the 2024 version to include a wider range of requirements. These will enable the Council to better respond to issues arising whilst it is managing the quality and quantity of all stormwater discharges from its reticulated networks and resolving common operating issues. The changes are summarised in the “Proposed Changes” section of this Statement, below.

### **Section 155 Report**

The Council is required to determine whether a bylaw is the most appropriate way of addressing the perceived problem, and if so, whether the proposed bylaw is the most appropriate form of bylaw and whether it gives rise to any implications under the *New Zealand Bill of Rights Act 1990*.

#### **Determination of whether the Bylaw is appropriate**

The Council considers a bylaw to still be the most appropriate mechanism for controlling nuisance and protecting public health and safety resulting from the discharge of stormwater or land drainage water, and other associated matters, for the following reasons:

- The bylaw provides an administratively simple way of specifying the rules and conditions to be met by each activity or person generating a stormwater or land drainage discharge
- A bylaw will help to ensure the health and safety of the public, Council contractors and employees, through preventing or reducing the discharge of contaminants, preventing interference with Council systems and requiring suitable maintenance of private systems
- It means the Council can make the public aware of the requirements by publishing its bylaw and providing enforcement in circumstances where a customer does not voluntarily agree to meet the requirements
- The bylaw provides an open and transparent process for the community to provide input into the preparation and adoption of the rules that will be applied
- The bylaw means the Council does not have to solely rely on the cooperation of the customer to ensure either: (a) the acceptable quality of stormwater and land drainage discharges into its systems; or (b) that it can avoid adverse effects of flood flows that may result from inappropriate private activities. This is because the bylaw sets out the conditions and rules that will apply in each of these circumstances, with enforcement as an option if necessary
- The bylaw provides the Council with a specific and focused method of enforcement in terms of managing activities in a way that will improve the quality of discharges into and from its systems
- Despite the need for a formal process, bylaws can be amended relatively easily to meet changing circumstances in the future

## Form of the Bylaw

The form of the 2018 bylaw needs to be amended as it is no longer appropriate or effective in addressing all of the circumstances and requirements of managing the stormwater drainage activity.

The 2018 version does not address all of the responsibilities of the Council in managing its systems or control all types of discharges into the systems. The bylaw is proposed to be updated to control the quality and quantity of all discharges into the reticulated stormwater networks, including from high-risk sites.

The 2018 bylaw also does not enable the Council to provide sufficient direction to the community in order to implement the stormwater network discharge consents which it is required to obtain under the CLWRP. The consents will require the Council to, over time, achieve the water quality standards of the CLWRP, as they apply within the district. The bylaw will provide a key method in the district to assist the Council to achieve these water quality standards. The revised version has been further updated in anticipation of meeting current requirements of the CLWRP as far as is practicable.

The bylaw has been reviewed by Council asset managers, engineering, water quality and environmental specialist and policy staff and compared with the bylaws of other territorial authorities to ensure that all of the required controls are included.

## New Zealand Bill of Rights Act 1990

The Council must determine whether the bylaw gives rise to any implication under the *New Zealand Bill of Rights Act 1990* and that it is not inconsistent with that Act.

The Act establishes certain fundamental human rights as well as rights in relation to offences and other matters. A review by the Council of all of the relevant provisions of the Act does not give rise to any concerns.

For instance, the *New Zealand Bill of Rights Act 1990* states:

### Section 5: *Justified Limitations*

*“Subject to section 4, the rights and freedoms contained in this Bill of Rights may be subject only to such reasonable limits prescribed by law as can be demonstrably justified in a free and democratic society.”*

It is believed that the bylaw is justified and reasonable as it contributes to public health and safety by reducing the risk of harmful or contaminated substances discharging into Council stormwater or land drainage systems, which may then enter the receiving environment and affect downstream properties and health of aquatic ecosystems.

It also protects against inadequate management of stormwater or drainage runoff volumes and peak flows resulting from inappropriate private activities. This includes protecting against interference with public systems and requiring maintenance of privately owned flood management infrastructure to protect wider public safety and avoid nuisance.

The bylaw will require restrictions on individual behaviour that are currently already understood and accepted by the majority of citizens because of the collective benefits they generate. Some examples of how the community will benefit from this bylaw will be in avoiding discharge of contaminants into the environment, improving quality of freshwater in local streams and rivers and protecting flood control infrastructure from interference. The bylaw will also ensure adequate private maintenance so as to reduce or avoid flood risk and damage to downstream properties.

The bylaw will be made using a democratic process including publicly notifying the proposal, receiving and hearing submissions giving all interested people an opportunity to participate, with the final decision determined by elected Councillors.

### **Options available to the Council**

The Council could either adopt the draft bylaw as proposed, further amend the bylaw following public consultation, or it could choose instead to seek to meet its objectives in undertaking the stormwater drainage activity without the use of a bylaw to regulate public and private behaviour.

Since the adoption of the 2018 Bylaw version the Council has continued to use a combination of education, guidelines and advocacy to the general public, in working towards improving the quality of the stormwater and land drainage discharges and in avoiding or reducing flood risks associated with the activity. The existence of the bylaw has enabled more insistence on compliant behaviour in cases where softer approaches have not had the desired effect.

The continued existence of a bylaw provides the appropriate legal tool to control activities of organisations and individuals that choose to dispose of waste into the stormwater system or otherwise damage infrastructure in a way that can create a risk to public health or safety.

### **Proposed Changes**

The draft bylaw that is proposed by staff is revised from the existing 2018 version. The key proposed changes shown in the revised 2024 version include:

- New Bylaw objectives recommended for inclusion by Ngai Tuahuriri
- Stormwater discharge, Site-Specific Stormwater Management Plans and Pollution Prevention Plan approvals for “high-risk” sites
- Site specific spill prevention and spill response procedures and other requirements for high-risk sites
- New controls and sampling methods to manage discharges of sediment into stormwater or waterways in accordance with the stormwater monitoring programmes (new Schedule 2)
- Reference to a risk assessment process for “high-risk” site stormwater discharges from potentially contaminated land
- Other minor changes for clarification or to align with operational practice

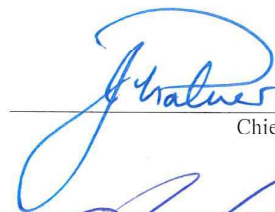
### **Related Documents**

- Proposed Waimakariri District Council Stormwater Drainage and Watercourse Protection Bylaw 2024 (TRIM 240328049939)
- Officer Report Titled “*Commence Public Consultation on Amended Stormwater Drainage and Watercourse Protection Bylaw*” (TRIM 240328049935)
- Waimakariri District Council Stormwater Drainage and Watercourse Protection Bylaw 2018 (TRIM 180504048735)
- Memorandum of Understanding Between Waimakariri District Council and Environment Canterbury Stormwater Discharge Approvals on Contaminated Land CRC184601 (TRIM 230925149963).
- Assessment Criteria for HAIL Sites from 1 January 2025– LLUR HAIL for Memorandum of Understanding Stormwater Discharge Approvals on Contaminated Land (TRIM 230412051135).
- Stormwater Drainage and Watercourse Protection Bylaw Review 2024 - Cultural Advice Report to Waimakariri District Council from Mahaanui Kurataiao Limited (TRIM 240409054566).



# STORMWATER DRAINAGE AND WATERCOURSE PROTECTION BYLAW 2018

This Stormwater Drainage and  
Watercourse Protection Bylaw 2018  
was adopted at a Council Meeting held on  
1 May 2018

  
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Chief Executive

  
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Governance Manager



WAIMAKARIRI DISTRICT COUNCIL  
STORMWATER DRAINAGE AND WATERCOURSE PROTECTION BYLAW 2018

**1 TITLE, AUTHORITY AND COMMENCEMENT**

- 1.1 This bylaw shall be known as the *Waimakariri District Council Stormwater Drainage and Watercourse Protection Bylaw 2018*.
- 1.2 This bylaw shall come into force on 14 May 2018.
- 1.3 This Bylaw supersedes and revokes the Stormwater Bylaw 2011.
- 1.4 The Council resolved to review the Stormwater Bylaw 2011 on 24 October 2017. The revised Bylaw was confirmed following a special consultative procedure by resolution at a meeting on 1 May 2018.

**2 INTRODUCTION**

- 2.1 This bylaw is made by the Waimakariri District Council in exercise of the powers and authority vested in the Council by Section 146 of the *Local Government Act 2002*.
- 2.2 This bylaw applies and operates throughout the Waimakariri District.
- 2.3 This bylaw applies to the following:
- Council stormwater systems;
  - Council managed land drainage systems or watercourses;
  - Privately managed stormwater systems, land drainage systems, watercourses, flood plains, overland flow paths or stop banks.
- 2.4 This bylaw does not derogate from the Building Act 2004, the Hazardous Substances and New Organisms Act 1996, the Health Act 1956 and the Resource Management Act 1991 and any of those Acts' subsequent amendments or applicable Regulations.

*Explanatory Note: This bylaw interacts with the Waimakariri District Council Wastewater Bylaw in seeking to reduce wastewater overflows. The Wastewater Bylaw seeks to prevent stormwater inflow into the wastewater systems by addressing defects in the wastewater reticulation, non-complying wastewater or stormwater connections and poorly designed gully traps. These steps all assist to prevent wastewater overflows that can adversely affect the receiving environment.*

*The Stormwater Drainage and Watercourse Protection Bylaw 2018 supports these provisions by requiring effective operation and maintenance of Council and private stormwater and land drainage systems and separate operation of the stormwater and wastewater systems.*

### 3 OBJECTIVES

- 3.1 The purpose of the bylaw is to provide a mechanism to assist the Council to achieve the following key objectives:
- a. Control the discharge of contaminants into any Council stormwater system or land drainage system;
  - b. Prevent the unauthorised discharge of stormwater into any Council stormwater or land drainage system;
  - c. Enable the Council to meet relevant objectives, policies and standards specified within the Canterbury Land and Water Regional Plan and any consent condition with which the Council is required to comply, which controls the quality or quantity of discharges from any Council system into the receiving environment;
  - d. To protect the land, structures and infrastructure of Council and private stormwater and land drainage systems;
  - e. To define the obligations and responsibilities of the Council, private property owners and occupiers and the public in matters related to the discharge of stormwater and land drainage water, and the management of stormwater systems and land drainage systems.

### 4 INTERPRETATION

- a. In this bylaw:
  - i. **“Approval or approved”** means approval or approved in writing by Waimakariri District Council either by resolution of Council or by a Council officer.
  - ii. **“Best practicable option”** means the best method for preventing or minimising the adverse effects of any stormwater discharge on the environment, as determined by the Council, having regard to:
    - a. the nature of the discharge or emission and the sensitivity of the receiving environment to adverse effects; and
    - b. the financial implications of an option compared with other options.
  - iii. **“Catchment Management Plan”** is a plan providing an overview of the stormwater system(s) and water quality issues within a catchment to provide a framework for future stormwater management.
  - iv. **“Connection”** means an approved discharge from a premises of stormwater into a Council stormwater system or land drainage water into a Council land drainage system that is subject to Council’s approved and applicable rates and charges.
  - v. **“Construction activities”** means any activities involving the disturbance of the surface of any land but excludes farming and forestry activities.
  - vi. **“Contaminant”** includes any substance (including gases, odorous compounds, liquids, solids, and micro-organisms) or energy (excluding noise) or heat, that either by itself or in combination with the same, similar, or other substances, energy or heat:
    - a. when discharged into water, changes, or is likely to change the physical, chemical, or biological condition of the water into which it is discharged, or
    - b. when discharged onto or into land or into air, changes or is likely to change the physical, chemical or biological condition of the land or air onto or into which it is discharged.
  - vii. **“Council”** means the Waimakariri District Council.
  - viii. **“Council system”** means a land drainage or stormwater system which is under the control of the Council.

- ix. **“Customer”** means the person discharging stormwater or land drainage water into the Council system.
- x. **“District Plan”** means the Waimakariri District Plan.
- xi. **“District”** means the Waimakariri District.
- xii. **“Environment Canterbury”** means the Canterbury Regional Council.
- xiii. **“Erosion and Sediment Control Plan”** means a plan that has been prepared in accordance with the Environment Canterbury Erosion and Sediment Control Toolbox for Canterbury.
- xiv. **“Flood plain”** means an area which is predicted to flood in a storm event.
- xv. **“Ground soakage system”** means a system that provides for stormwater to soak into the ground.
- xvi. **“High-Risk Activities”** are those activities defined as High-Risk in Schedule 1 of this Bylaw.
- xvii. **“Land drainage system”** means any combination of surface or subsurface pipes, channels, drains or canal systems that have been constructed for the primary purpose of collecting or draining water from agricultural or rural land and ancillary structures; or controlling or permanently lowering the water table; and which conveys and discharges that water to the receiving environment.
- xviii. **“Land drainage water”** means water arising from the drainage of water from the soil profile, or excess surface water from agricultural or rural land. It excludes stormwater, which is separately defined.
- xix. **“Medium-Risk Activities”** are those activities defined as Medium-Risk in Schedule 1 of this bylaw.
- xx. **“Natural servitude”** means a state where low-lying land is obliged to receive surface water which drains naturally from land situated at a higher gradient (surface water includes all naturally occurring water which results from rainfall or water flowing onto the site, including percolating water).
- xxi. **“Nuisance”** has the same meaning as Section 29 of the *Health Act 1956*, and includes a person, thing, or circumstance causing stress or annoyance or unreasonable interference. In the context of this bylaw the term nuisance includes, but is not limited to:
  - a. Danger to life;
  - b. Danger to public health;
  - c. Flooding of any building floor or sub-floor, or public roadway;
  - d. Damage to property;
  - e. An effect on the efficient operation of a stormwater or land drainage system;
  - f. Damage to any facet of a stormwater or land drainage system;
  - g. Erosion or subsidence of land;
  - h. Long or short term adverse effects on the environment; or
  - i. Adverse loss of riparian vegetation; or
  - j. Wastewater overflow to land or water; or
  - k. Anything that causes a breach of any stormwater discharge consent condition binding Council.
- xxii. **“Offence”** includes any act or omission in relation to this bylaw or any part thereof for which any person can be prosecuted.
- xxiii. **“Owner/occupier”** means any persons acting in general management or control of the land, or any plant or machinery on that land.
- xxiv. **“Overland flow path”** means any secondary flow path that is:
  - a. illustrated in a catchment management plan or on any Council drainage plan or record; or



- b. the overland route taken by any concentration of, or significant sheet flow of stormwater or land drainage water on its way to a flood plain, stormwater system, land drainage system or watercourse.
  - xxv. **“Person”** includes an individual person (corporation sole) and also a body of persons, whether corporate, incorporate or non-corporate.
  - xxvi. **“Point of connection”** means the point on the Council system that marks the boundary of responsibility between the customer and the Council, at which the customer(s) private system connects to and discharges stormwater or land drainage water into the Council system.
  - xxvii. **“Pollution Prevention Plan”** means a Council approved plan which identifies actual or potential risks relating to the discharge of contaminants from a specific site or operation, and the management strategies implemented or proposed to mitigate these risks.
  - xxviii. **“Premises”** means either:
    - a. A property or allotment which is held under a separate certificate of title or for which a separate certificate of title may be issued and in respect to which a building consent has been or may be issued, or
    - b. A building that has been defined as an individual unit by a cross-lease, unit title or company lease and for which a certificate of title is available, or
    - c. Land held in public ownership (e.g. reserve) for a particular purpose.
    - d. Individual units in a building which are separately occupied and/or leased.
  - xxix. **“Private system”** means any land drainage system or stormwater system that drains water from a privately owned premises to a receiving environment or up to the point of connection with a Council system. For the purposes of the bylaw, drains that are managed by the New Zealand Transport Agency, KiwiRail or Environment Canterbury are deemed to be part of a private system.
  - xxx. **“Receiving environment”** means any surface water body or land into which stormwater or land drainage water is conveyed.
  - xxxi. **“Stop bank”** means an embankment to prevent flooding.
  - xxxii. **“Stormwater”** means runoff that has been channelled, diverted, intensified or accelerated by human modification of the land surface or rainfall runoff from the external surface of any structure as a result of precipitation, and excludes land drainage water, which is separately defined.
  - xxxiii. **“Stormwater system”** means the system provided by the Council or private property owner/occupier for the management of stormwater runoff, which includes any combination of open channels, drains, underground pipes and basins, ponds, wetlands, kerb, channel and swales up to and including the point of discharge, but excluding the receiving environment.
  - xxxiv. **“Stormwater Management Plan”** is a plan to improve the management of water quality and water quantity in a defined area.
  - xxxv. **“The Act”** means the *Local Government Act 2002* and its amendments.
  - xxxvi. **“Watercourse”** means every open river, stream, creek, floodway, culvert, channel and open drain through which stormwater or land drainage water commonly flows, whether continuously or not, and which may be either managed by the Council or privately managed.
  - xxxvii. **“WDC”** means the Waimakariri District Council.
- b. Terms and expressions defined in the Act shall, when used in this bylaw, have the same meanings as those in the Act, unless they are alternatively defined in this bylaw.

- c. If any requirement in relation to any person or activity specified in this bylaw differs from a requirement in any other legislation, regulation, consent condition, standard or Regional or District Plan provision then the more stringent requirement shall apply.

## PART 1: ACCEPTANCE, DESIGN AND CONNECTIONS

### 5 ACCEPTANCE OF STORMWATER AND LAND DRAINAGE WATER

- 5.1 Every person seeking a new or altered connection to a Council system shall be entitled to have the stormwater or land drainage water from the premises accepted by the Council subject to:
- a. The premises being located within a drainage rated area (designated in accordance with the *Local Government Act 2002*) which is serviced by a Council stormwater or land drainage system;
  - b. The owner of the premises has prior written approval from the Council for the new or altered connection(s), with such approvals assessed subject to requirements of Sections 5.1 and 6.1 of this bylaw;
  - c. There being sufficient capacity within the Council system to accommodate the additional new or altered connection(s);
  - d. The additional new or altered connection(s) must be at least cost neutral to the existing scheme members and annual rates generated from the additional connection(s) must be sufficient to cover the life cycle costs of the new assets and the variable costs of the service;
  - e. Fulfillment of the requirements of this bylaw, including obtaining any relevant consent, implementing any pollution prevention plan that the customer is required to obtain, and meeting all requirements of the *Resource Management Act 1991*, *Building Act 2004* or any other acts or regulations;
  - f. Payment of the appropriate fees and charges applicable to the connection(s).

*Explanatory Note: A premises within a drainage rated area will either have a direct connection to a council system, or will have a private system that discharges to a council system within the drainage rated area. The customer is required to maintain the private system prior to the point of connection to the Council system.*

*In the areas outside of drainage rated areas, the principles of natural servitude apply and stormwater and land drainage water that discharge to a private system or receiving environment are subject to the applicable clauses within section 16 and to the Building Code.*

*An altered connection refers to an increase in the quantity of, or contaminant loading within, stormwater being discharged from the site.*

- 5.2 If an application to connect to a Council system does not meet the requirements of clauses 5.1 (c), (d) or (e) then the Council may:
- a. Require an upgrade to the system at the cost to the customer(s); or
  - b. Require that an alternative stormwater or land drainage system is provided within the premises in accordance with section 6; or
  - c. Decline the application and advise the customer(s) of the reason(s) why the application was declined.

## 6 DESIGN

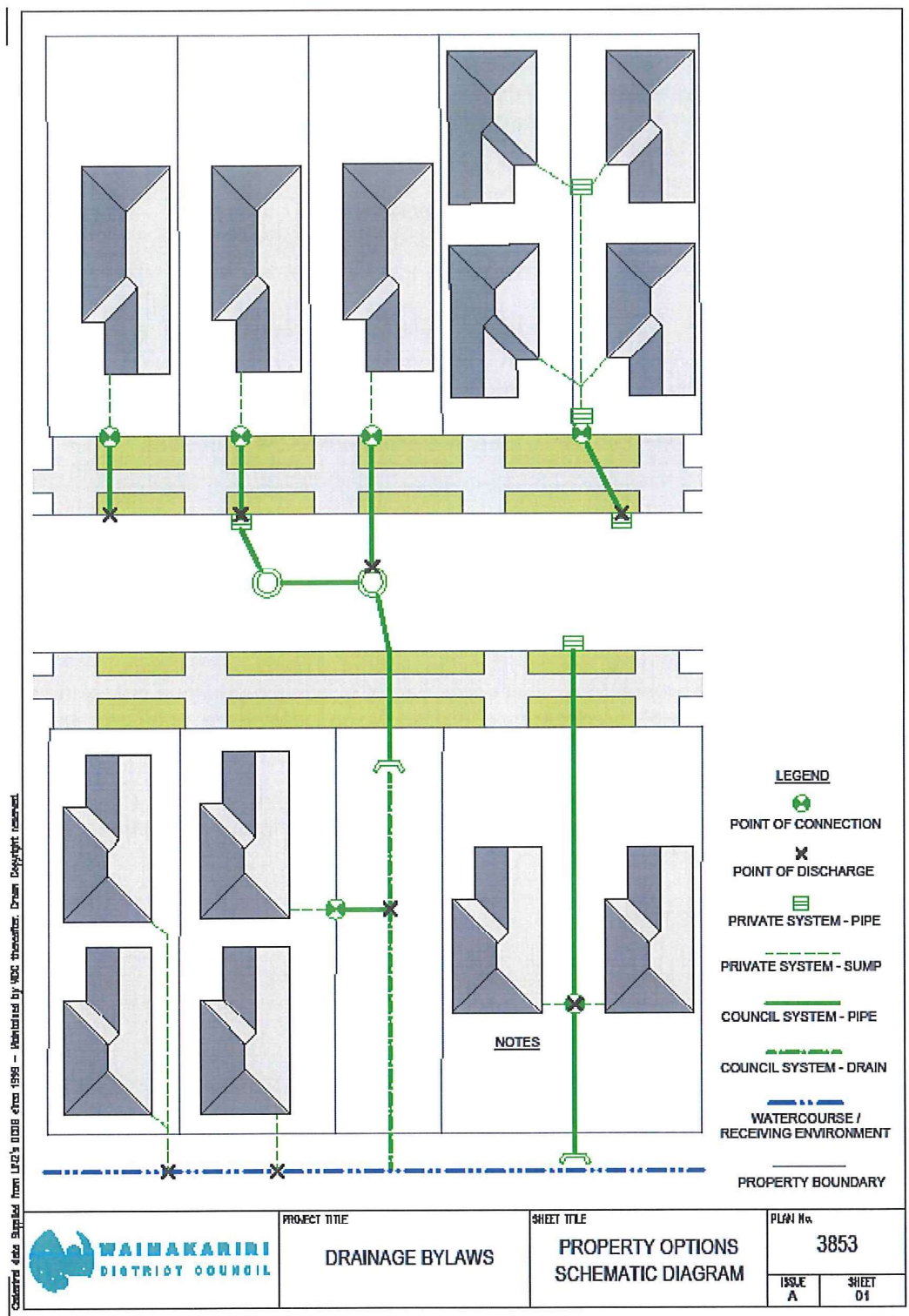
- 6.1 Any proposed new stormwater or land drainage system and any proposed alteration to any existing system must be designed, constructed and operated in accordance with:
- a. Council's Engineering Code of Practice;
  - b. Any relevant Catchment Management Plan prepared by Environment Canterbury or Waimakariri District Council;
  - c. Any relevant Stormwater Management Plan prepared and approved by the Waimakariri District Council;
  - d. The Waimakariri District Plan;
  - e. The Canterbury Land and Water Regional Plan;
  - f. The Regional Coastal Environment Plan for the Canterbury Region;
  - g. The Environment Canterbury Erosion and Sediment Control Toolbox for Canterbury;
  - h. Any approved pollution prevention plan that has been provided in accordance with Section 9;
  - i. Any resource, building or other consents relevant to the proposed works;
  - j. Any written conditions imposed by Council when approving the works;
  - k. Waimakariri District Council standard construction specifications.
- 6.2 As-built plans showing details of all new or altered systems must be provided to Council within the timeframe specified in Council's written approval or Engineering Code of Practice.
- 6.3 For existing sites being redeveloped, Council may require retrofit stormwater mitigation and/or implementation of site specific management plans or practices to treat and/or retain stormwater runoff from all or some part of existing impervious areas, in order for Council to comply with consent conditions which control the quality or quantity of discharges from any Council system into the receiving environment.
- 6.4 The Council may specify areas in the District, or may impose controls on any premises, whereby stormwater disposal must be undertaken by ground soakage, unless site conditions prevent it.

## 7 POINT OF CONNECTION

- 7.1 The point of connection to the Council's system is shown in Figure 1. There may be only one point of connection for each premises unless prior written agreement is provided by the Council.
- 7.2 The Council is responsible for the maintenance and all repairs to the Council system, including any pipe and fittings up to the point of connection, except:
- a. The customer is responsible for clearing of blockages or repairing damage from trees on the customer's own property, up to the point of discharge.
- 7.3 The customer is responsible for the maintenance and all repairs to the private stormwater or private land drainage system within the customer's property and on the customer's side of the point of discharge. Except where the private system is within public land, the following applies:
- a. The Council is responsible for any damage to the system caused by a Council contractor or a Council asset (such as a street tree).

b.

Figure 1: Stormwater Drainage Point of Connection Examples



## PART 2: MANAGEMENT OF CONTAMINANTS

**8 DISCHARGE OF CONTAMINANTS**

- 8.1 No person or premises may discharge directly or indirectly a contaminant into a Council system, including by way of private system to a Council system, if the discharge is likely to cause nuisance or adversely affect the operation of the system or receiving environment, including having an adverse effect on aquatic life, unless the discharge is approved by the Council or is expressly authorised by an operative resource consent.

*Explanatory note: Contaminants as defined in Section 4 of this bylaw include (but are not limited to) sediment, concrete, cement slurry, sewage, effluent, solvents, soap, detergents, dissolved metal, hazardous material, fungicide, herbicide, insecticide, litter and green waste.*

- 8.2 The Council may require premises that do not comply with clause 8.1 to implement the following controls:
- a. The modification of the premises to reduce or avoid the discharge of the contaminant;
  - b. The installation and use of treatment and mitigation measures or devices;
  - c. The proactive maintenance of the private system, including the provision of and compliance with a site specific management plan approved by Council.
- 8.3 Any owner, occupier or person who is present on a premises subject to a control made under clause 8.2 must comply with that control.

## PART 2A: OPERATING PHASE DISCHARGES

**9 MEDIUM-RISK ACTIVITIES / SITES**

- 9.1 The owner/occupier undertaking any new medium-risk activity on any site as defined in Schedule 1 that connects to a Council system shall prepare and implement a site specific Pollution Prevention Plan. This plan shall be submitted to and approved by the Council and fully implemented prior to connecting into the Council system.
- 9.2 The owner/occupier undertaking any existing medium-risk activity on any site as defined in Schedule 1 and that connects to a Council system shall, if requested by the Council, prepare and implement a site specific Pollution Prevention Plan. This plan shall be submitted for Council approval no later than six months after being requested by the Council, or such later date as agreed with Council. The plan shall be fully implemented within six months of being approved by the Council.
- 9.3 The Pollution Prevention Plan if required under 9.1 or 9.2 above shall include:
- 9.3.1 A site assessment identifying all actual and potential sources of contaminant discharge, including surface coatings;
  - 9.3.2 Suitably-scaled plans showing the site layout, boundaries, all stormwater, land drainage and wastewater drainage including the point of connection or discharge to the Council stormwater, land drainage or wastewater systems, and relevant buildings and outdoor spaces (including identification of their use);

- 9.3.3 Identification and installation requirements of the best practicable options proposed to ensure that potential contamination of all discharges are minimised. The application of current, nationally accepted standards, such as the Auckland Regional Council's Guidelines TP10, the Christchurch Waterways and Wetlands Drainage Guide or Environment Canterbury's Erosion and Sediment Control Toolbox for Canterbury will be taken into account by the Council when assessing pollution prevention plans;
- 9.3.4 Site specific spill prevention and spill response procedures;
- 9.3.5 A description of the maintenance procedures proposed, actions to be taken and/or infrastructure to be developed.
- 9.4 Evidence of ongoing compliance with any Pollution Prevention Plan shall be provided to the Council every three years at the time the Plan is reviewed, or at any other time upon request of Council.
- 9.5 Any Pollution Prevention Plan prepared pursuant to this section shall be reviewed by the owner/occupier or operator of the activity to which the plan relates, at three yearly intervals after implementation. The review shall identify any changes to the matters covered in clause 9.3, and with a timeframe of action. The reviewed pollution prevention plan shall be forwarded to the Council for approval within its three yearly review timeframe. The Council may include further terms and conditions within the revised Pollution Prevention Plan to ensure the activity is being undertaken in accordance with clauses 9.3 and 8.1. Once approved, the plan shall become binding.
- 9.6 Notwithstanding clause 9.5, the Council may require that any Pollution Prevention Plan shall be revised where there have been significant changes to an activity or failure to meet any requirement of clause 8.1.

## **10 HIGH-RISK ACTIVITIES / SITES**

- 10.1 The owner/occupier undertaking any new high-risk activity on any site as defined in Schedule 1 which would discharge either directly or indirectly into any Council system shall apply for and obtain a resource consent from Environment Canterbury for the discharge.
- 10.2 The owner/occupier undertaking an existing high-risk activity on any site as defined in Schedule 1 which causes a discharge, either directly or indirectly, into any Council system shall, if requested by Council:
- a) apply for and obtain a resource consent from Environment Canterbury for the discharge; and
  - b) any such consent shall be provided to Council no later than six months after being requested by the Council, or at such a later date as agreed with Council.
- 10.3 Any owner/occupier whom is required to obtain a resource consent from Environment Canterbury under clauses 10.1 or 10.2 shall also comply with the requirements of this bylaw except for the need to submit a Pollution Prevention Plan.

## PART 2B: CONSTRUCTION PHASE DISCHARGES

### 11 CONSTRUCTION ACTIVITIES

- 11.1 An Erosion and Sediment Control Plan must be prepared and implemented by the owner/occupier of any premises where construction activities are occurring where there is a discharge, either directly or indirectly, into any Council system. This plan shall be submitted to and approved by the Council and fully implemented prior to discharging into the Council system.
- 11.2 The Erosion and Sediment Control Plan required under clause 11.1 must be prepared and implemented in accordance with the current version of the Environment Canterbury Erosion and Sediment Control Toolbox for Canterbury.
- 11.3 The owner/occupier undertaking a construction activity on any site which would discharge into any Council system shall apply for and obtain a resource consent from Environment Canterbury for any construction phase stormwater discharge from that site into the Council system, if requested by the Council, where that construction is on:
- a) any site where an activity listed in the Canterbury Land and Water Regional Plan Schedule 3 "Hazardous Industries and Activities List" is occurring; and/or
  - b) Any site on the Canterbury Listed Land Use Register; and/or
  - c) Any new development site, or re-development of an existing site, that is not permitted under the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

*Explanatory note: Construction phase discharges referred to in clause 11.3 refer to construction activities on sites where there may be potentially contaminated land on all or part of the site that is discharging construction phase stormwater into the Council system. These sites and associated discharges are considered to be "at-risk" of, or from, contamination. The risks posed by any such discharges from the site may be subject to verification, and the Council, following receipt of technical advice, may require the owner/occupier to obtain a resource consent from Environment Canterbury for the discharge. It is noted that Schedule 1 of the bylaw (defining sites as either high-risk or medium-risk) does not directly apply to assessment of risk posed by sites generating construction phase discharges.*

## PART 3: PROTECTION OF SYSTEMS AND WATERCOURSES

### 12 ACTIVITIES REQUIRING APPROVAL

- 12.1 Approval in writing must be obtained from the Council before any of the following occur:
- 12.1.1 Any works on a Council system or a watercourse managed by the Council;
  - 12.1.2 Any modification to a bank structure, including widening, deepening, damming, diverting or planting or removing any vegetation from any part of a Council system or from the banks of any watercourse managed by the Council, including use of herbicide in such a way as to impede the flow of water or destabilise the bank structure; or
  - 12.1.3 The erection of a structure, or placement of any material or planting of any vegetation (e.g. tree or hedge) where these impede access by machinery or

apparatus used to clean, maintain or improve any part of a proposed or existing Council system; or

12.1.4 The erection of any new vehicle or stock crossing over a watercourse managed by the Council.

12.2 The following activities are forbidden:

12.2.1 Any alteration, interference with or obstruction of any Council system;

12.2.2 Allowing any stock or vehicles to do anything that damages or is likely to cause damage to any Council system or watercourse managed by the Council.

### **13 WORKS IN PROXIMITY TO SYSTEMS**

13.1 Any person who proposes to undertake any works or activities that may result in damage to any part of a Council system, including excavation works, must obtain Council's approval before beginning such works.

13.2 The person undertaking the works or activities is responsible for locating any buried services.

13.3 Any person who damages or causes disruption to any Council system is liable for the full costs of any repairs and associated costs incurred as a result of the damage or disruption. Any possible damage or disruption to any Council system must be reported to the Council immediately.

13.4 Following any works in proximity to a Council system, bedding and backfill must be reinstated in accordance with the Engineering Code of Practice.

## **PART 4: ACCESS, MAINTENANCE AND MONITORING**

### **14 SYSTEM ACCESS**

14.1 An owner/occupier shall allow Council access to and about all facets of all Council systems for the purposes of monitoring, testing and maintenance in accordance with Sections 171-173 and 182 of the Local Government Act 2002 (or other such notice as otherwise arranged with any owner/occupier).

14.2 In emergency conditions, or for the purpose of ascertaining whether a stormwater or land drainage system is being misused or this bylaw is not being complied with, an owner/occupier shall allow Council access to and about all facets of the system in accordance with sections 171-173 and 182 of the Local Government Act 2002.

### **15 WATER QUALITY MONITORING**

15.1 Council may independently monitor, sample and analyse discharged stormwater or land drainage water and recover costs from the property owner/occupier, where failure to comply with any Pollution Prevention Plan relating to the property is evident.

15.2 Where it is suspected that any discharge within the District is in breach of any part of sections 8 to 11, the Council may independently monitor, sample and analyse discharged stormwater or land drainage water, and where an offence is proven, may recover the costs of investigating, sampling and analysing the discharge, from the property owner/occupier.



## PART 5: PRIVATE SYSTEMS

### 16 PRIVATE SYSTEM MAINTENANCE

- 16.1 All private systems must be designed, constructed, managed and maintained by the owner/occupier, at the owner/occupier's expense or by some other arrangement acceptable to the Council.
- 16.2 The owner/occupier of a private system must ensure that it is maintained in good operating condition and does not cause or contribute to nuisance.
- 16.3 The owner/occupier of a premises on which there is a watercourse, stop bank, overland flow path or flood plain must maintain that watercourse, stop bank, overland flow path or flood plain in an operational state which does not cause or contribute to nuisance.

*Explanatory note – the alteration or construction of works on a watercourse, overland flow path, flood plain or stop bank may require a consent from Environment Canterbury in accordance with the Canterbury Land and Water Regional Plan. Activities within the beds of lakes and rivers may be subject to rules in regional plans in accordance with Section 13 of the Resource Management Act 1991.*

## PART 6: OFFENCES, PENALTIES AND ENFORCEMENT

### 17 OFFENCES

- 17.1 Every person who breaches this bylaw commits an offence and is liable on summary conviction to a fine not exceeding \$20,000.00 as set out in section 242 of the Local Government Act 2002.

### 18 FEES AND CHARGES

- 18.1 The Council may in accordance with the Local Government Act 1974 and Local Government Act 2002 set charges or fees to recover the cost of any of the following:
- a. Processing the assessment of Pollution Prevention Plans, their review, approvals and monitoring of compliance with the plans;
  - c. Processing the assessment of any other approval, consent, or any other monitoring, investigation, sampling or analysis charge that is required under any part of this bylaw;
  - d. Processing the assessment, approval or monitoring of any Erosion and Sediment Control Plan required under this bylaw.

### 19 REMEDIES

- 19.1 In the event of a breach of statutory or other legal requirements including this bylaw, the Council may serve notice on the owner/occupier advising the nature of the breach and the steps to be taken within a specified period to remedy it. If after the specified period, the owner/occupier has not remedied the breach, the Council may charge a re-inspection fee.
- 19.2 At any time after the specified period in 19.1 has elapsed, the Council may carry out any remedial work required in order to make good the breach, and recover from the owner/occupier all reasonable costs incurred in connection or associated with the remedial work together with any resulting damages.

- 19.3 If however the breach is such that public health or safety considerations or nuisance, or risk of consequential damage to council assets is such that delay would create or be likely to create unacceptable results, the Council may take immediate action to rectify the defect, and recover all reasonable costs and damages from the owner/occupier.

**SCHEDULE 1 – MEDIUM-RISK AND HIGH-RISK ACTIVITIES AND SITES (OPERATING PHASE DISCHARGES)**

**A) High-Risk** activities and sites include sites where an activity is occurring that is described in the current version of the Canterbury Land and Water Regional Plan Schedule 3 "*Hazardous Industries and Activities List*", unless any such activity or site is specifically identified as "medium-risk" in Schedule 1B of this bylaw.

**B) Medium-Risk** activities and sites include any of the following:

- i. Aggregate and material storage/stockpiled yards,
- ii. Commercial analytical laboratory sites,
- iii. Construction and maintenance depots (that exclude areas used for refueling or bulk storage of hazardous substances),
- iv. Demolition yards that exclude hazardous wastes,
- v. Dry cleaning premises,
- vi. Engineering workshops with metal fabrication,
- vii. Engine reconditioning workshops,
- viii. Food and beverage manufacturers,
- ix. Motor vehicle workshops,
- xi. Any other activity or premises that has failed to meet the requirements of Section 8, unless that activity or site is otherwise defined as a "high-risk" in Schedule 1(a).

## Memorandum of Understanding for Process for Exclusion from Stormwater Discharge Consent CRC184601 in Waimakariri District

Memorandum dated April 2023

BETWEEN The Reticulated Network Operator (Waimakariri District Council)

AND Canterbury Regional Council (Environment Canterbury)

### Purpose

1. The purpose of this Memorandum of Understanding (MoU) is to record the Parties' agreement **about the process through which the risk to surface water and groundwater quality from discharges from sites or activities described in condition 4 (specific exclusions) can be assessed and accepted under the reticulated network operator's stormwater network discharge consent from 1 January 2025.**

### Background

2. Policy 4.16A of the Canterbury Land and Water Regional Plan (LWRP) requires network operators to manage the quality of all stormwater discharges into and out of their network by 1 January 2025, however the network operator (Waimakariri District Council, (WDC)) proposed to develop a process in collaboration with Environment Canterbury (ECan) to continue excluding sites that pose an unacceptably high environmental risk after this date.
3. This exclusion should occur only in exceptional circumstances i.e., when all other means available to WDC to ensure that site owners reduce the risk (e.g., by improving site management practices) have been exhausted, and is subject to the confirmation from the Canterbury Regional Council that the process outlined in Condition 6 has been followed.
4. Under the WDC resource consent, exclusions from the Rangiora reticulated stormwater network consent from 1 January 2025 are subject to the process for exclusions set out in conditions (5) to (7). Condition (5) states Waimakariri District Council (the network operator), in agreement with Canterbury Regional Council is required to develop a process for the assessment of risk to surface water and groundwater quality.

### Specific Exclusions

5. Condition 4 allows for sites which **may be** excluded from the Rangiora reticulated stormwater network consent if the site or activity has been identified by WDC as posing an unacceptable risk to the receiving environment (subject to condition 6). Condition 4(b) states 'Any site listed on the Canterbury Regional Council Listed Land-Use Register or where a HAIL Activity described in Schedule 3 of the Canterbury Land and Water Regional Plan has historically occurred, where the discharge of stormwater from that site or activity is considered by WDC to pose an unacceptably high risk of surface water or groundwater contamination.

6. In the interest of managing efficiency in risk assessment related to LLUR and HAIL sites and activities, a process is agreed which will allow sites which are not explicitly excluded from the Rangiora reticulated stormwater network consent and are listed on the LLUR or where a HAIL activity has historically or is currently occurring, to be accepted by WDC under their resource consent. This process will assist in reducing the need for consultation with ECan or the need for specialist advice.

### **Proposed Process**

7. The following process to be agreed to:
  - i. Stormwater discharges from sites flagged on Environment Canterbury's LLUR and sites not flagged on the LLUR but which have been identified as having had HAIL activities in accordance with Schedule 1 of the Stormwater Drainage and Watercourse Protection Bylaw will be assessed by the network operator against the criteria for definition of medium or high risk sites in Schedule 1 of the Bylaw to determine whether the level of risk posed by the discharge is deemed acceptable.
  - ii. Those discharges which are explicitly prohibited for coverage under the reticulated network operator's consent shall be referred to Environment Canterbury for separate resource consent.
  - iii. Those discharges from medium or high risk sites which are not explicitly prohibited for coverage will be assessed by the reticulated network operator against the criteria outlined in the attachment 'Assessment Criteria for HAIL Sites'.
  - iv. Those discharges (either construction phase, operational phase, or both) assessed by the reticulated network operator as having a risk to the environment that is deemed to be acceptable in accordance with the attachment 'Assessment Criteria for HAIL Sites' **will be** accepted by the reticulated network operator under the stormwater discharge consent. At its discretion, the network operator may consult with Environment Canterbury to seek agreement that the level of risk is able to be effectively managed by the operator and to ensure suitable conditions of discharge are provided through the approval.
  - v. Those discharges (either construction phase, operational phase or both) assessed by the reticulated network operator as generating an unacceptable risk to the receiving environment in accordance with the attachment 'Assessment Criteria for HAIL Sites' will be referred to Environment Canterbury for consideration. Environment Canterbury will assess these and either:
    - a. Require a resource consent for stormwater discharge from Environment Canterbury; or
    - b. Judge them to of an acceptable risk and refer them back to the network operator.

Execution

*Jason Recker*  
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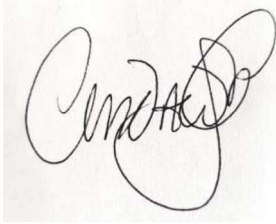
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Signature

Date

Name

Position, Reticulated Network Operator (Waimakariri District Council)

A handwritten signature in black ink on a light-colored background. The signature is highly stylized and cursive, appearing to read 'Andrew Arps'.

Name: Andrew Arps

Date 4<sup>th</sup> July 4, 2023

Position: Northern Zones Manger - Environment Canterbury

## Attachment - Assessment Criteria for HAIL Sites from 1 January 2025

### Construction Phase Discharges:

#### Acceptable Risk

1. The following site discharges are considered to present an acceptable risk to the receiving environment:
  - i. Sites not listed on the LLUR.
  - ii. Sites on the LLUR where only a portion of the site is identified as a historic or current HAIL activity and proposed construction will not occur on that portion of the site based on a PSI / DSI.
  - iii. Sites where construction is proposed with the following LLUR categories:
    - 'at or below background concentrations'; and
    - with toxicant concentrations below the Default Guideline Values from the Australia and New Zealand Guidelines for Fresh and Marine Water Quality website – toxicant **default** guideline values for sediment quality measured in mg/kg of dry weight; and
    - 'below human health guideline values for' the proposed site use (e.g. to demonstrate compliance with the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NESCS)).

*Note: this assessment does not cover direct private property construction phase discharges into land and groundwater.*

#### Risk Assessment Required

2. Notwithstanding clause 1, sites with the following LLUR categories are considered to be medium or high risk sites and will require a further specific risk assessment by the reticulated network operator:
  - i. 'contaminated for'
  - ii. 'significant adverse environmental effects'
  - iii. 'managed for'
3. Sites with all other LLUR categories ('not investigated', 'partially investigated', 'non-verified HAIL', etc.) and sites which are not listed on the LLUR but have been identified as having had HAIL activities will be dealt with under the following guidelines:
  - i. Developments or redevelopments that do not disturb greater than 25 cubic metres (m<sup>3</sup>) of soil per 500 square metres (m<sup>2</sup>) of land are considered to be of acceptable risk, unless a DSI is specifically requested by the Council for that site which indicates compliance with clause 1(iii) is not being achieved; or
  - ii. Developments or redevelopments that disturb greater than 25 m<sup>3</sup> of soil per 500 m<sup>2</sup> of land and that do not achieve compliance with clause 1 (iii); and
4. For sites being assessed under (2), 3 (i) and 3 (ii), the level of risk posed by the discharge will be determined by the network operator, taking into account whether the applicant proposes suitable measures to dispose of or contain contaminated material onsite such that the proposed disturbance of land will create no additional risk to the environment; and

- i. if deemed necessary then agreement will be sought with Environment Canterbury that the level of assessed risk can be approved and managed by the network operator; and
- ii. if the network operator deems the risk unacceptable following the process specified in 4, then the site will be individually referred to Environment Canterbury for a final decision regarding risk, and:
  - Sites judged to be of acceptable risk will be referred back to the network operator for inclusion under its consents.
  - Sites judged to be of unacceptable risk will require resource consent for stormwater discharge from Environment Canterbury.

### **Operational Phase Discharges:**

#### Acceptable Risk

1. The following site discharges are considered to present an acceptable risk to the receiving environment:
  - i. Sites and activities not described in Schedule 1 of the Stormwater Drainage and Watercourse Protection Bylaw;
  - ii. Sites where only a portion of the site is identified as a current HAIL activity in accordance with Schedule 1 of the Bylaw, and where no stormwater discharge is occurring from that portion of the property (e.g. the HAIL activity discharge is fully contained within that part of the site and all runoff with entrained contaminants is removed or treated within an on-site treatment device such as a grease trap or similar).

#### Risk Assessment Required

2. Notwithstanding clause 1, sites with current HAIL activities defined in Schedule 1 of the Bylaw will be deemed to present an acceptable risk to the environment when the activity and discharge are effectively being managed through an approved pollution prevention plan.
3. Sites that do not comply with their approved pollution prevention plan and that do not subsequently amend their activities in accordance with the network operator requirements notified under condition 6 of the Rangiora Stormwater Network Consent CRC184601, will be deemed to present an unacceptable risk to the receiving environment and will require resource consent for the stormwater discharge from Environment Canterbury.





## CULTURAL ADVICE REPORT

### J6351 – Stormwater Drainage and Watercourse Bylaw Review

To: Waimakariri District Council

Contact: Janet Fraser

#### 1.0 Mana Whenua Statement

Ngāi Tahu are tangata whenua of the Canterbury region and hold ancestral and contemporary relationships with Canterbury. The contemporary structure of Ngāi Tahu is set down through the Te Rūnanga o Ngāi Tahu Act 1996 (TRoNT Act). The TRoNT Act and Ngāi Tahu Claims Settlement Act (NTCSA) 1998 sets the requirements for recognition of tangata whenua in Canterbury.

The Te Rūnanga o Ngāi Tahu Act 1996 and the NTCSA 1998 gives recognition to the status of Papatipu Rūnanga as kaitiaki and mana whenua of the natural resources within their takiwā boundaries. Each Papatipu Rūnanga has their own respective takiwā, and each is responsible for protecting the tribal interests in their respective takiwā, not only on their own behalf of their own hapū, but again, on behalf of the entire tribe.

The following Rūnanga hold mana whenua over the project's location, as it is within their takiwā:

- Ngāi Tūāhuriri Rūnanga

#### 2.0 Summary of Proposal

Waimakariri District Council is reviewing the Stormwater Drainage and Watercourse Bylaw and has requested review and input from Te Ngāi Tūāhuriri Rūnanga.

The bylaw provides the legal basis for the Waimakariri District Council (WDC) to protect waterways by preventing discharges of contaminants in the WDC stormwater system from connected properties.

Public consultation on the draft Stormwater Drainage and Watercourse Bylaw is expected to be undertaken later in 2024.

#### 3.0 Consultation Methodology

Mahaanui Kurataiao Limited review the application documents and undertake an assessment of the application against the Mahaanui Iwi Management Plan.

A briefing report is prepared for Kaitiaki representatives who have been mandated by the Papatipu Rūnanga they represent to speak on behalf of hapū on environmental issues.

A Mahaanui Kurataiao Limited staff member meets with Kaitiaki representatives to discuss the application and Kaitiaki provide feedback based on Mātauranga Māori.

The Cultural Advice Report is provided to outline the relevant policies in the Mahaanui Iwi Management Plan and the feedback provided by Kaitiaki representatives.

The relevant policies and Kaitiaki feedback for this application are provided in the following sections of this report.

## 4.0 Mahaanui Iwi Management Plan 2013

The Mahaanui Iwi Management Plan (IMP) is a written expression of kaitiakitanga, setting out how to achieve the protection of natural and physical resources according to Ngāi Tahu values, knowledge, and practices. The plan has the mandate of the six Papatipu Rūnanga, and is endorsed by Te Rūnanga o Ngāi Tahu, as the iwi authority.

Natural resources – water (waterways, waipuna (springs), groundwater, wetlands); mahinga kai; indigenous flora and fauna; cultural landscapes and land - are taonga to mana whenua and they have concerns for activities potentially adversely affecting these taonga. These taonga are integral to the cultural identity of ngā rūnanga mana whenua and they have a kaitiaki responsibility to protect them. The policies for protection of taonga that are of high cultural significance to ngā rūnanga mana whenua are articulated in the IMP.

The policies in this plan reflect what Papatipu Rūnanga support, require, encourage, or actions to be taken with regard to resolving issues of significance in a manner consistent with the protection and enhancement of Ngāi Tahu values, and achieving the objectives set out in the plan.

The relevant Policies of the IMP to this proposal have been identified as:

### 5.1 KAITIAKITANGA

**K2.3** In giving effect to Te Tiriti, government agencies and local authorities must recognise and provide for kaitiakitanga and rangatiratanga. As the tāngata whenua who hold manawhenua, Ngāi Tahu interests in resource management extend beyond stakeholder or community interests.

#### EFFECTIVE RECOGNITION OF KAITIAKITANGA

**K3.4** To require that Mahaanui IMP 2013 is recognised and implemented as a collective and mandated manawhenua planning document.

**Comment:** *The exercise of kaitiakitanga is enhanced through working alongside local government, central government and the wider community. As tāngata whenua, Ngāi Tahu can bring the community together under a common kaupapa: a healthy environment as the basis for a healthy community and economy.*

### 5.3 WAI MĀORI

## TĀNGATA WHENUA RIGHTS AND INTERESTS IN FRESHWATER

**WM1.2** Te Tiriti o Waitangi is the basis for the relationship between Ngāi Tahu and local authorities (and water governance bodies) with regard to freshwater management and governance in the takiwā.

## CHANGING THE WAY WATER IS VALUED

**WM2.1** To consistently and effectively advocate for a change in perception and treatment of freshwater resources: from public utility and unlimited resource to wāhi taonga.

**WM2.2** To require that water is recognised as essential to all life and is respected for its taonga value ahead of all other values.

**WM2.3** To require that decision making is based on intergenerational interests and outcomes, mō tātou, ā, mō kā uri ā muri ake nei.

## PRIORITIES FOR USE

**WM3.1** To advocate for the following order of priority for freshwater resource use, consistent with the Te Rūnanga o Ngāi Tahu Freshwater Policy Statement (1999):

(1) That the mauri of fresh water resources (ground and surface) is protected and sustained in order to:

- (a) Protect instream values and uses (including indigenous flora and fauna);
- (b) Meet the basic health and safety needs of humans, specifically the provision of an untreated and reliable supply of drinking water to marae and other communities; and
- (c) Ensure the continuation of customary instream values and uses.

(2) That water is equitably allocated for the sustainable production of food, including stock water, and the generation of energy; and

(3) That water is equitably allocated for other abstractive uses (e.g. development aspirations).

## WATER QUALITY

**WM6.1** To require that the improvement of water quality in the takiwā is recognised as a matter of regional and immediate importance.

**WM6.2** To require that water quality in the takiwā is of a standard that protects and provides for the relationship of Ngāi Tahu to freshwater. This means that:

- (a) The protection of the eco-cultural system (see Box - Eco-cultural systems) is the priority, and land or resource use, or land use change, cannot impact on that system; and
- (b) Marae and communities have access to safe, reliable, and untreated drinking water; and
- (c) Ngāi Tahu and the wider community can engage with waterways for cultural and social well-being; and
- (d) Ngāi Tahu and the wider community can participate in mahinga kai/food gathering activities without risks to human health.

**WM6.5** To require that water quality standards in the takiwā are set based on “where we want to be” rather than “this is the point that we can pollute to”. This means restoring waterways and working toward a higher standard of water quality, rather than establishing lower standards that reflect existing degraded conditions.

### *Addressing the source of the problem*

**WM6.6** Where there are water quality issues, we need to address the source of the problem, and not just dig deeper wells or find new ways to treat water.

### *Discharges*

**WM6.8** To continue to oppose the discharge of contaminants to water, and to land where contaminants may enter water.

**WM6.9** To require that local authorities work to eliminate existing discharges of contaminants to waterways, wetlands and springs in the takiwā, including treated sewage, stormwater and industrial waste, as a matter of priority.

**WM6.10** To require that the regional council classify the following discharge activities as prohibited due to significant effects on water quality:

(a) Activities that may result in the discharge of sewage (treated or untreated), stormwater, industrial waste, animal effluent or other contaminants to water, or onto land where contaminants may enter water; and

(b) Stock access to waterways and waterbodies (including drains and stock races), regardless of the size of the waterway and type of stock.

*Costs and benefits*

**WM6.22** To require that local authorities afford appropriate weight to tāngata whenua values when assessing the costs and benefits of activities that may have adverse effects on water quality.

**WM6.23** To ensure that economic costs do not take precedence over the cultural, environmental and intergenerational costs of poor water quality.

ACTIVITIES IN THE BEDS AND MARGINS OF RIVERS AND LAKES

*Access*

**WM12.3** To require that local authorities recognise and provide for the following cultural matters associated with access and use of the beds and margins of rivers and lakes:

(a) The need to protect sites of cultural significance to tāngata whenua when considering public access; and

(b) The need to protect and maintain Ngāi Tahu access to sites associated with wāhi tapu, wāhi taonga, mahinga kai and other cultural resources, including Fenton reserves, Fenton Entitlements and Nohoanga.

*Use and enhancement of river margins in the built/ urban environment*

**WM12.4** All waterways in the urban and built environment must have indigenous vegetated healthy, functioning riparian margins.

**WM12.5** To require that all waterways in the urban and built environment have buffers or set back areas from residential, commercial or other urban activity that are:

(a) At least 10 metres, and up to 30 metres; and

(b) Up to 50 metres where there is the space, such as towards river mouths and in greenfield areas.

DRAIN MANAGEMENT

**WM14.1** To require that drains are managed as natural waterways and are subject to the same policies, objectives, rules and methods that protect Ngāi Tahu values associated with freshwater, including:

(a) Inclusion of drains within catchment management plans and farm management plans;

(b) Riparian margins are protected and planted;

(c) Stock access is prohibited;

(d) Maintenance methods are appropriate to maintaining riparian edges and fish passage; and

(e) Drain cleaning requires a resource consent.

## INVASIVE WEEDS IN RIVERBEDS AND MARGINS

**WM15.1** To oppose the planting of willows and poplars along waterways, for erosion control or otherwise.

***Comment:** Water management should effectively provide for the taonga status of water, the Treaty partner status of Ngāi Tahu, the importance of water to cultural well-being, and the specific rights and interests of tāngata whenua in water.*

## 5.4 PAPANUKU

### STORMWATER

**P6.1** To require on-site solutions to stormwater management in all new urban, commercial, industrial and rural developments (zero stormwater discharge off site) based on a multi tiered approach to stormwater management:

- (a) Education - engaging greater general public awareness of stormwater and its interaction with the natural environment, encouraging them to take steps to protect their local environment and perhaps re-use stormwater where appropriate;
- (b) Reducing volume entering system - implementing measures that reduce the volume of stormwater requiring treatment (e.g. rainwater collection tanks);
- (c) Reduce contaminants and sediments entering system - maximising opportunities to reduce contaminants entering stormwater e.g. oil collection pits in carparks, education of residents, treat the water, methods to improve quality; and
- (d) Discharge to land based methods, including swales, stormwater basins, retention basins, and constructed wetponds and wetlands (environmental infrastructure), using appropriate native plant species, recognising the ability of particular species to absorb water and filter waste.

**P6.2** To oppose the use of existing natural waterways and wetlands, and drains, for the treatment and discharge of stormwater in both urban and rural environments.

**P6.3** Stormwater should not enter the wastewater reticulation system in existing urban environments.

**P6.4** To require that the incremental and cumulative effects of stormwater discharge are recognised and provided for in local authority planning and assessments.

**P6.5** To encourage the design of stormwater management systems in urban and semi urban environments to provide for multiple uses: for example, stormwater management infrastructure as part of an open space network that provides for recreation, habitat and customary use values.

**P6.5** To support integrated catchment management plans (ICMP) as a tool to manage stormwater and the effects of land use change and development on the environment and tāngata whenua values, when these plans are consistent with Policies P6.1 to P6.4. **P6.6** To oppose the use of global consents for stormwater discharges.

### SOIL CONSERVATION

**P9.4** To support the following methods and measures to maintain or improve soil organic matter and soil nutrient balance, and prevent soil erosion and soil contamination:

- (a) Matching land use with land capability (i.e. soil type; slope, elevation);
- (b) Organic farming and growing methods;

- (c) Regular soil and foliage testing on farms, to manage fertiliser and effluent application levels and rates;
- (d) Stock management that avoids overgrazing and retires sensitive areas;
- (e) Restoration and enhancement of riparian areas, to reduce erosion and therefore sedimentation of waterways;
- (f) Restoration of indigenous vegetation, including the use of indigenous tree plantations as erosion control and indigenous species in shelter belts; and
- (g) Avoiding leaving large areas of land/soil bare during earthworks and construction activities.

**Comment:** *An important kaupapa of Ngāi Tahu resource management perspectives and practice is the protection and maintenance of the mauri of Papatūānuku, and the enhancement of mauri where it has been degraded by the actions of humans.*

## 5.5 TĀNE MAHUTA

### MAHINGA KAI

**TM1.1** Ngāi Tahu whānui, both current and future generations, must be able to access, use and protect mahinga kai resources, as guaranteed by Te Tiriti o Waitangi.

**TM1.2** To advocate that the protection and restoration of traditional and contemporary mahinga kai sites and species is recognised and provided for as a matter of national importance under the RMA 1991.

#### *Ki Uta Ki Tai*

**TM1.4** To promote the principle of Ki Uta Ki Tai as a culturally appropriate approach to mahinga kai enhancement, restoration and management, in particular:

- (a) Management of whole ecosystems and landscapes, in addition to single species; and
- (b) The establishment, protection and enhancement of biodiversity corridors to connect species and habitats.

#### *Freshwater management*

**TM1.5** To require that freshwater management recognises and provides for mahinga kai, by:

- (a) Customary use as a first order priority;
- (b) Restoring mahinga kai values that were historically associated with waterways, rather than seeking to maintain the existing (degraded) mahinga kai value of a waterway; and
- (c) Protecting indigenous fish recruitment and escapement by ensuring that waterways flow Ki Uta Ki Tai and there is sufficient flow to maintain an open river mouth.

#### *Remnant areas*

**TM1.7** To require that district and regional plans include policy and rules to protect, enhance and extend existing remnant wetlands, waipuna, riparian margins and native forest remnants in the takiwā given the importance of these ecosystems as mahinga kai habitat.

## INDIGENOUS BIODIVERSITY

### *Ngāi Tahu interests in biodiversity*

**TM2.1** To require that local authorities and central government actively recognise and provide for the relationship of Ngāi Tahu with indigenous biodiversity and ecosystems, and interests in biodiversity protection, management and restoration, including but not limited to:

- (a) Importance of indigenous biodiversity to tāngata whenua, particularly with regard to mahinga kai, taonga species, customary use and valuable ecosystem services;

- (b) Recognition that special features of indigenous biodiversity (specific areas or species) have significant cultural heritage value for Ngāi Tahu;
- (c) Connection between the protection and restoration of indigenous biodiversity and cultural well-being;
- (d) Role of mātauranga Ngāi Tahu in biodiversity management; and
- (e) Role of Ngāi Tahu led projects to restoring indigenous biodiversity (e.g. Mahinga Kai Enhancement Fund; Kaupapa Kēreru).

**TM2.2** To recognise Te Tiriti o Waitangi as the basis for the relationship between central and local government and tāngata whenua with regard to managing indigenous biodiversity, as per the duty of active protection of Māori interests and the principle of partnership.

#### *Biodiversity corridors*

**TM2.9** To advocate for the establishment of biodiversity corridors in the region, Ki Uta Ki Tai, as means of connecting areas and sites of high indigenous biodiversity value.

**Comment:** *The protection and enhancement of indigenous biodiversity and mahinga kai occurs through a shared, coordinated effort between tāngata whenua, local authorities, conservation groups and communities.*

#### **4.1 Guidance to Moderate Impacts on Cultural Values**

The above policies from the Mahaanui IMP provide a framework for assessing the potential negative impacts of the proposed activity on cultural values and provide guidance on how these effects can be moderated.

Te Tiriti o Waitangi guarantees tāngata whenua the right to fulfill their kaitiaki obligations to protect and care for taonga in the environment, including land, waterways, natural features, wāhi tapu and flora and fauna with tribal areas.

Mana whenua represents the ability to influence and exercise control over a particular area or region and act as its kaitiaki. Mana whenua is derived from whakapapa, and protected and secured through continued occupation of ancestral lands (ahi kā roa), the continued use of resources (e.g. mahinga kai) and the protection of the mauri of resources and the environment mō tātou, ā, mō kā uri ā muri ake nei.

The discharge of contaminants to the Waimakariri River, its tributaries and Te Tai o Mahaanui is inconsistent with Ngāi Tahu values and interests. The mauri and mahinga kai values of the Waimakariri and its tributaries and associated springs, wetlands and lagoons need to be protected and restored; mō tātou, ā, mō kā uri ā muri ake nei.

Mauri is often described as the 'life force' or 'life principle' of any given place or being. It can also be understood as a measure or an expression of the health and vitality of that place or being. The notion embodies the Ngāi Tahu understanding that there are both physical and metaphysical elements to life, and that both are essential to overall well-being. It also associates the human condition with the state of the world around it. Mauri, therefore, is central to kaitiakitanga; that is, the processes and

practices of active protection and responsibility by Mana whenua for the natural and physical resources of the takiwā.

Mauri can change either naturally or through intervention and Ngāi Tahu use both physical and spiritual indicators to assess its relative strength. Physical indicators include, but are not limited to, the presence and abundance of mahinga kai fit for consumption or cultural purpose. Spiritual indicators include the kaitiaki referred to above. They are often recalled in kōrero pūrākau to explain the intrinsic connection between the physical and metaphysical realms of our world.

To incorporate the Kaitiaki views and values into the objectives of the Stormwater Drainage and Watercourse Protection Bylaw the following have been provided:

The Stormwater Drainage and Watercourse Protection Bylaw should:

- Provide for improvement in the quality of waterways.
- Provide for protection and enhancement of waterways, mahinga kai, indigenous species and habitat.
- Provide for the protection of wahi tapu, wahi taonga, wai tapu and wai taonga.

For tāngata whenua, the current state of cultural health of the waterways and groundwater is evidence that water management and governance in the takiwā has failed to protect freshwater resources. Surface and groundwater resources are over-allocated in many catchments and water quality is degraded as a result of urban and rural land use. This has significant effects on the relationship of Ngāi Tahu to water, particularly with regard to mauri, mahinga kai, cultural well-being and indigenous biodiversity.

A significant kaupapa that emerges from the Mahaanui Iwi Management Plan is the need to rethink the way water is valued and used, including the kind of land use that water is supporting, and the use of water as a receiving environment for contaminants such as sediment and nutrients. Fundamental to tāngata whenua perspectives on freshwater is that water is a taonga, and water management and land use should reflect this importance.

All potential contaminants that may enter water such as nutrients, sediments and chemicals should be managed onsite and at site rather than be discharged into the drainage and waterway system. The discharge of contaminants to waterways is not supported and stormwater should be treated prior to discharge into natural or manmade waterways. There should be controls on land use, including prohibiting activities that have a negative impact on water quality.

The effects of development activity on values of importance to Ngāi Tahu is the 'cultural footprint' of the development. The cultural footprint is dependent on the nature and extent of values on site, and the wider cultural landscape context within which the development sits. It is also a reflection of the ability of the development to moderate cultural effects, and realise opportunities to provide cultural benefit (e.g. waterways enhancement). Low impact design methods, such as, minimising impervious surface area and rainwater collection and reuse systems should be encouraged within developments to reduce the level of runoff within catchments. Compliance monitoring and enforcement is a significant concern. Rules are only effective when there are enforceable penalties and enforced remediation.



## 6.0 Recommendations

The following recommendations are provided to incorporate Kaitiaki views and values within the Bylaw Review.

Suggested objectives: The Stormwater Drainage and Watercourse Protection Bylaw should:

- Provide for improvement in the quality of waterways.
- Provide for protection and enhancement of waterways, mahinga kai, indigenous species and habitat.
- Provide for the protection of wahi tapu, wahi taonga, wai tapu and wai taonga.

Comments to provisions of the Bylaw:

- The discharge of contaminants to waterways is not supported.
- Minimisation of impervious surface area and onsite solutions are recommended.
- All stormwater should be treated prior to discharge into natural or manmade waterways.
- Compliance with rules within the Bylaw should be monitored and enforced.

On behalf of Mahaanui Kurataiao Ltd, this report has been prepared by Kelly Sunnex | Mahaanui Kurataiao Ltd Environmental Advisor, and peer reviewed by Henrietta Carroll | Mahaanui Kurataiao Ltd Kaihautū.

Date: 5 April 2024

<b>AGENDA ITEM NO: 4</b>	<b>SUBJECT MATTER:</b> Committee Updates
<b>REPORT TO:</b> Waimakariri Water Zone Committee	<b>MEETING DATE:</b> 1 July 2024
<b>REPORT BY:</b> Murray Griffin, CWMS Facilitator, 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.

## COMMITTEE UPDATES

The following updates will be addressed with the committee:

### 1. Zone Committee Working Groups

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#### 1.1 Biodiversity Working Group

Martha Jolly will provide an update at the meeting on the Working Group's mahi to co-ordinate the Waimakariri Environmental Awards for 2024.

The Waimakariri Water Zone Committee wants to celebrate those who are contributing towards the protection of our environment and particularly its biodiversity and waterways. You are our champions!

Applications and nominations are sought for the following three categories:

- Youth – 18 or under (could also be a youth group)
- Individual
- Group/Organisation – commercial companies, volunteer groups, NGOs (whether formal or informal)

We're on the lookout for individuals or groups who undertake, champion, or inspire environmental protection, conservation, or restoration, within the Zone .

- Have you been involved with a wetland restoration?
- Are you winning a battle against weeds and pests to protect our indigenous biodiversity?
- Is your company's native roadside berm looking awesome?
- Has your project helped identify ways to enhance indigenous biodiversity and/or improve our waterways?
- Has your research helped identify ways to enhance indigenous biodiversity and/or improve our waterways?
- Do you know someone who is doing a great job of reducing nutrients and/or sediment entering our waterways?

#### Criteria:

We want to see how you, or your group, are enhancing our local natural environment.

We want to understand how your project relates to the Waimakariri Water Zone Committee's Action Plan, by demonstrating one or more of our actions:

- Improved monitoring of ground and surface water;
- Increased indigenous biodiversity;
- Promoting the natural character of braided rivers (particularly of the Ashley/Rakahuri);

- Enhancing environmentally stable recreation/amenity;
- Improved mahinga kai.

Don't forget to include:

- Your connection to the Waimakariri Zone.
- Full details of project or activities, including photos or other evidence where necessary and available.
- How your project or activities meet the criteria of undertaking, championing, or inspiring environmental protection, conservation, or restoration.

Applications can be submitted online below or emailed with the application form to [biodiversity@wmk.govt.nz](mailto:biodiversity@wmk.govt.nz) ,(External link) or delivered to any Waimakariri District Council libraries or service centres.

**Closing date for entries is 5pm, Friday 2 August.** The Panel's decisions are final and binding. Awards will be presented at the Community Service Awards.

To apply, go to: [Environmental Awards | Let's Talk Waimakariri](#)

To learn more about the Waimakariri Water Zone Committee, its purpose and actions visit their: [page on the Environment Canterbury website\(External link\)](#).

### 1.2 Lifestyle Block Working Group

Carolyne Latham will provide a short update at the meeting.

She has provided the invite for the *Soil Health & Water Quality Workshop* being hosted by the Sefton Saltwater Creek Catchment Group on Tuesday 9 July, 7-9pm in the Sefton Hall, Upper Sefton Rd. This invite is included for the committee's information as **agenda item 5-1**.

### 1.3 Monitoring Working Group

Erin Harvie has provided two updates for the committee.

1. A progress report of the water quality gap analysis in the Waimakariri completed by Aqualinc for the Waimakariri Landcare Trust. This project was supported through the CWMS Action Plan Budget for the Waimakariri in 2022/23 and is provided as **agenda item 5-2**.
2. Is a case study which provides an overview of the project work undertaken with the Our Land and Water science challenge by the Waimakariri Landcare Trust that was finished in the last year and is provided as **agenda item 5-3**.

## 2. Environment Canterbury Updates

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Councillor Claire McKay will lead this update to the committee.

### 2.1 Upcoming Council Meetings

#### Environment Canterbury Water and Land Committee – 27 June 2024

Please find the link below for the upcoming Environment Canterbury Council and Water and Land Committee meetings in June.

- The next Water and Land Committee meeting to be held on *Thursday 27 June 2024*. It includes two papers of direct relevance to the committee.
  - **Agenda item 8.2** – Provides an overview of all the CWMS Action Plan Budget projects supported by Zone Committees in Canterbury in 2023-24.
  - **Agenda item 8.3** – Provides an update on the CWMS Zone Committee Review.

- Also noting Environment Canterbury will adopt its Long-Term Plan for 2024-34 at its 26 June Council meeting.
- Council Meeting agendas can be viewed and downloaded from this link:  
[Council and committee meetings: Current month | Environment Canterbury \(ecan.govt.nz\)](#)

## **2.2 Our Future Canterbury – the Canterbury Regional Policy Statement**

Environment Canterbury is reviewing the Canterbury Regional Policy Statement. We spoke to the community about this review last year and have now prepared a draft which we are sharing and consulting on.

### **Who are we consulting with?**

This phase of our consultation is broadly according to Schedule 1, clause 3 of the Resource Management Act which defines both the process and the specific entities we must consult with, including local government, tangata whenua and Government Ministers.

So that we hear from a broad spectrum of interested groups, we have opted to consult more widely than required. Our hope is to take our communities with us and create the best CRPS we can through a more inclusive approach. For that reason and in appreciation of your connections within your communities, we are informing you of this consultation, noting that you will likely hear from catchment groups, industry bodies, NGO's and other community groups.

We are contacting key stakeholders directly and ask that you support us in keeping the consultation targeted to the organisations and groups we have identified. To that end, we ask that you don't share the draft document outside of the Zone Committee.

This stage is intended to help us work with key stakeholders to refine the draft document so that when we share it widely later in the year, the community will see a document that reflects the best information available. When we notify the Regional Policy Statement (currently scheduled in December) everyone in the community will have the opportunity to make submissions and be heard.

For those CWMS Zone Committee members who would like to find out more about this stage of the Regional Policy Statement review process, and its associated consultation, an online drop-in session has been arranged on Friday 12 July (from 12:00 – 1:00pm). All zone committee members have been emailed the details for this session.

## **3. Waimakariri District Council updates**

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With Councillor Tim Fulton being an apology for this meeting, Sophie Allen, Water Environment Advisor, will provide this update.

### **3.1 Upcoming Council Meetings**

Noting Waimakariri District Council will adopt its Long-Term Plan for 2024-34 at its Tuesday 2 July meeting.

Council Meeting agendas can be viewed and downloaded from this link:  
[Minutes & Agendas | Waimakariri District Council](#)

### **3.2 Council Reports for the committee**

Two Roading and Utilities committee reports are also included in the meeting papers alongside the unconfirmed minutes of the 6 May zone committee meeting, when they were noted by Cr Fulton.

They are:

- 6–1: Eastern Districts Sewer Scheme and Oxford Wastewater Treatment Plant Annual Compliance Monitoring Reports 2022 – 2023
- 6–2: Eastern Districts Sewer Scheme – Annual Compliance Monitoring Report 2022 – 2023

Also included for the committee's information are the following reports:

- **agenda item 5–4:** Private well study results 2023
- **agenda item 5–5:** Rangiora stormwater monitoring programme 2021-23 annual report
- **agenda item 5–6:** Rangiora stormwater monitoring programme 2022-23 water quality results
- **agenda item 5–7:** Zone Implementation Programme Addendum (ZIPA) Capital Works Programme – 2024-25.

#### **4. Ministry for the Environment – Our Land 2024 report**

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Our land 2024 explores the current state of our natural assets and natural infrastructure, the benefits they provide us, and how we've placed them under pressure. The report is produced jointly by the Ministry for the Environment and Stats NZ.

This report produced by the Ministry for the Environment can be downloaded from the following link: <https://environment.govt.nz/publications/our-land-2024/>

The Ministry has also produced a snapshot document of the report's key findings. This document can also be downloaded from the following link:

<https://environment.govt.nz/publications/our-land-2024-a-snapshot/>

#### **5. Parliamentary Commission for the Environment – Going with the grain: Changing land uses to fit a changing landscape**

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How do we respond to the environmental challenges of climate change, biodiversity loss and water quality while looking after the economic, social and cultural life of our regions? This is the pressing question addressed in the Commissioner's new report, Going with the grain: Changing land uses to fit a changing landscape, sets out the multiple environmental problems facing rural New Zealand and makes suggestions on how to approach the land use change needed to prevent further degradation.

The Commissioner draws on six years of research to present practical suggestions on how to manage land use change. His key recommendations are:

- We must take an integrated approach to environmental management that focuses on the catchment rather than one-size-fits-all national regulation. This will make it easier to understand how environmental policies on water, climate, and biodiversity interact.
- We need to rethink the roles of central government, regional councils, mana whenua and communities in decision making and involve catchment groups more in environmental management.
- Central government must enable farmers and regulators to have access to inexpensive, high-quality environmental information and underwrite it as a public good.

- Alternative financial tools can help fund land use transitions. The report discusses examples such as loans and grants, resource rentals on the commercial use of water and pricing biogenic methane.
- The costs of successful transition would be lower if we removed the barriers that are impeding progress, such as progressively removing forestry from the NZ ETS and creating a separate mechanism (or ETS) to manage biogenic methane.

In a companion report – *Exploring land use change under different policy settings in two case study catchments*, the Commissioner details an investigation into how current and alternative approaches to environmental regulation could affect land use change in the Wairoa catchment in Te Tai Tokerau Northland and the Maitai catchment in Murihiku Southland.

These reports can be downloaded from the following link:

<https://pce.parliament.nz/publications/going-with-the-grain-changing-land-uses-to-fit-a-changing-landscape/>

## **6. Action points from the previous zone committee meetings**

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- An update on the water quality sampling at Tutaepatu Lagoon.
- An update on the Kaiapoi River salinity logger data.

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*Fin.*



(including Saltwater, Fox's, Stony, Boyne, Benzie's Creeks and tributaries)

## Soil Health & Water Quality Workshop Nitrates Water Testing

**Tuesday 9<sup>th</sup> July 2024**  
**7-9pm**  
**Sefton Hall, Upper Sefton Rd**

Quorum Sense are bringing Dr Charles Merfield to talk to us about soil health and water quality (see separate flier below). We will also have a nitrates sensor on hand for workshop participants, so feel free to come a bit earlier with any water samples that you would like tested for nitrates. If you are on a Council water supply scheme, your water will already be tested regularly, but if you are on a private supply such as a well, it is important that you understand the quality of your water. Sophie Allen from WDC will explain why testing is important, what to test for, and what you can do if you get a high reading.

This event is open for anyone to attend, RSVP to Carlyne by Sun 7<sup>th</sup> July

Carlyne 0277888044 / [avlink@xtra.co.nz](mailto:avlink@xtra.co.nz)



9 July 2024

# Soil Health & Water Quality Workshop

A free event hosted by Quorum Sense  
and Sefton Saltwater Creek Catchment Group

An opportunity to find out more about the inter-relationship between soil health, water quality and water infiltration. It will include an introduction to DIY soil tests and the opportunity to discuss how soil health relates to catchment management.

The event will include presentations from

- Dr Charles Merfield, Head of the BHU Future Farming Centre and recent recipient of OrganicNZ 2024 Organic Leader of the Year
- Chloë Dear, Manager, Quorum Sense and Sefton local

**Date: Tuesday 9 July 2024**

**Location: Sefton Hall,  
Sefton, Canterbury**

**Doors open: 6:45pm**

**Start: 7pm**

**Finish: 9pm**

**FREE - open to all**

**RSVP to Carlyne Latham  
avlink@xtra.co.nz**

**Further info:  
[www.quorumsense.org.nz](http://www.quorumsense.org.nz)**



Supported by the Ministry for Primary  
Industries Sustainable Land Use Extension Fund





## Memorandum

**To:** ..Charlotte Wright.....  
**From:** Nicole Calder-Steele  
**Reviewed by:** ..Helen Rutter & Julian Weir..  
**Subject:** ..WLT Progress Update.....

**Of:** ..Element Environmental..  
**Date:** Original: 14 June 2023  
Updated: 20 May 2024..  
**Job no:** ..WL23021.....

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### 1 Background

Following hui on 18 May, Aqualinc was to collate monitoring information relative to private water supply areas and nitrate management areas to identify monitoring gaps.

### 2 Kreleger & Etheridge (2019)

Environment Canterbury (ECan) report Kreleger & Etheridge (2019)<sup>1</sup> describes the process for delineating private water supply areas (PWSAs) and nitrate management areas (NMAs).

Private water supply wells are wells that supply domestic drinking water outside of reticulated schemes. Under PC7, Table 8-7 sets private water supply wells limit of 5.65 mg/L (median) as the “*median value for all samples collected from a representative area.*” Note that ‘all samples’ and ‘representative area’ are not defined. It is assumed ‘all samples’ can be taken literally, and ‘representative area’ refers to the PWSAs delineated by Kreleger & Etheridge (2019). WLT may want to check these assumptions with ECan.

Kreleger & Etheridge (2019) divided ~2,640 private water supply wells south of the Ashley River into 23 geographic and depth-based areas (Figure 2-1). Forward and backward particle tracking simulations using MODPATH delineated recharge zones for each area (PWSAs) (Figure 2-2). There is significant overlap for some of the PWSAs due to modelling uncertainty. The large extent of some of the recharge areas reflects both modelling uncertainty and the spatial extent of the PWSA area itself. The PWSAs were derived using a steady state flow model so do not allow for temporal variability (e.g. seasonal differences).

Based on the modelling that was carried out, the West Eyrewell/Burnt Hill area not overlain by a PWSA (Figure 2-2) was considered to recharge the Christchurch aquifers.

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<sup>1</sup> Kreleger, A & Etheridge, Z (2019). *Waimakariri Land and Water Solutions Programme, Options and Solutions Assessment: Nitrate Management*. Environment Canterbury Report No. R19/69.  
<https://api.ecan.govt.nz/TrimPublicAPI/documents/download/3626251>

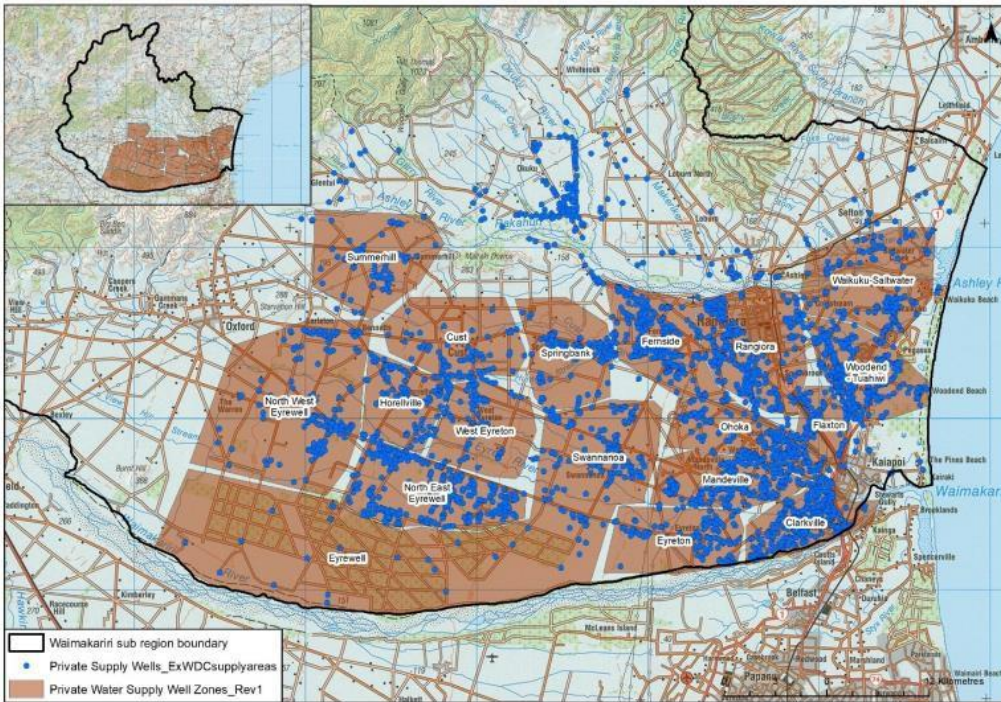


Figure 2-1 Area-based private water supply zones from Kreleger & Etheridge (2019)

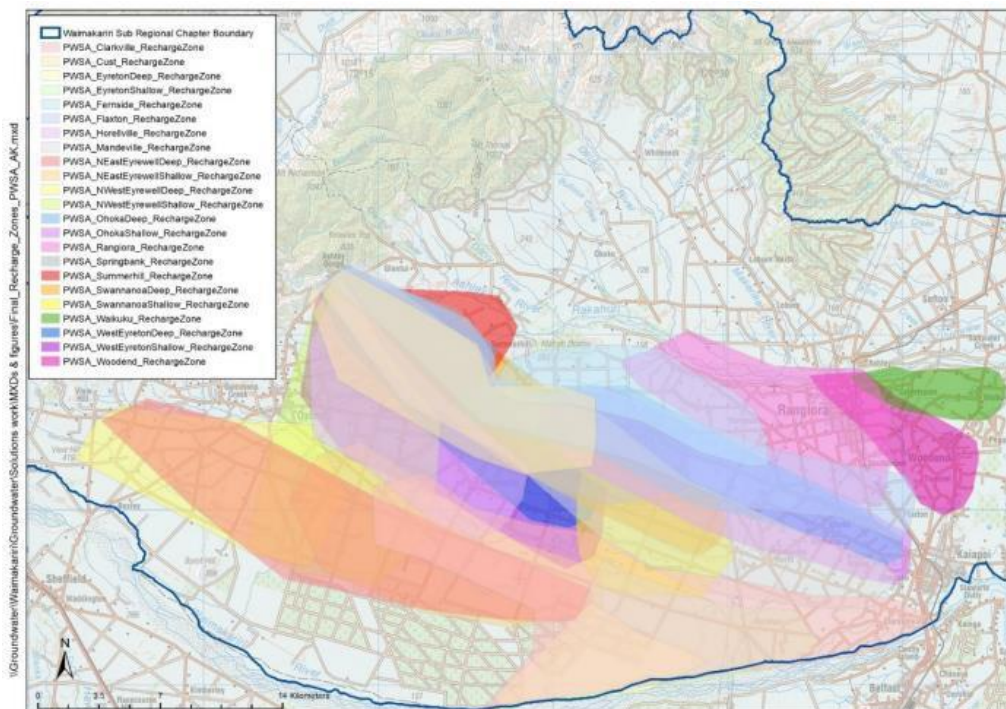


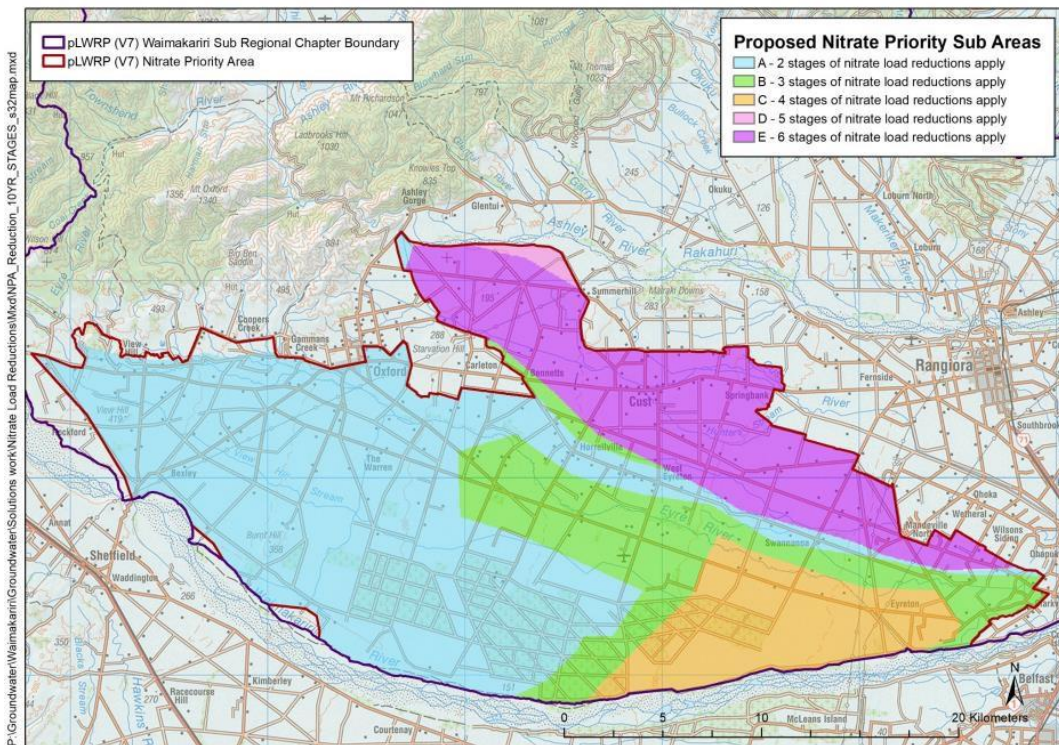
Figure 2-2 Recharge zones (PWSAs) for the areas shown in Figure 2-1 from Kreleger & Etheridge (2019)

Kreleger & Etheridge (2019) created NMAs (Figure 2-3) based on PWSAs and other receptors<sup>2</sup>. NMAs reflect how many nitrate loss reduction stages<sup>3</sup> (beyond baseline GMP) are required to meet nitrate limits of 5.65 mg/L (as set in the ZIPA) based on 50<sup>th</sup> percentile nitrate loss model results for dairy farms and for other consented land use. Nitrate loss reduction maps were generated by:

<sup>2</sup> Defined in the report as 'a receiving water body that could be affected by contamination – e.g. a community water supply well, spring fed stream or estuary'.

<sup>3</sup> Each stage being ten years.

1. Calculating the percentage difference between current pathways nitrate concentration (based on 50<sup>th</sup> percentile model results) and 5.65 mg/L to show the required percentage reductions in nitrate concentration at each receptor.
2. Comparing model results using nitrate load layers based on ZIPA limits (as above) and permitted activity rules against current pathways concentrations for one ten-year reduction stage to determine percentage concentration reduction achieved.
3. Determining the percentage concentration reduction achieved per ten-year nitrogen reduction stage within the NMA for each receptor.
4. Applying these percentages to each receptor catchment (aka recharge area). Where these areas overlap, the receptor requiring the greatest reduction drives the percent reduction.
5. Calculating the number of reduction stages required to achieve the required concentration reduction.
6. Multiplying the number of stages by 15% for dairy<sup>4</sup> and 5% for consented non-dairy to determine the total percentage reduction required by these land uses under the ZIPA recommendations.



**Figure 2-3 NMAs and the number of stages of nitrate load reductions required beyond GMP based on 50<sup>th</sup> percentile model results**

Visual review of the PWSAs relative to NMAs suggests:

- NMA 'B' is largely based on the Clarkville PWSA (Figure 2-4);
- NMA 'C' is largely based on the extent of the Eyreton deep and shallow PWSAs (Figure 2-5);
- Several PWSAs generally align with the orientation and extent of NMA 'E' (Figure 2-6) but the NMA boundaries appear controlled by other receptors; and
- Several PWSAs fall within NMA 'A' and 'D' but, other than the boundary between NMA 'A' and NMA 'B' (Figure 2-4), other PWSAs do not appear to drive the extent of these NMAs.

<sup>4</sup>This became 20% under PC7.

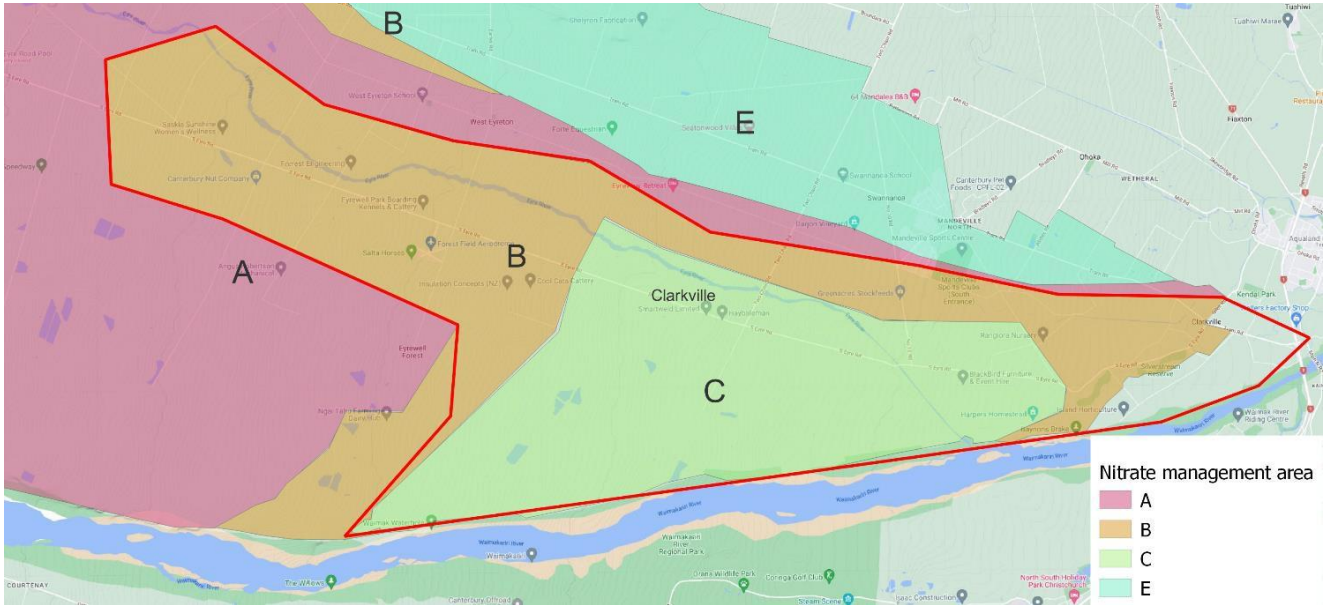


Figure 2-4 Clarkville PWSA (red outline) compared to NMAs

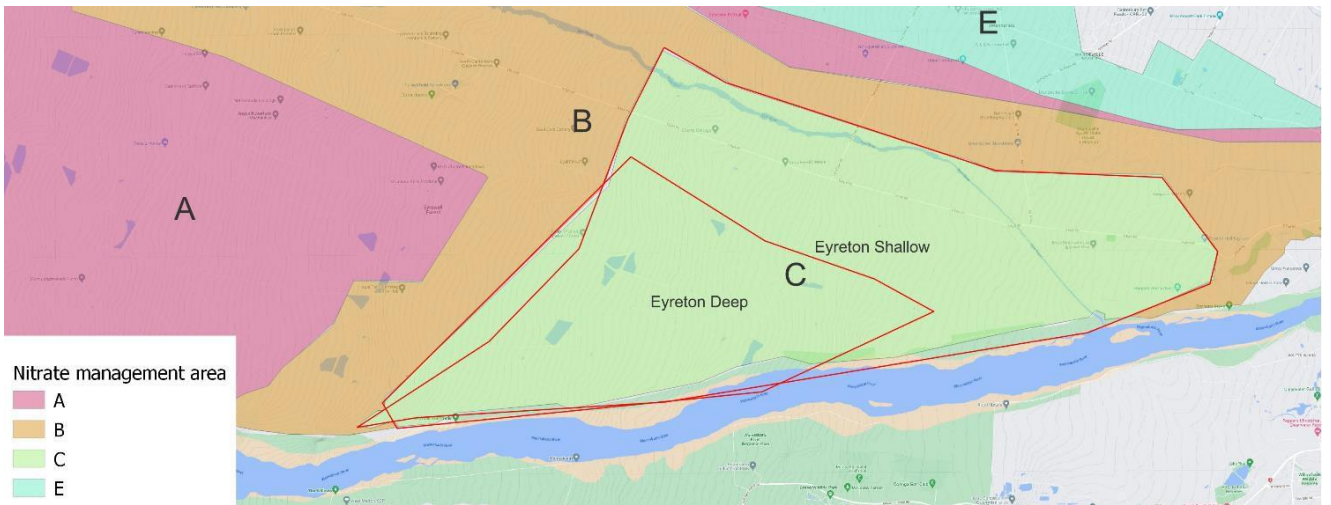


Figure 2-5 Eyreton deep and shallow PWSAs (red outline) compared to NMAs

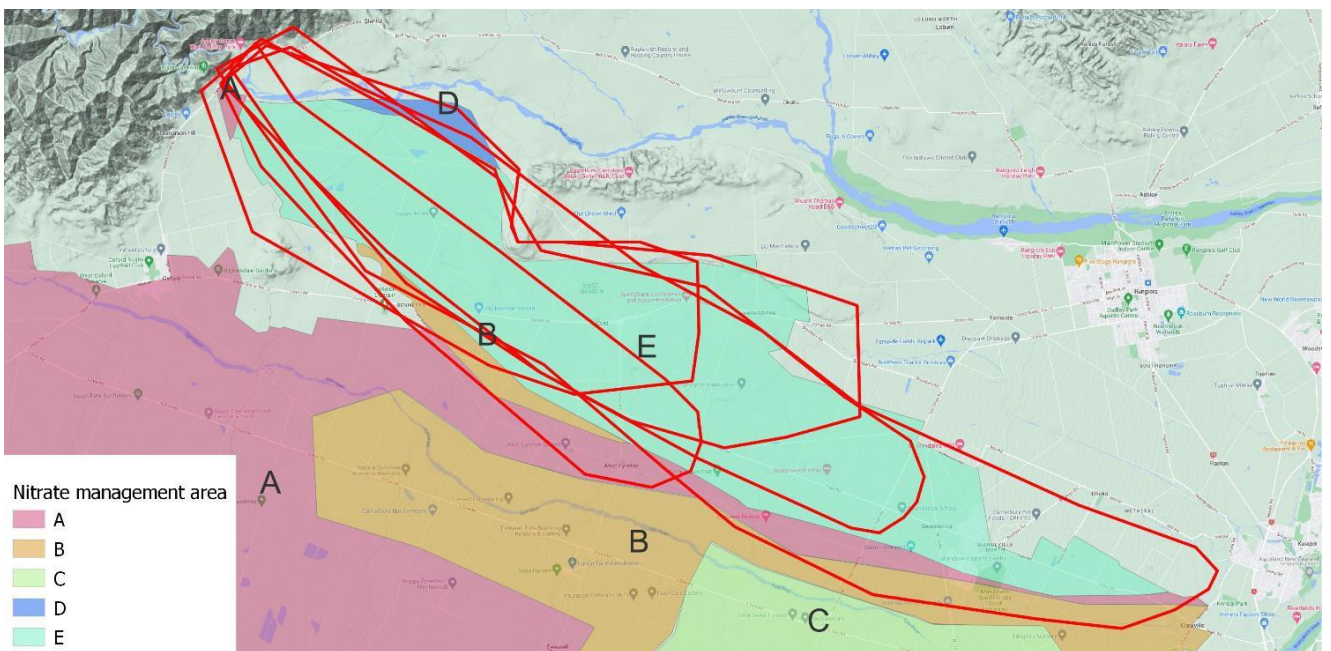
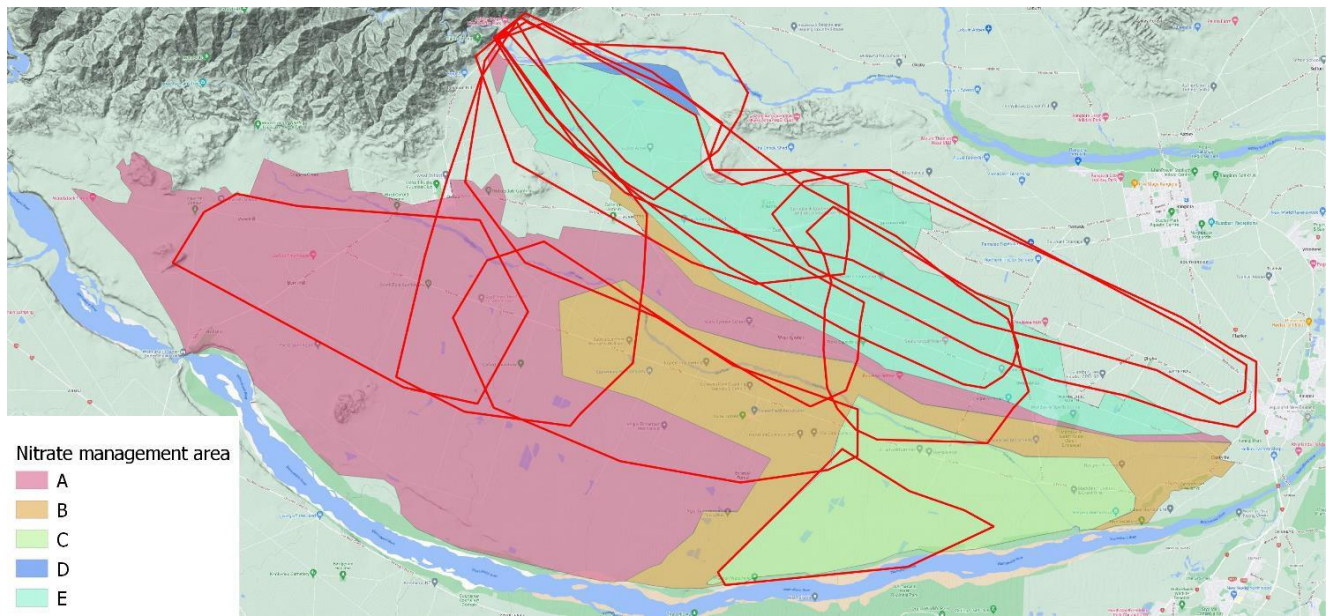


Figure 2-6 PWSAs (red outline) compared to NMAs

The Kreleger & Etheridge (2019) model results suggests that 50 years (five model stages) after implementation of the Solution Package, under 50<sup>th</sup> percentile model results all PWSAs meet target load reductions, and for 95<sup>th</sup> percentile model results 11 PWSAs<sup>5</sup> do not meet target reductions (Figure 2-7).



**Figure 2-7 PWSAs (red outline) that are forecast to not meet target load reductions after 50 years based on 95<sup>th</sup> percentile model results**

### 3 Existing Monitoring

Since the 18 May workshop, WDC has provided their stormwater monitoring network information, which Aqualinc have added to the compiled monitoring site information. Aqualinc has also sent a follow-up request to Ngāi Tahu Farming and have received no response. A summary of the collated data is presented below.

It is important to note that any one site can be counted more than once in the following sections depending on who is monitoring it and how it is monitored, e.g. the same well monitored by WIL monthly and ECan quarterly, or the same surface water site monitored by WIL for SW quality and ecology.

#### 3.1 Monitoring Relative to PWSAs

Figure 3-1 shows compiled monitoring sites relative to the PWSAs. The Waikuku PWSA has no groundwater quality monitoring while there is no surface water monitoring in Eyreton deep, Fernside, North East Eyrewell deep, North East Eyrewell shallow, North West Eyrewell deep, and Summerhill PWSAs.

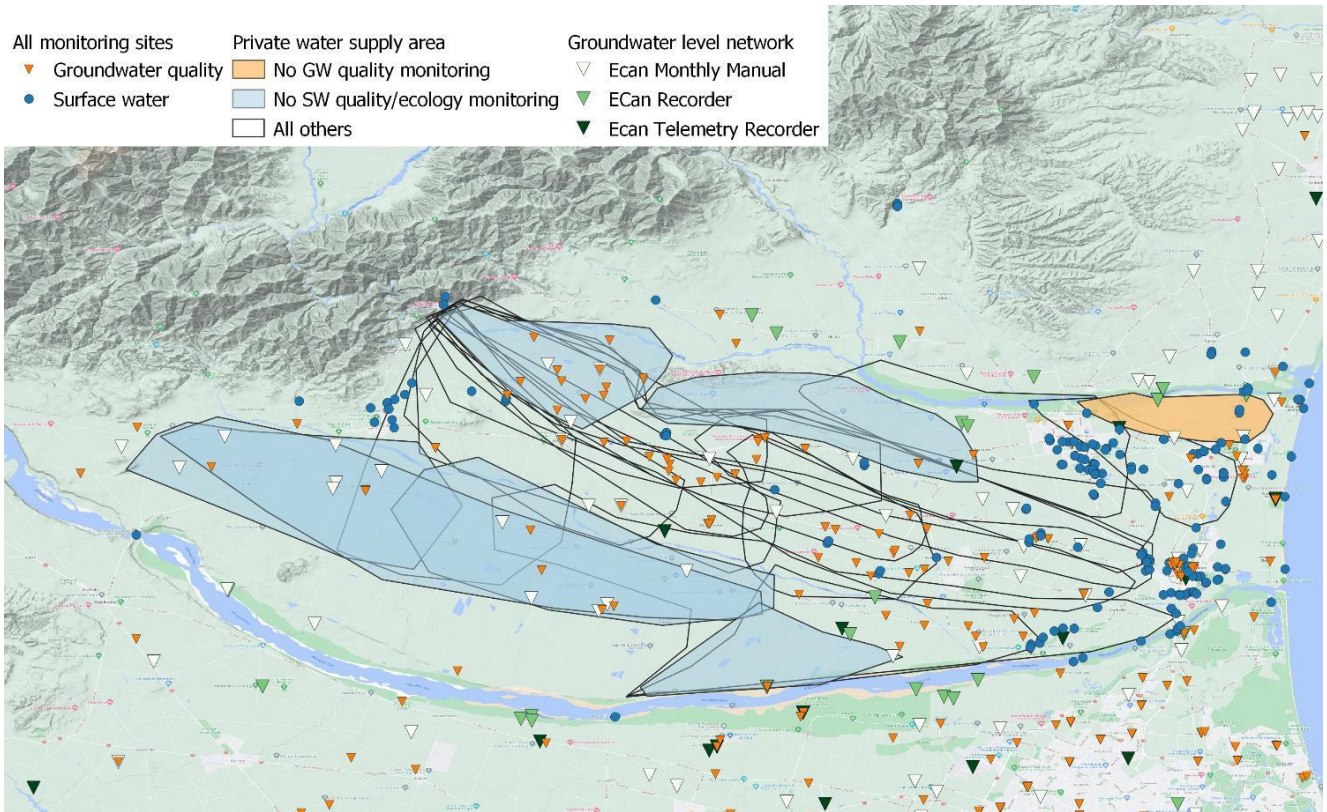
Table 3-1 shows monitoring type and frequency relative to PWSAs and participating organisations. Four PWSAs<sup>6</sup> have ≥10 ecology sites, and three have ≥10 surface water quality<sup>7</sup> sites. The same six sites listed above have neither ecological nor surface water quality monitoring.

Table 3-2 shows the depth distribution of monitoring wells. Most wells are <50 m deep, with significantly fewer wells beyond this depth. In addition to the Waikuku PWSA having no groundwater quality monitoring, the Fernside, North East Eyrewell deep and shallow, Rangiora, and Woodend-Tuahiwi PWSAs have ≤ 5 wells.

<sup>5</sup> Cust, Eyreton Deep, North East Eyrewell shallow, North West Eyrewell deep and shallow, Ohoka deep and shallow, Summerhill, Swannanoa deep and shallow, West Eyreton shallow

<sup>6</sup> Flaxton, Mandeville, Ohoka deep and shallow

<sup>7</sup> Ohoka shallow, Rangiora, Woodend-Tuahiwi



**Figure 3-1 Existing monitoring relative to PWSAs**

Table 3-1 Monitoring type and frequency count relative to PWSAs and participating organisations. Note there are duplicates where different organisations monitor the same site

PWSA	Organisati on	Ecology			GW quality			SW quality					GW leve l	Total by org by PWSA	Total by PWSA		
		3-5 years	Annu al	Tota l	Annu al	Monthl y	Quarterl y	Tota l	6 monthly	Annu al	Monthl y	Quarterl y				Weekly Nov- Mar	Tota l
Clarkville	DairyNZ		6	6												6	37
	ECan		2	2	1		1		2				2	10	15		
	WDC				12		12								12		
	WIL		1	1			2			1			1		4		
Cust	DairyNZ		4	4											4	42	
	ECan		1	1	2		3		1				1	5	10		
	WDC				17	2	19								19		
	WIL		2	2			5			2			2		9		
Eyreton Deep	ECan				3		3							4	7	7	
Eyreton Shallow	DairyNZ		1	1											1	26	
	ECan		1	1	4		4		1				1	8	14		
	WDC				8		8								8		
	WIL		1	1			1			1			1		3		
Fernside	ECan				1		1								1	4	
	WDC					1	1							1	2		
	WIL						1								1		
Flaxton	DairyNZ		8	8											8	40	
	ECan		2	2	1		2		1			1	2	6	12		
	WDC	1		1	8	2	10	1			2		3		14		
	WIL		2	2			2			2			2		6		
Horellville	DairyNZ		2	2											2	20	
	ECan				3		3							5	8		
	WDC				4		4								4		
	WIL		1	1		1	3	4		1			1		6		
Mandeville	DairyNZ		8	8											8	63	

PWSA	Organisati on	Ecology			GW quality				SW quality					GW leve l	Total by org by PWSA	Total by PWSA
		3-5 years	Annu al	Tota l	Annu al	Monthl y	Quarterl y	Tota l	6 monthly	Annu al	Monthl y	Quarterl y	Weekly Nov- Mar			
	ECan	1	1	2	1	1	4		1					1	9	15
	WDC			26	5		31									31
	WIL	1	1		1	4	5			3				3		9
North East Eyrewell Deep	ECan			3			3									3
	WDC				4		4							10		14
	WIL					2	2									2
North East Eyrewell Shallow	ECan			2			2									2
	WDC				1		1							5		6
	WIL					2	2									2
North West Eyrewell Deep	ECan			1			1							6		7
	WDC				3		3									3
North West Eyrewell Shallow	DairyNZ	4	4													4
	ECan			3			3							4		7
	WDC				2		2			3				3		5
	WIL	1	1		1	3	4			1				1		6
Ohoka Deep	DairyNZ	10	10													10
	ECan	3	3	2		1	3		3					3	8	17
	WDC			12	4		16									16
	WIL	3	3			4	4			4				4		11
Ohoka Shallow	DairyNZ	11	11													11
	ECan	4	4	2		1	3		4					4	6	17
	WDC	1		1	5	4	9	1			3			4		14
	WIL	2	2		1	2	3			5				5		10
Rangiora	DairyNZ	1	1													1
	ECan		1	1					1			1		2	5	8
	WDC	5		5		5	5	5			26			31		41



PWSA	Organisati on	Ecology			GW quality				SW quality				GW leve l	Total by org by PWSA	Total by PWSA	
		3-5 years	Annu al	Tota l	Annu al	Monthl y	Quarterl y	Tota l	6 monthly	Annu al	Monthl y	Quarterl y				Weekly Nov- Mar
Springbank	DairyNZ	4	4												4	42
	ECan	1	1	1		2	3		1				1	6	11	
	WDC			17	2		19								19	
	WIL	2	2			3	3			3			3		8	
Summerhill	ECan													3	3	14
	WDC			10			10								10	
	WIL					1	1								1	
Swannanoa Deep	DairyNZ	3	3												3	45
	ECan	1	1	1	1	1	3		1				1	6	11	
	WDC			21	4		25								25	
	WIL	1	1			3	3			2			2		6	
Swannanoa Shallow	DairyNZ	3	3												3	23
	ECan					1	1							3	4	
	WDC			10	4		14								14	
	WIL									2			2		2	
Waikuku	DairyNZ	1	1												1	10
	ECan	2	2						2				2	5	9	
West Eyreton Deep	DairyNZ	1	1												1	30
	ECan			3		1	4							2	6	
	WDC			10	3		13								13	
	WIL	1	1			4	4			1			1		6	
West Eyreton Shallow	DairyNZ	3	3												3	32
	ECan			3		1	4							7	11	
	WDC			8	3		11								11	
	WIL	1	1			5	5			1			1		7	
Woodend-Tuahwi	DairyNZ	2	2												2	37

PWSA	Organisati on	Ecology			GW quality				SW quality					GW leve l	Total by org by PWSA	Total by PWSA
		3-5 years	Annua l	Tota l	Annua l	Monthl y	Quarterl y	Tota l	6 monthly	Annua l	Monthl y	Quarterl y	Weekly Nov- Mar			
	ECan		1	1	1			1		1		2	1	4	3	9
	WDC	4		4		3		3	2			17		19		26
<b>Total by monitoring type</b>		<b>11</b>	<b>111</b>	<b>122</b>	<b>207</b>	<b>59</b>	<b>57</b>	<b>323</b>	<b>9</b>	<b>19</b>	<b>29</b>	<b>53</b>	<b>3</b>	<b>113</b>	<b>127</b>	<b>700</b>

Table 3-2 Depth distribution of monitoring wells by PWSA and participating organisations

PWSA	Row Labels	<20 m	20-50 m	50-100 m	100-150 m	Total per org per PWSA	Total per PWSA
Clarkville	ECan quality		1			1	25
	ECan level	6	2		2	10	
	WDC	8	3		1	12	
	WIL		2			2	
Cust	ECan quality		2		1	3	32
	ECan level	2	1	2		5	
	WDC	5	10	4		19	
	WIL	1	4			5	
Eyreton Deep	ECan quality		1		2	3	7
	ECan level		1		3	4	
Eyreton Shallow	ECan quality		2		2	4	21
	ECan level	2	2		4	8	
	WDC	6	1		1	8	
	WIL		1			1	
Fernside	ECan quality	1				1	4
	ECan level				1	1	
	WDC	1				1	
	WIL	1				1	
Flaxton	ECan quality	2				2	20
	ECan level	2	1	2	1	6	
	WDC	3	4	3		10	
	WIL	1	1			2	
Horellville	ECan quality	1	1		1	3	16
	ECan level	3	1	1		5	
	WDC	2	1	1		4	
	WIL	2	2			4	
Mandeville	ECan quality	1	2		1	4	49
	ECan level	6	1	2		9	
	WDC	5	20	5	1	31	
	WIL	1	4			5	
North East Eyrewell Deep	ECan quality		1		2	3	19
	ECan level	3	4	1	2	10	
	WDC		1		3	4	
	WIL		2			2	
North East Eyrewell Shallow	ECan quality		1		1	2	10
	ECan level	1	3		1	5	
	WDC		1			1	
	WIL		2			2	
North West Eyrewell Deep	ECan quality				1	1	10
	ECan level	2	1	1	2	6	
	WDC				3	3	
North West Eyrewell Shallow	ECan quality	1	1		1	3	13
	ECan level	1	3			4	
	WDC				2	2	
	WIL	1	3			4	

Ohoka Deep	ECan quality	3				3	<b>31</b>
	ECan level	4	1	3		8	
	WDC	5	5	5	1	16	
	WIL	3	1			4	
Ohoka Shallow	ECan quality	3				3	<b>21</b>
	ECan level	4	1	1		6	
	WDC	2	4	3		9	
	WIL	2	1			3	
Rangiora	ECan level	3	1		1	5	<b>10</b>
	WDC	4	1			5	
Springbank	ECan quality	1	1		1	3	<b>31</b>
	ECan level	2	2	2		6	
	WDC	5	10	4		19	
	WIL	1	2			3	
Summerhill	ECan level	1		2		3	<b>14</b>
	WDC	4	3	2	1	10	
	WIL		1			1	
Swannanoa Deep	ECan quality		2		1	3	<b>37</b>
	ECan level	3	1	2		6	
	WDC	5	13	5	2	25	
	WIL	1	2			3	
Swannanoa Shallow	ECan quality		1			1	<b>18</b>
	ECan level	2	1			3	
	WDC	1	9	3	1	14	
Waikuku	ECan level	4		1		5	<b>5</b>
West Eyreton Deep	ECan quality		3		1	4	<b>23</b>
	ECan level		1	1		2	
	WDC	3	7	3		13	
	WIL	1	3			4	
West Eyreton Shallow	ECan quality		3		1	4	<b>27</b>
	ECan level	4	2	1		7	
	WDC	3	5	3		11	
	WIL	2	3			5	
Woodend-Tuahiwi	ECan quality		1			1	<b>7</b>
	ECan level	2	1			3	
	WDC	2	1			3	
		151	187	63	49	450	<b>450</b>

### 3.2 Monitoring Relative to NMAs

Figure 3-2 shows compiled monitoring sites relative to the NMAs. A and B have been split into subzones (1 and 2) to enable reporting for each extent. A2 and B2 have no monitoring, and D only has groundwater quality monitoring (noting that A2 is very small). When considering spatial distribution, Figure 3-2 shows there are large gaps in A1, B1, and C. Note that A1 and C are important for assessing the potential for travel towards Christchurch city.

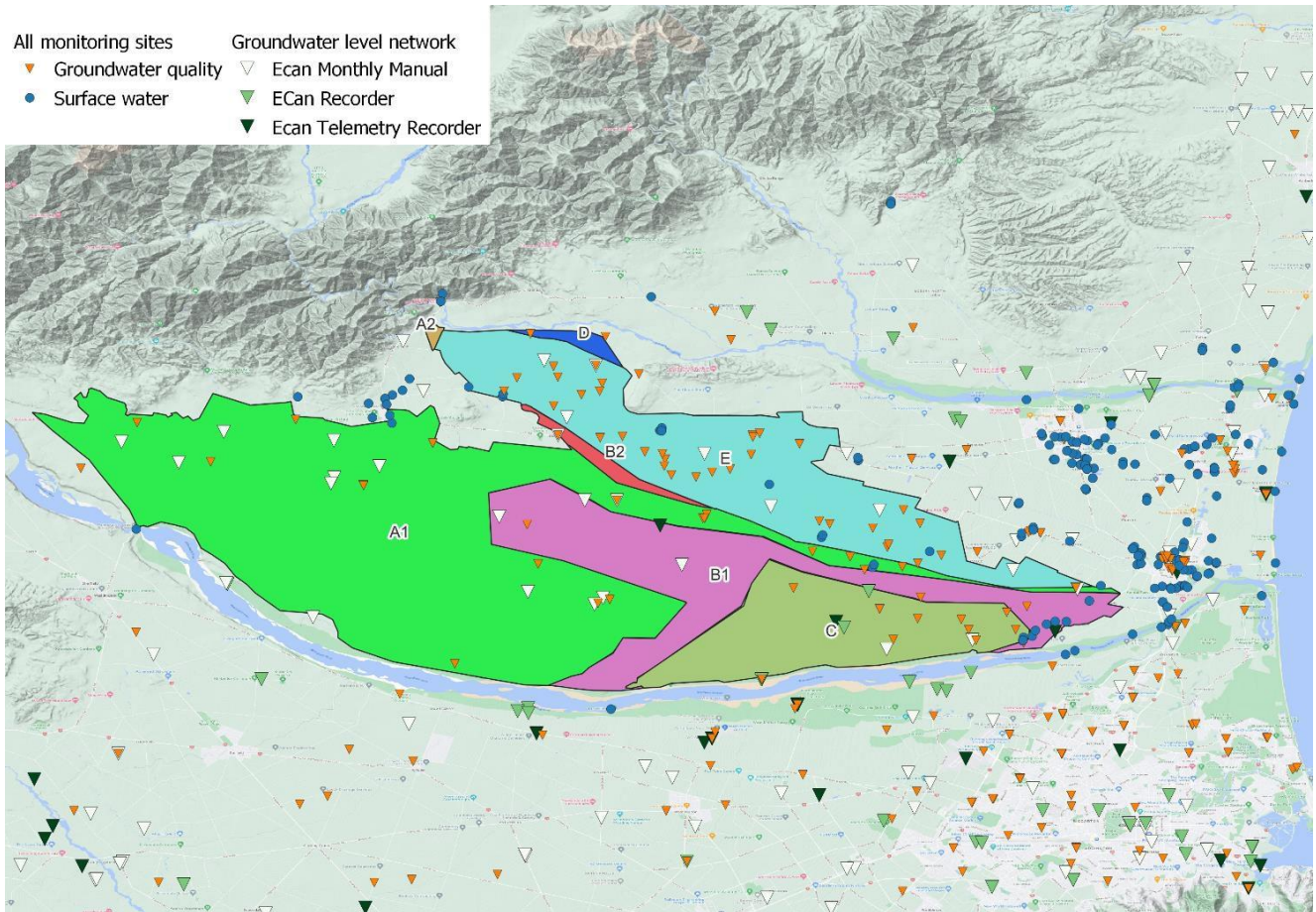


Figure 3-2 Existing monitoring relative to NMAs (note: multiple polygons for areas A and B have been considered separately)

Table 3-3 shows monitoring type and frequency relative to NMAs. A1 and E have the most monitoring sites, while there are substantially more groundwater monitoring sites than there are surface water monitoring sites. Ecological monitoring only occurs annually, most groundwater monitoring is annually, and most surface water quality monitoring is monthly.

Table 3-3 Monitoring type and frequency count relative to NMAs and participating organisations

NMA	Organisation	Ecology		SW quality				GW quality			GW level	Total by org by NMA	Total by NMA	
		Annual	Total	Annual	Quarterly	Monthly	Total	Annual	Monthly	Quarterly				Total
A1	DairyNZ	2	2									2	38	
	ECan							6		2	8	12		20
	WDC				2		2	3	8		11			13
	WIL									1	2	3		3
A2												0	0	
B1	DairyNZ	5	5									5	17	
	ECan	1	1	1			1					5		7
	WDC							4			4			4
	WIL									1	1			1
B2												0	0	
C	DairyNZ	1	1										1	20

NMA	Organisation	Ecology		SW quality				GW quality			GW level	Total by org by NMA	Total by NMA	
		Annual	Total	Annual	Quarterly	Monthly	Total	Annual	Monthly	Quarterly				Total
	ECan	1	1	1			1	1			1	5	8	
	WDC							8			8		8	
	WIL	1	1			1	1			1	1		3	
D	WDC							1			1		1	1
E	DairyNZ	6	6										6	
	ECan	1	1	1			1	1	1	2	4	7	13	55
	WDC							21	5		26		26	
	WIL	2	2			4	4			4	4		10	
<b>Total by monitoring type</b>		20	20	3	2	5	10	45	15	12	72	29	131	

Table 3-4 shows the depth distribution of monitoring wells. Most wells are 20-50 m deep, with few wells >50 m deep.

*Table 3-4 Depth distribution of monitoring wells by NMA and participating organisations*

NMA	Organisation	<20 m	20-50 m	50-100 m	100-150 m	Total by org by NMA	Total by NMA
A1	ECan quality	2	4		2	8	<b>34</b>
	ECan level	4	4	1	3	12	
	WDC	2	4	2	3	11	
	WIL	2	1			3	
A2						0	<b>0</b>
B1	ECan level	4	1			5	<b>10</b>
	WDC	2	2			4	
	WIL		1			1	
B2						0	<b>0</b>
C	ECan quality		1			1	<b>15</b>
	ECan level	2	1		2	5	
	WDC	6	1		1	8	
	WIL		1			1	
D	WDC	1				1	<b>1</b>
E	ECan quality	1	2		1	4	<b>41</b>
	ECan level	4	1	2		7	
	WDC	4	16	5	1	26	
	WIL	1	3			4	
<b>Total</b>		35	43	10	13	101	

## 4 14 June 2023 Next Steps

This memo summarises existing monitoring sites provided by participants relative to spatial extents defined by ECan during the PC7 process. The below sections lay out potential next stages and considerations. We would like direction on WLT and Element Environmental's preferred approach before undertaking further work. It is

worth being aware that the next Plan Change is likely to be outcomes focussed: that is, although there will be a need to work towards national bottom lines (in terms of concentrations), there is likely to be a focus on freshwater ecology outcomes.

## 4.1 Data Collection and Interpretation

We recommend collating available data. We need to decide whether we are focussed only on nitrate or need to include other parameters, and if the latter, which parameters/measures, and where and when – i.e. what data we want to consider spatially and temporally.

1. Check progress against the 5.65 mg/L median limit and/or measured nitrate versus the modelled nitrate concentrations. Do we include assessment of trends (that is, is the measured data heading towards modelled)?
2. Based on target parameters, identify the priority gaps to fill. Considerations include:
  - a. Spatial coverage/location within area.
  - b. Different well depths
  - c. Sampling density in each area
    - i. Possibly have more monitoring in areas where the greatest reductions are required or have a target number of sites per km<sup>2</sup>
    - ii. More sites where the highest nitrate concentrations are or balance the distribution so that we don't show a worst-case picture.
  - d. Possibly increase data density in areas of high model error.
  - e. Timing/frequency of data collection
3. To assess the model, we need to also include groundwater level measurements.
  - a. Groundwater level measurements should be being collected as part of groundwater quality sampling protocols.

## 4.2 Model Review

Although we have been advised that the existing model is not likely to be run again for the next Plan development, the outputs from the model may be used. For this reason, it is worth evaluating the model structure and/or calibration, particularly in the light of recent data. To do this, we need both water quality and groundwater level information.

- b. Groundwater levels control where groundwater flows and therefore also where nitrates (and other potential contaminants) travel (and at what rate).
- c. We recommend collating available information not captured by ECan to further assess their model calibration.

A further area of work that could be beneficial would be to run sensitivity analyses using the model, to determine where additional water level monitoring would help to constrain the model. This would be additional work but might help to refine where additional monitoring would have most benefit.

## 4.3 Further Work

As discussed at recent meetings, it would be useful to review land use inputs into the model. This is in terms of both more accurate land use assessment and taking into account any changes in Overseer modelling.

## 5 Work Between June 2023 and May 2024

1. Provided a July 2023 update with progress measured against the contract tasks and estimated hours to complete outstanding tasks.
2. Comms and receipt of monitoring data from ECan, WDC, CCC. Preliminary QA.
3. Testing of trend analysis on select bores and display of selected method results on digital GIS interface and presented at meeting with Element Environmental and WLT.
4. Had meetings to confirm direction and scope and next steps. These all landed on next steps being with Element Environmental.
5. Provided a February 2024 update with progress measured against the contract tasks and estimated hours to complete outstanding tasks.

### 5.1 Data Provided to Aqualinc

#### Data Provided by ECan

- **Groundwater Waimakariri Water Monitoring** nitrate data, has easting/northing and well numbers, various nitrate readings dating from 1973-2023.
- **Quantity data** in separate tab showing various water level in bores from 1971 to 2023, has easting/northing data too.

#### Data Provided by WDC

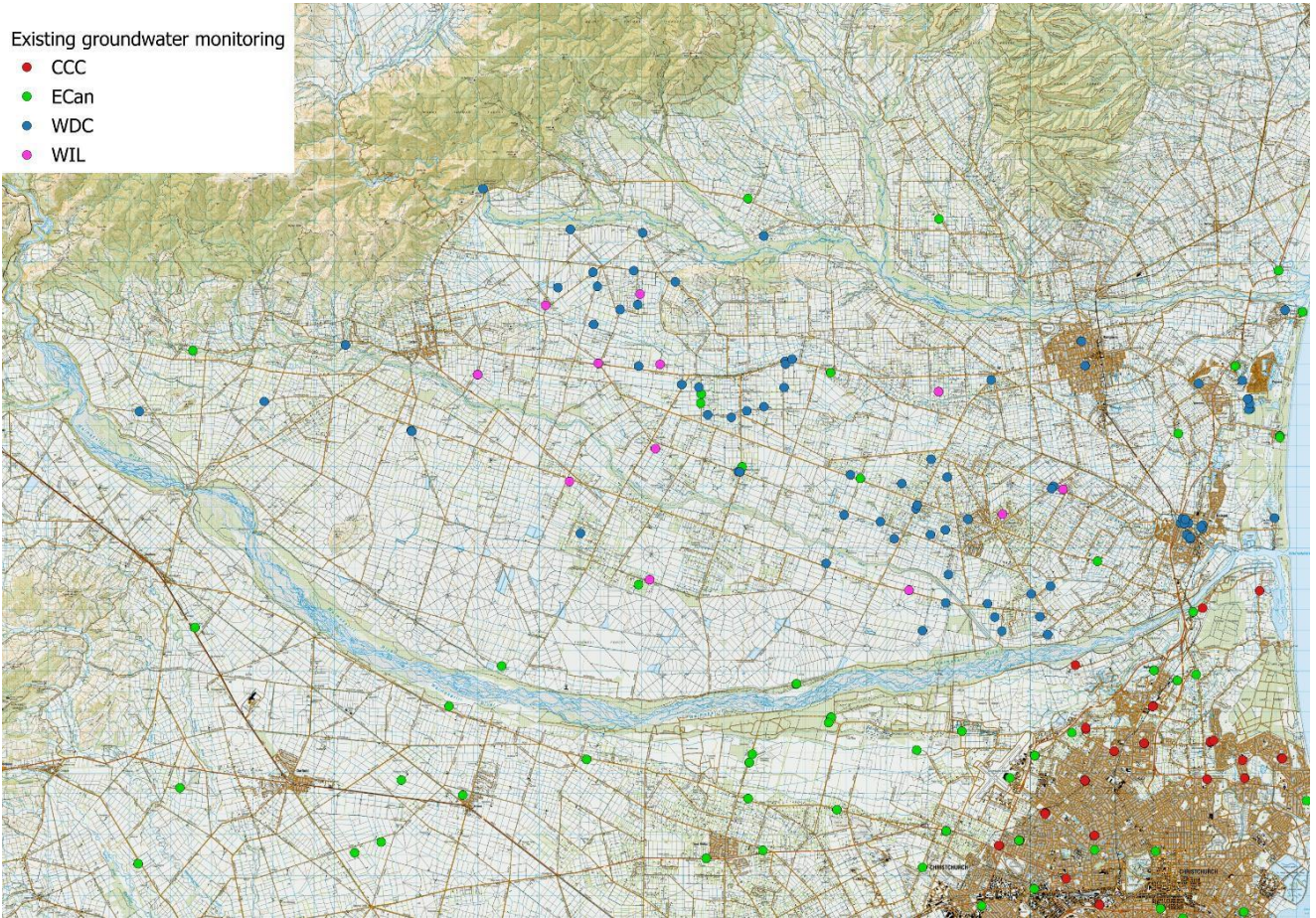
- **Hills WDC nitrate data (2012-2023)** for lots of groundwater and surface water sites.
  - No location information, except for the lab sample name.
  - Requested location/site ID from WDC Water team. Received some location data in excel file 'WWZC project WDC supply information Dec 2023'.
- **Eurofins nitrate data (Nov 2021- May 2023)** for various samples, some have an area, but no bore numbers or location data.
  - Requested location/site ID from WDC Water team.
- **Private well nitrate (and other parameters) data** for 38 wells around Eyreton, Cust, Carleton, Swannanoa.
  - One reading each spring between 2019-2022 for Eyreton and Cust wells, and 2021-2022 for Carleton and Swannanoa wells.
- **'Waimakariri WQ Raw Data from Ecan'**. (This is Eurofins nitrate data for bores to 2020 provided by Colin Roxburgh for nitrate mapping in 2020). There are two tabs, 'Waimak DC data' includes nitrate data for 1996-Dec 2019. 'ECan Waimak CWMS Zone Data' includes nitrate data 1990-2020. Both these data sources have bore numbers and eastings/northings.

Data was also provided by CCC. Data was not provided by any private entities, though we do have monitoring site locations as previously provided by WIL and DairyNZ.

## 6 State of play as at May 2024

Figure 6-1 shows ongoing groundwater monitoring sites by organisation. The data-poorest area is north of the Waimakariri especially towards the west. Figure 6-2 identifies wells >4 km from existing monitoring ranging from 3 m to 200 m deep that could increase understanding of variability of nitrate concentrations and groundwater levels spatially and with depth. We recommend WLT consider monitoring these wells. We have not progressed analysis of monitoring data, nor have we actioned any work on the Waimakariri model.





*Figure 6-1 Groundwater monitoring sites (220 across four entities)*

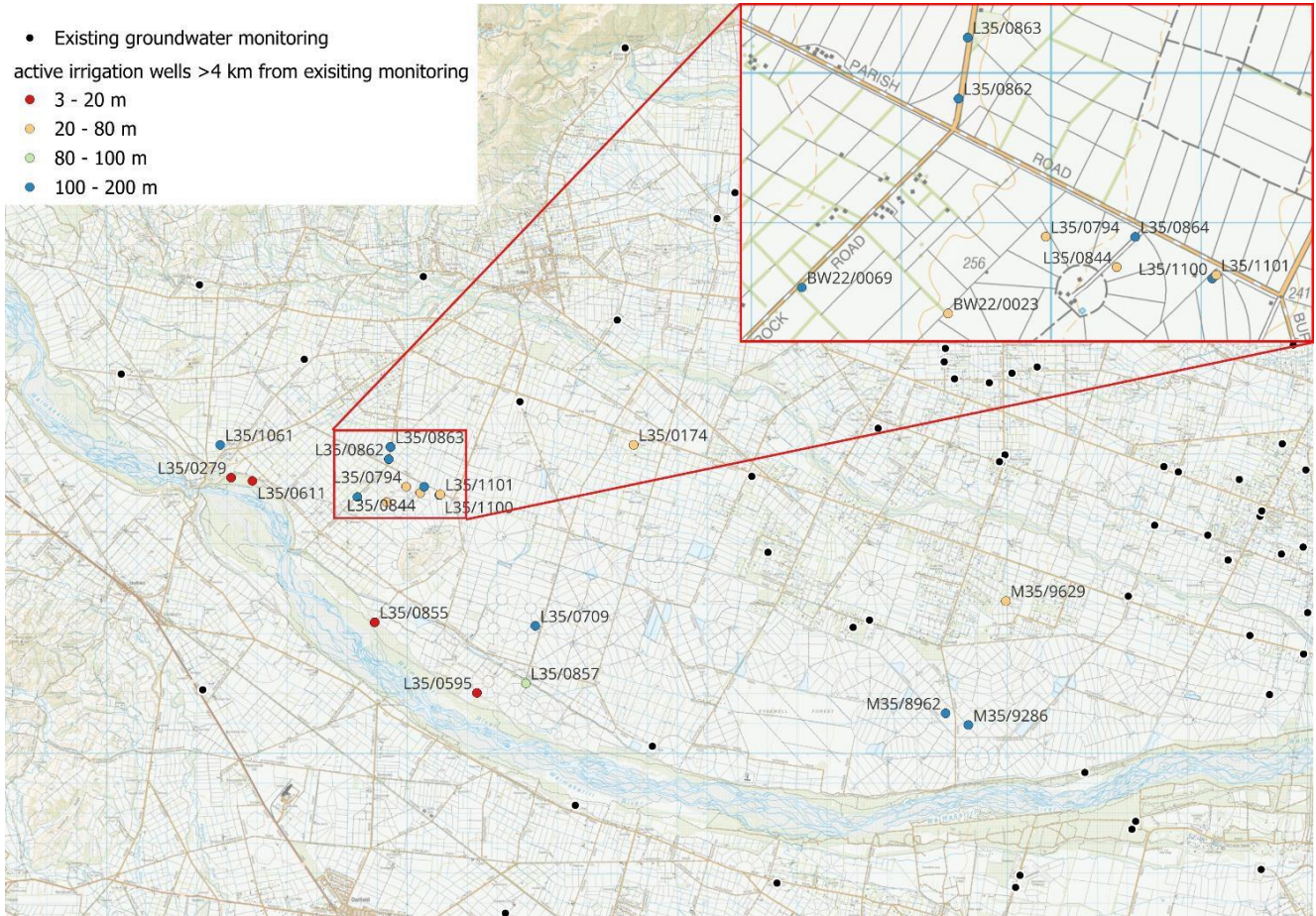


Figure 6-2 Potential additional monitoring wells relative to existing groundwater monitoring

OUR LAND  
AND WATER

Toitū te Whenua,  
Toiora te Wai



Photo: Tony Benny

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# Land Use Options in Waimakariri

Case Study from Whitiwhiti Ora:  
Land Use Opportunities Research

OUR LAND  
AND WATER

Toitū te Whenua,  
Toiora te Wai

National  
**SCIENCE**  
Challenges

 Data  
Supermarket  
Land Use Opportunities for Aotearoa

## Introduction

There's a common saying, that land is lifeblood to farmers. It's popular because it captures the deep intrinsic connection and care most farmers take in their land-use decisions.

Making decisions about future land use is complex and the impact of any choice can feel as though it is looming over a farming family's very existence. Farmers are deeply affected by the problems facing the natural world and are deeply aware of where human impact is causing changes to the environment and the climate. Choosing the right response to these problems, however, is often complicated by:

- ▶ Regulations and policies that change every few years.
- ▶ The uncertainty that comes with scientific modelling — especially models that don't always tell a useful story at farm level.
- ▶ Some researchers who recommend theoretical possibilities that don't connect to the practical realities of farming.

Many of those concerned about the land and the ongoing viability of farming within Aotearoa New Zealand, know some land use change is going to occur through opportunity or necessity to respond to the growing pressures faced by land, water, and people. At the national scale, the country supports a mosaic of land uses, but as we zoom to more and more local scale, monocultures increase. Examples include dairying in Taranaki or horticulture in Pukekohe. It may be time to examine new opportunities alongside existing successes.

Developing alternative land-uses requires support to leverage collective knowledge and resources, as well as a viable supply chain. It also benefits from expert knowledge around appropriate growing conditions and feasible opportunities. A detailed investigation of the risks involved in the product, its production needs, and market are fundamental to the success of any enterprise.

## About this case study

The Whitiwhiti Ora: Land Use Opportunities case study in Waimakariri brought farmers and researchers together to co-design an approach to assessing diverse opportunities when considering land-use change. It encompassed opportunities beyond business as usual. Any alternative land-use opportunities under consideration had to be economically viable, acceptable to the farmer, as well as possible given the soil and climate. The focus was on diversification over time rather than wholesale land use change.

While the work focused mostly on water quality and the impact of nitrogen (nitrate leaching) in particular, the work also took into account other contaminants (phosphorus, *E.coli*, sediment), greenhouse gas emissions, and the need to adapt to a changing climate. Workshops with farmers, industry experts, and researchers ran in tandem with the development of the [Data Supermarket](#), which aims to make this process more accessible for similar land-use decision-making in the future.

The ultimate aim of the project was to enable farmers to make confident decisions that allow the land and its people to prosper.

## How the process worked

We chose the Waimakariri location as it is an agricultural community in a nitrogen over-allocated catchment, with irrigation pressures. The catchment is vulnerable to both drought and flooding that may increase in the future.

The project allowed farmers within the Waimakariri catchment to assess potential land uses that their farms could diversify into. We worked with dairy, sheep and beef, and mixed cropping farms. The project included the catchment group, farm managers and farm business owners, regional council representatives, farm consultants, investment advisors, researchers, and experts in the proposed alternative land uses.

When making decisions, the group considered environmental benefits, climate resilience, and economic resilience in the area.

## What is required to replicate the process?

Another reason Waimakariri was chosen as the case study is because it has a strong catchment group trusted by and connected with the local farming community.

The first five steps of the process are therefore available to any group of farmers operating within a supportive catchment group and with access to a technically proficient farm consultant. Information contained in the Data Supermarket enables economically viable alternative land-use opportunities to be prioritised by anyone who can work GIS software.

This will enable your catchment to identify the top five feasible options for partial land-use diversification without monetary investment.

### Replicable process

1. To start the process, local farmers, the catchment group, and a technically literate consultant begin with an introductory workshop. The scope for the workshop includes a range of land use change and the requirement for any change to be commercially viable. The consultant can bring maps sourced from the Data Supermarket showing possible land-use options for the district. By the end of the workshop there should be a long-list of feasible land-use opportunities.
2. The consultant can then use the Data Supermarket, Farmax, and other available tools to refine the land-use options into a list of the top six opportunities specific to the location and acceptable to farmers.
3. In a second workshop, farmers are asked to volunteer to put their farms forward as case studies. It is best if a variety of farm types can be case studies. In Waimakariri, three case study farms were involved throughout the process, one dairy, one arable, and one dryland sheep and beef.
4. The farm consultant then takes each case study farms through baseline farm modelling, involving current stocking policy and level of production. This

### How to extend the process in your catchment

Steps six to 11 require discovery seed funding from primary industry or environmental regional development funds, industry bodies, or iwi to access external experts who can work at farm scale to create a more in-depth business case. The business case should include an examination of the impact of the climate to on farm risk (e.g. pest and disease risk).

If seed funding is available, the process for a case study farm requires an investment of time and an openness to providing farm information. Information case study farmers needed to provide included opening their books and giving a full baseline of their financials and farm system. Farmers talked to land-use experts over the phone and read up on the different options. They were also required to identify areas on their farm that were suitable for alternative land-uses and show these to the land-use experts in on-farm visits.

modelling also examines some elements of soil type and micro-climates on each farm.

5. Once modelling is completed, it's time for another workshop. At this meeting, farmers from each individual case study will work with the consultant, the catchment group, and other local farmers to identify appropriate land use opportunities for their farms.

### Extended process

6. Additional expertise to understand the catchment context may be required. Because this case study focused on reducing nitrogen losses, N-mitigation modelling was needed for the two dairy farm case studies. This usually requires a specialist consultant. Ecological monitoring assessments of the catchment waterways using eDNA may also be useful.



7. The next step is a workshop where:
  - ▶ Local experts knowledgeable about the alternative land use opportunities present on the short-listed land uses.
  - ▶ Modellers present the existing mitigation options and the potential results from stacked mitigation actions.
  - ▶ Participants split into groups to support each case study farm in building scenarios for potential new land-use options, including how much land could be reallocated to their chosen options, and where on the farm this would occur.
8. Experts in the identified alternative land-uses can then visit each case study farm where they and the farmer assess the options on the ground.
9. The land-use experts then produce individualised scoping reports, that go into more detail about the alternatives for each case study farm. For Waimakariri they were asked to report on two options, one with which farmers were comfortable and one that researchers had identified that was more of a stretch for the farm business.

10. Consultants then work with the case study farmers to produce detailed final reports on land-use scenarios for the farm incorporating capital investment, the impact on the farm’s environmental footprint, and the expected return on investment. The reports should also include information about labour, key skills, and infrastructure requirements.
11. Finally, the group gets back together for a final workshop, where the results of the scoping, scenarios and modelling are presented to all the farmers involved.

### Land-use opportunities in Waimakariri

Once the first six steps of the process were completed in Waimakariri, the following opportunities were identified for further investigation:

- ▶ On-farm forestry
- ▶ Fungi
- ▶ Hops
- ▶ Futuristic dairy (agrivoltaics on composting shelters)
- ▶ Apples

### On-farm forestry

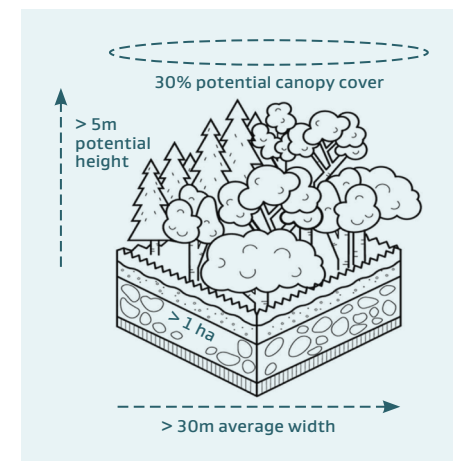
Carbon farming is a widely discussed option for farms, especially those on more marginal land. The definition of land eligible for inclusion in the Emissions Trading Scheme (ETS) is strict and is only an option for areas over 1 ha. The diagram at right summarises the requirements for inclusion in the ETS. This can make planting trees on farms difficult where tractors and irrigation access is important.

Carbon sequestration can occur using both native and exotic species, although trees grown for harvesting fruit or nuts do not qualify.

The work on commercial forestry in the Waimakariri catchment was carried out by Phil Orme from Orme & Associates.

In Canterbury, more carbon was sequestered over 12 years under hardwood forestry than for 16 years’ worth of radiata.

While planting forestry is often mentioned in the context of restoring catchments with high nitrate levels, water quality experts



recommend riparian planting of indigenous species, stock control, and shading streams as more important; although this kind of planting may not qualify as sequestration forest.

In the Waimakariri case study, on-farm forestry was also investigated in combination with the introduction of harvestable edible fungi.

Species	Registered as	Rotation	Stems p/ha	Value of 20 ha (at \$54/ha)
Pinus radiata	Production or Permanent	29 years (production)	625–1,100	\$22,449
Redwoods	Permanent	50 years with selective harvesting	600–1,100	\$51,209

Table 1: Potential for Carbon Farming in the Waimakariri catchment. Source: Orme & Associates

## Fungi

Edible fungi can grow on trees eligible for inclusion in the Emissions Trading Scheme. They can be grown in a range of situations ranging from very intensive to extensive. They are a long-term investment that requires soil testing and preparation. An intensive operation may require a level of development and irrigation set up similar to an intensive orchard. Maintenance of the crop involves pruning and grass management. Truffles also require soil aeration and spore enrichment along with specialist truffle hunting dogs for harvesting and skills in cleaning and grading.

Truffles and other fungi are complementary crops. This means that if they are planted near to each other the result is a longer fruiting season.



Cultivated saffron milk-cap. Photo: Mycotree

The work on edible fungi in the Waimakariri catchment was carried out by Alexis Guerin from Mycotree.

Fungus type	Pros	Cons
Bianchetto truffle on pines, oaks & hazels	<ul style="list-style-type: none"> <li>▶ High yield, high value</li> <li>▶ Requires less liming</li> <li>▶ Quick return especially on pines</li> </ul>	<ul style="list-style-type: none"> <li>▶ High labour, high set-up cost (for intensive farming under 1 ha) including liming, irrigation, pruning, grass control, truffle grading skills</li> </ul>
Périgord black truffle on oaks, hazels, hornbeams	<ul style="list-style-type: none"> <li>▶ High yield, high value</li> <li>▶ Premium prestigious product</li> </ul>	<ul style="list-style-type: none"> <li>▶ Requires a minimum of 1 ha</li> <li>▶ High labour, high set-up cost including liming, irrigation, pruning, grass control, truffle grading skills</li> <li>▶ Potentially slow return</li> </ul>
Saffron milk-cap on radiata pines	<ul style="list-style-type: none"> <li>▶ Low management, just needs mechanical grass control</li> <li>▶ No liming required</li> <li>▶ Easier set-up, harvest and sell than truffles, quick return, low management</li> <li>▶ Popular autumn commodity</li> </ul>	<ul style="list-style-type: none"> <li>▶ Harvesting more time-consuming on the margins, harvest weather-dependent</li> <li>▶ Fresh, or preserved (pickled) products only</li> </ul>
Porcini mushroom trials around the boundary on natives or redwoods	<ul style="list-style-type: none"> <li>▶ Easier, economic set-up, with minimum maintenance required</li> <li>▶ High value, premium prestigious product</li> <li>▶ Mushrooms can be frozen or dried, extended shelf-life</li> </ul>	<ul style="list-style-type: none"> <li>▶ Unlikely to be an efficient way to generate edible fungi returns</li> <li>▶ Results not guaranteed, time to production could be 10 years or more</li> <li>▶ Variable production that is weather-dependent</li> </ul>

Table 2: Fungi with potential in the Waimakariri catchment. Source: Mycotree



## Hops

Hops have become a popular international crop in recent years, with 80–90 percent exported. The current international market is soft, but the industry has confidence that this is a short-term situation.

There are a variety of hops to suit different climates and soils, with wind and hail being significant risks. Growing hop vines requires shelter, specific support structures and free draining soils. Some farmers grow up to 13 different varieties with prices varying between \$20–65/kg depending on varietal demand. Some varieties require a license.

Hops are commonly dried on the vine. However, hops as a crop need considerable processing, which is likely to require building a commercial relationship with an existing hop collective and processing plant.

The work on hop farming in the Waimakariri catchment was carried out by Craig Hornblow of AgFirst.

For a 40 ha hop orchard, yield was modelled as 1,800 kg/ha and at the average price of \$35/kg, the gross margin was \$18/kg. Labour needs varied between 1–10 FTE across the year and, during the labour demand peak in March, 25 full time pickers would be required. 200kg N/ha and between 100–200kg K/ha would need to be applied for the three-month growing period every year.

Photo: Elevate

## Agrivoltaics on composting shelters

In some places, to meet stringent water quality requirements, it may be necessary to switch from open pasture dairy to a barn-based system. To avoid intensification, the Waimakariri group looked at a 'cut-and carry' system, where cows are housed in a large composting barn.

Challenges identified under these new opportunities included how to resource the increase in energy and labour required to achieve new processes that would be introduced: cutting and carrying fresh grass, silage feed delivery, tilling the compost bed, and brushing the cows.

The group looked at how cutting-edge technology could undertake these new processes without substantially increasing the number of workers otherwise needed for a 'cut and carry barn' operation.

The work on agrivoltaics and futuristic dairy options in the Waimakariri catchment

was carried out by Sharee McNab from the University of Canterbury. She analysed the available technological solutions and found the following viable options:

- › A driver-optional (autonomous) electrified vehicle to mow the paddock, load the cut grass and dose liquid fertiliser
- › A robotic feed kitchen to collect feed from hoppers, mix the feed and deliver it to the cows
- › Milking robots
- › A small to medium electrified tractor to till the barn, spread muck, and plant crops

All of these 'futuristic' technologies require power. Luckily the large size of composting barns allow space for installing solar panels on the roof. Combined with storage batteries, solar energy generated on-farm would power a farm's new technology.



## Apples

New Zealand currently has around 10,000 ha of apple orchards. Ninety percent of apples are exported with Asia the most important market. In the last two year, apples have provided comparatively poor returns, however, prior to that returns were very good. Choosing a variety of apple crop depends on soil and climate. The premium varieties are controlled, and license fees vary between \$5,000–200,000 p/ha.

All apple growers are aligned to one or more of the 40 exporters in New Zealand. Many

contract for fruit packing and cool storage off-farm.

The work on apple orchards in the Waimakariri catchment was carried out by Craig Hornblow of AgFirst.

For a 50 ha orchard, in the first three years of tree growth the N-footprint is high – modelled as 200kg N/ha, reducing to 30kg N/ha once the trees reach maturity. Labour needs vary across the year, however during the five-week harvesting season, modelling showed a need for 175 full time apple pickers.



Photo: The Grange

### Case study farms

Three farms, one each of dairy, arable, and dryland sheep and beef, took part across the whole case study project in the Waimakariri

catchment. All three farms have very different starting points in regard to water quality and profit.

Farm type	N-loss (kg)	N-loss (kg/ha)	Profit / ha (EBIT)	Alternate land-use
<b>Drystock</b> ▶ 640 ha (385 ha pastoral) ▶ ~200 Angus cattle ▶ ~1,000 sheep/lambs	5,443	15	\$170	Trees/carbon, edible fungi
<b>Dairy</b> ▶ 513 ha (162 ha lease block) ▶ 95% irrigated, ▶ ~1,400 cows	33,817	66	\$4,400	Apples, hops + solar power and autonomous electric vehicles to achieve up to 70% reduction
<b>Arable</b> ▶ 747 ha (in separate blocks) ▶ 75% irrigated ▶ Barley, wheat, ryegrass seed, oil seed, dried peas, clover seed, specialty seeds ▶ ~4,000 lambs	32,082	45	\$3,100	Trees/carbon, edible fungi + manage and/or crop changes to reduce N

Table 3: Case study farms

### Hill country sheep-beef expansion into carbon farming and fungi

Alistair and Genna Bird are a couple who have been leasing The Grange from family for the last ten years. Currently The Grange is predominantly a store farm with lambs and calves at weaning with some forestry in the ETS. They have also got farm tourism going with on farm camping, a rentable cabin, and some horse trekking. They have two school aged children and want to give their kids the opportunity to run the farm in the future if they are interested.

However, their short-term focus is staying viable and keeping the lights on, which means they are looking to diversify and are open to different revenue streams. The case study has made them interested in diversifying into carbon farming, edible fungi and growing hops.

Working with a commercial forestry consultant, the Birds are planning to register their remaining post 1989 native vegetation in the ETS and plant another 6.8 ha in pines.

The ETS consultant then worked together with the couple and an expert in edible fungi. The farm visits identified four potential sites where fungi could be seeded on newly planted trees. Two other sites appropriate for ETS forestry had too many established trees that meant edible fungi wouldn't be easy to seed.

The Birds are now looking into planting 10 ha in pines with Bianchetto truffle spores that would be intensively managed and irrigated with stored water. They also decided to plant another 1 ha in stone pine and seed half each with Bianchetto and Périgord truffle varieties. A further 0.65 ha in two separate blocks is planned to be planted with radiata pines seeded with saffron milk cap mushrooms.

Alistair Bird said: "Fungi ticks a lot of boxes for us. We can still graze underneath and keep our income from the ETS. This could allow us to expand into destination tourism and market ourselves that way. At the moment, we're mulling it over. We haven't pulled the trigger yet, but we are really well set up to make a decision now."







Photo: Tom Swinnen

### Futuristic dairy with apples

Ben McKerchar, his partner, and their kids are one of three families working as contract milkers on Larundel Dairy Farm. The farm was converted to a partnership arrangement in 2001 and Ben and his family have been there for 15 years. Ben is clear that he doesn't want to own a farm but is invested in ensuring that the benefits of Larundel's profits don't outweigh the long- and short-term impacts on the environment.

"Being part of this gave us a push to look at what a dairy farm might look like in 30 years. We were medium-term thinkers and it's pushed us out a bit and upped our environmental thinking."

The case study looked at Larundel moving to 'futuristic dairy' and introducing apple and hop crops to the land no longer used in pasture.

The 'futuristic' element examined building a large composting barn to house Larundel's 1,300 cows. It found that installing enough solar panels on the new barn's roof to power the new autonomous electric vehicles as well as the composting barn and milking system would likely be a worthwhile investment. However, installing enough solar to power

the irrigation load as well as the new technology and barn was unlikely to be profitable.

Ben said, "We always look at following down the path of any technology that would benefit the farm, so we're already that way inclined. It's joined all the other new tech in the massive bubble above our heads that contains our thinking about what the farm will look like in 20 years."

Larundel also investigated planting 50 hectares of apples and 40 hectares of hops on the farm. While hops were not for Larundel, they remain interested in apples.

The modelling for the apple orchard saw a maximum debt of \$13 million (in year three) and the farm breaking even in year ten. By year 15, the internal rate of return was 6 percent. However, there was a need for 175 full time apple pickers during the five-week harvesting season. Ben said, "The apples are something we're quite interested in, the only thing that was holding us back was the climate and that's changing. So it's in our heads now and has opened up our thinking a bit more."

### Arable shift with hops, fungi, carbon farming and crop changes

Roscoe Taggart, his parents, wife and three kids live on Taggart Farms. Roscoe has been running the farm for five years, taking over the job from his dad, who took over from his father, who bought the farm in 1958. Taggart's has been a predominantly arable farm since the early 2000s. A third of the farm is in wheat, a third in rye grass and white clover and the final third in forage crops. They also run around 4,000 store lambs.

The Taggarts take the balance between profitability and sustainability seriously, as they would very much like their young children to have the option to continue on the farm if they wish.

The case study had the Taggarts looking at diversifying into carbon farming combined with the introduction of edible fungi and hops. In addition, the case study looked at decreasing lamb numbers from 4,000 to around 2,300. These actions would meet the requirement to decrease N-loss by 5 percent by 2030 and 10 percent by 2040.

Working with a commercial forestry consultant, the farm investigated options for potential plantings that would maximise return on around 18 ha of the farm including planting hardwoods that would be entered into the ETS and also host edible fungi. They also looked into production forestry revenue, particularly around eucalyptus production, which could be entered into the ETS and potentially used as a biofuel or post material crop using coppicing. A stream runs through the farm, so the farm also examined riparian planting of 4.7 ha in indigenous forestry. Alongside fungi, the arable farm also looked into other new forage crops.

The farmers also investigated whether planting hops would be an option. Modelling for the hop vines saw a maximum debt of \$7.8 million (in year one) and the farm breaking even in year seven. By year 15, the internal rate of return was 14.4 percent. At the labour demand peak in March, 25 full time pickers would be required. Due to the considerable offsite processing needs required, the farm would need to investigate working with a hop collective in a different region.

Roscoe said "Right now's not the time to take risks, but the information that was gathered was exciting, especially the hops. We could do most of the hop primary production ourselves and it would fit with the quieter times on the farm. So, once interest rates come down, we're hoping to set up a few bines as a trial with a few different cultivars and see how far we can go."



Photo: Tony Benny



Photo: Timo Volz

## Complexity and scale

The Whitiwhiti Ora Waimakariri case study has reinforced that land use diversification is a complex issue.

With irrigation and access to a significantly sized local market as well as the benefits of being close to an international port and airport, local farmers understand that there is real potential for changes to land use in the Waimakariri catchment. However, the complexities involved add to any existing challenge for family-owned businesses. These complexities include:

- ▶ accessing capital
- ▶ identifying high value markets
- ▶ sourcing the resources needed to access or develop required infrastructure (e.g. coolstores, pack houses)
- ▶ reaching the scale required to operate the new infrastructure cost-effectively.

A corporate investor in forestry and horticulture shared their investment journey with the farmers. They noted the risks, challenges, and opportunities involved in choosing whether to change land-use. They also highlighted the need to consider different business models to get the required scale for new industries within a region. Finally, they discussed the opportunity to be followers if corporate investment can provide the required scale to enable development of the required infrastructure.

The sheep and beef and arable farms already had a range of enterprises within their farming businesses. They were therefore able to discuss additional challenges, including:

- ▶ significant capital requirements
- ▶ the need to build on-farm capacity and skills
- ▶ uncertain markets adding further risk across a range of indicators (e.g. profitability, employing skilled labour, accessing practical experts).

For all farms moving into new business area, managing additional land uses in an already complex system makes significant demands on managerial focus and skills. If there is insufficient managerial focus, there is a risk that farm performance will become suboptimal for both existing and new enterprises. There needs to be a large enough scale in the microclimate and soil niche required in any new enterprise to make the dilution of managerial focus worthwhile, or to allow additional management expertise and skills to be brought in. This emphasises the need to think of new ways and structures to create the required on-farm capacity and skills.

Finally, the scientific analyses from Plant & Food Research, AgResearch, Dairy NZ, and LWP highlighted the scale of change required for meaningful impacts on catchment freshwater.

## Other resources

Alongside the Data Supermarket, various other resources are available when investigating land-use opportunities.

- ▶ Venture Taranaki's [Branching Out](#) project has short brochure-style documents that discuss the practical details of alternative land use choices. Land-use opportunities include avocados, gin botanicals, grains, legumes and vegetables, hemp fibre for construction, hops, indigenous ingredients, kiwifruit, medicinal plants, sheep/dairy, and trees.
- ▶ Work has also been done by [Thriving Southland](#) to shortlist seven food and fibre opportunities for the region, and feed into the region's [long-term plan](#). Opportunities include on-farm energy and biomass, food and beverage tourism, industrial hemp, and precision fermentation.
- ▶ The [Worker Requirements by Land Use dashboard](#) is a tool to estimate the number of full-time equivalent staff needed for different land-use scenarios, and can suggest land uses that complement a selected land use(s) to smooth out seasonal variance in workforce requirements.
- ▶ Pohewa Pae Tawhiti (Visualising Horizons) is a guided process for decision making. The [Process Guidelines](#) document assists a facilitator to lead groups through the seven steps of the Pohewa Pae Tawhiti framework to explore different options appropriate to their context and land.
- ▶ [Tools for Making Land Use Decisions](#) is a learning module developed by the Our Land and Water National Science Challenge for rural professionals. It includes evidence-based insights on how to involve a broader group with land use diversification., how to help farmers and catchment groups with decision making, and the tools you can use to support change.
- ▶ The [Integrated Impact Assessment \(IIA\) Framework](#) shows the impact of land use changes on economic, social, cultural and environmental indicators, allowing exploration of scenarios where land use is changing for a specified region of New Zealand.
- ▶ As this case study is being produced, some resources are still in development. Please check the following pages for relevant research to be added mid-2024: [Signals for Land Stewards](#) (Stronger Signals sub-project), [Synthesis Scenarios for Future Land-Use](#), [Mosaic vs Monoculture Landscapes](#).

**WAIMAKARIRI DISTRICT COUNCIL**

**REPORT FOR INFORMATION**

**FILE NO and TRIM NO:** 240520080417

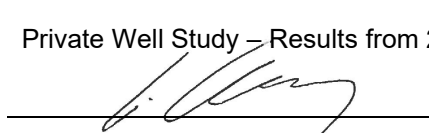
**REPORT TO:** UTILITIES AND ROADING COMMITTEE

**DATE OF MEETING:** 18 June 2024

**AUTHOR(S):** Sophie Allen – Water Environment Advisor

**SUBJECT:** Private Well Study – Results from 2023 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. WDC community drinking water supplies are compliant with the Drinking Water Standards for New Zealand (2022) and are not examined in this study, with a focus on private wells.
- 1.3. This report summarises the findings of the WDC private well study for 2023 and compares to results from 2019- 2022. 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 35 wells in total: nine in Cust, eight in Eyreton, eight in Carleton and ten in Swannanoa.
- 1.4. The nitrate mean and median for Cust and Eyreton samples has fluctuated over the 2019-23 period. It is not possible yet to conclude any long-term trend in nitrate levels from five data points for each well.
- 1.5. Carleton and Swannanoa areas were sampled for the first time in the 2021 study, with nitrate medians lower than that found for Cust and Eyreton. The 2022 and 2023 mean and median results for Carleton and Swannanoa decreased when compared to the 2021 study mean and median.
- 1.6. Note that not all wells were resampled each year over the 2019-2023 period, with some well samples not being submitted each year consistently by the property owner.
- 1.7. In the 2023 study, one well 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 is the role of Taumata Arowai to set the MAV for nitrate-nitrogen in the Drinking Water Standards for New Zealand based on a review of scientific literature. 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.

- 1.8. 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. 57% of the wells in Eyreton, 60% in Cust, 25% in Carleton and 20% in Swannanoa were above half the MAV (5.65 mg/L) for nitrate-nitrogen in the 2023 study. The median nitrate concentration for Cust and Eyreton, as sampled in the 2023 study exceeds the limit of a median of 5.65 mg/L nitrate-nitrogen (half of the MAV). Carleton and Swannanoa median nitrate concentration for the 2023 study were less than 5.65 mg/L (half of the MAV).
- 1.9. In the 2023 study, a weak correlation was found between the increasing well depth and decreasing nitrate levels, as found in previous years. Other factors such as geochemical processes, nitrate recharge sources and date of sampling likely play a larger role than depth.
- 1.10. Other chemical parameters analysed in the 2023 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 manganese was also exceeded in one well. Microbiological testing was not carried out due to the risk of contaminating a sample if not trained appropriately.
- 1.11. This nitrate study is intended be repeated in spring 2024 to allow for assessment of trends over time. Well owners from the 2019-23 sample rounds will be approached again for repeat annual sampling.
- 1.12. 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). Maps of common groundwater contaminants will be updated shortly.

## 2. **RECOMMENDATION**

**THAT** the Utilities and Roading Committee:

- (a) **Receives** Report No. 240520080417.
- (b) **Notes** the findings of the 2023 study, with one well above the nitrate-nitrogen Maximum Acceptable Value (MAV) set in the Drinking Water Standards for New Zealand (2022). Of the wells sampled, 57% of the wells in Eyreton, 60% in Cust, 25% in Carleton and 20% in Swannanoa sampling areas were above half of the MAV (5.65 mg/L).
- (c) **Notes** that the median nitrate concentration for Eyreton and Cust sampling areas, as sampled in the 2023 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, while 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 2024 (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.

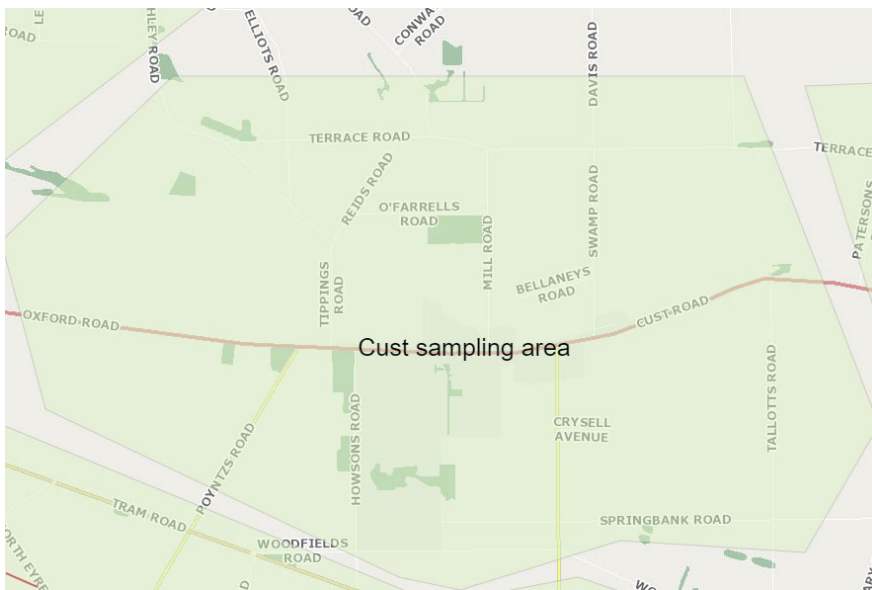
- (f) **Notes** that statistically robust trends for nitrate concentration over time are not able to be concluded from data for only five years, or three years of data for Swannanoa and Carleton sampling areas.
- (g) **Circulates** this report to the Council, Community Boards and Waimakariri Water Zone Committee for information.

### 3. **BACKGROUND**

- 3.1 Drinking-water supplies to more than one household are ultimately the responsibility of the owner or operator to provide a duty of care under the Water Services Act (2021). Domestic self-suppliers are not required to test or monitor their supply under the Water Services Act (2021) however are strongly encouraged to do so.
- 3.2 Drinking-water safety is also a 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.
- 3.3 Taumata Arowai is the regulator responsible for drinking water regulation-related activities in New Zealand (see <https://www.taumataarowai.govt.nz/>). It is the role of Taumata Arowai to set the MAV for nitrate-nitrogen in the Drinking Water Standards for New Zealand based on a review of scientific literature.
- 3.4 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.'
- 3.5 A pilot study of nitrate levels in private wells in the Eyreton and Cust 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.
- 3.6 Eyreton (Map 1) and Cust (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.



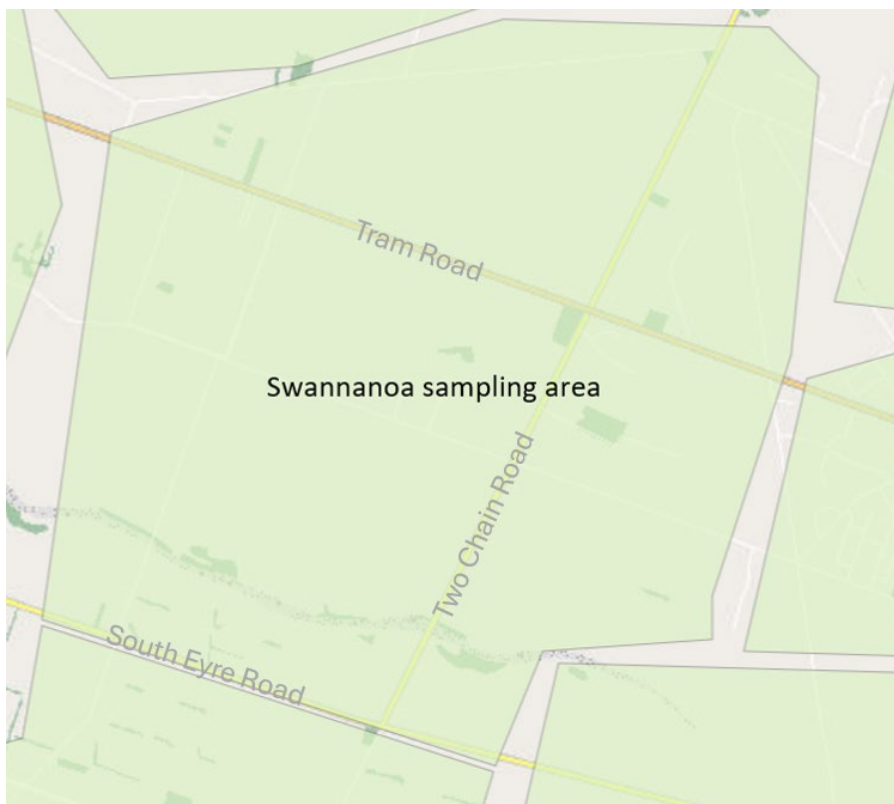
**Map 1:** Eyreton private well sampling area for groundwater within the Waimakariri Water Zone, as defined in the Zone Implementation Programme Addendum (ZIPA)



**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 2023 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 7.5 mg/L, similar to findings from 2019-2022 (see Figure 1). Eyreton wells sampled had a median of 6.6 mg/L, similar to findings in 2019, 2021 and 2022, 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 1.98 mg/L which was a decrease from 3.78 mg/L in 2021 but increase from 0.78 mg/L in 2022, and the Swannanoa area median was 3.25 mg/L which was a decrease from 5.62 mg/L in 2021 and 4.3 mg/l in 2022. Note that wells were selected based on a geographic spread over an area and for a range of well depths.

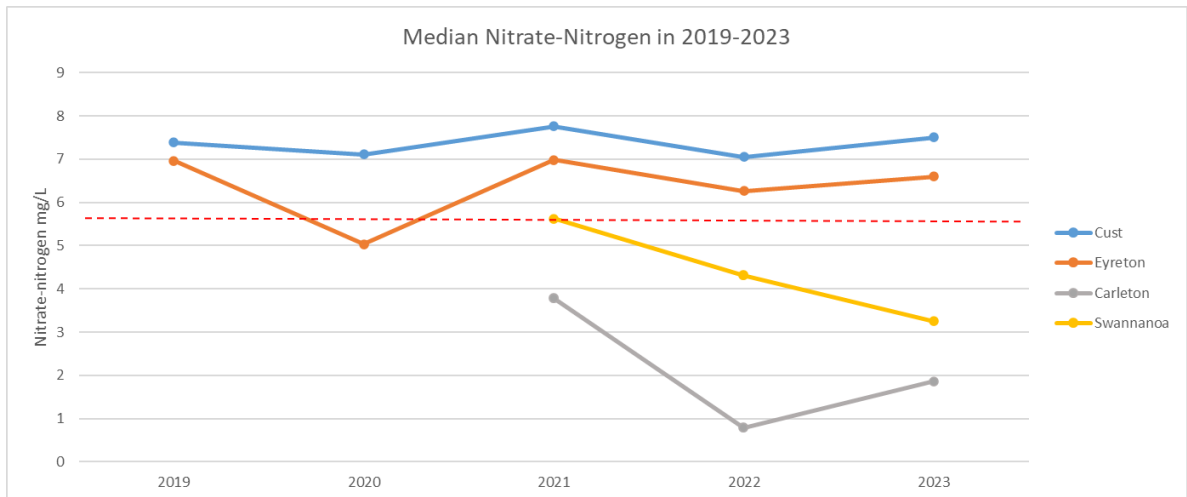


Figure 1: Median nitrate-nitrogen (mg/L) found in wells for the private well study 2019-2023 for Eyreton, Carleton, and Swannanoa. Red dotted indicates  $\frac{1}{2}$  MAV for nitrate-nitrogen (5.65 mg/L). One well was excluded from the median calculation in Eyreton as high nitrate levels were already known to be present before the study.

- 4.2. One well measured over the MAV of 11.3 mg/L for nitrate-nitrogen in Cust. This well has tested in previous years of the study over the MAV, and the landowner is aware of this issue. 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.
- 4.3. 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

- 4.4. 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. Updated versions of the groundwater quality maps have been provided by Environment Canterbury be replaced in the booklet shortly. This booklet has been 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).

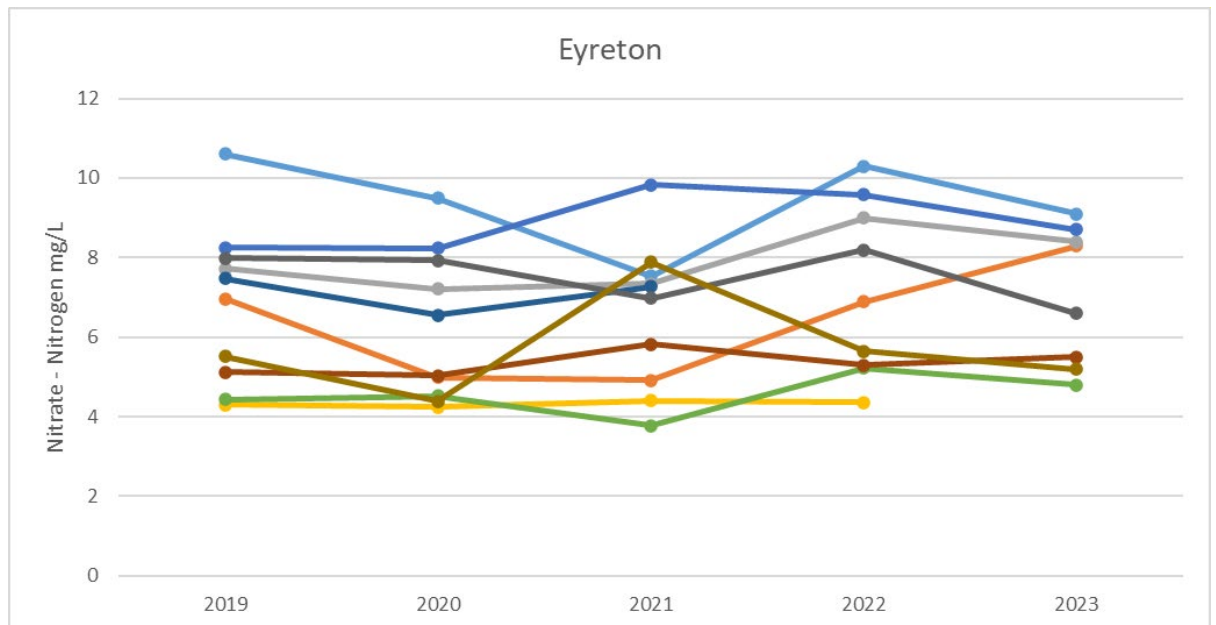


## Sample Collection

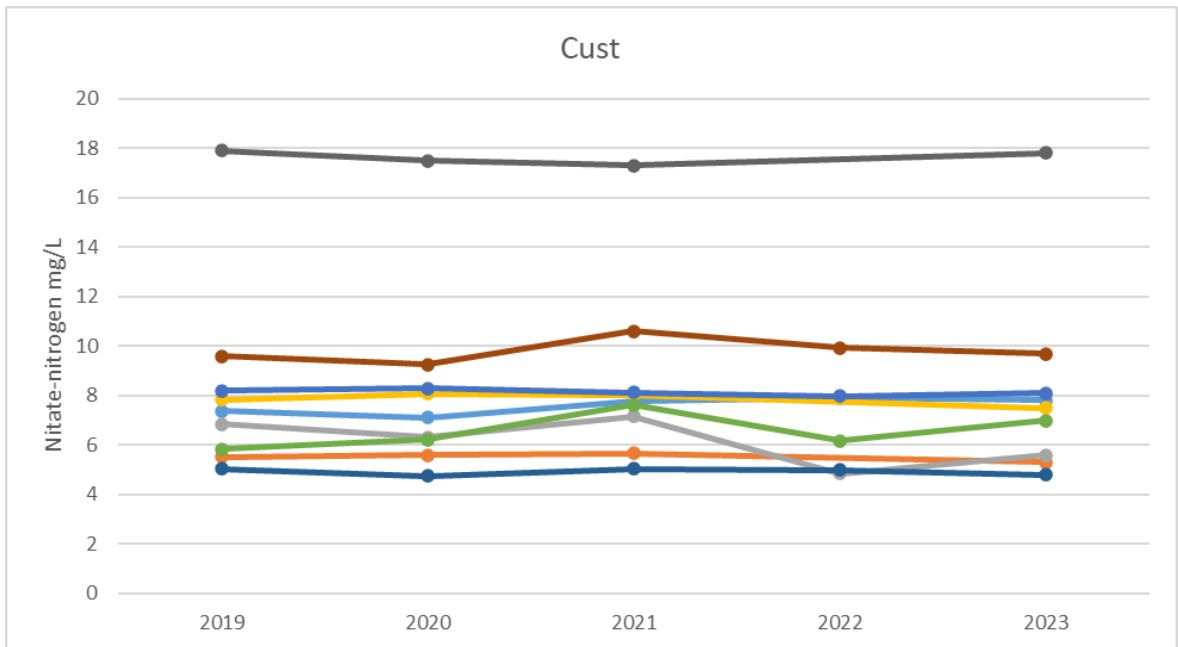
- 4.5. Although efforts were made to select private wells randomly based on geographic spread over the sampling areas and for a range of depths, there is likely to have been some selection bias of the wells. Some locations within the chosen sampling areas have reticulated water, and therefore were not included in the sampling area.
- 4.6. In total, 35 of 40 study participants were willing to participate and were able to take and return water samples in the study timeframe. This sample size is slightly smaller than 2019-2021 but higher than 2022. Reasons for samples not being submitted included participants requesting to be removed from the study while the house was on the market, samples that went missing in transit to the laboratory then were not resubmitted when requested, and only one of two bottles returned to the laboratory (i.e. only metals were sampled, but not nitrate). 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

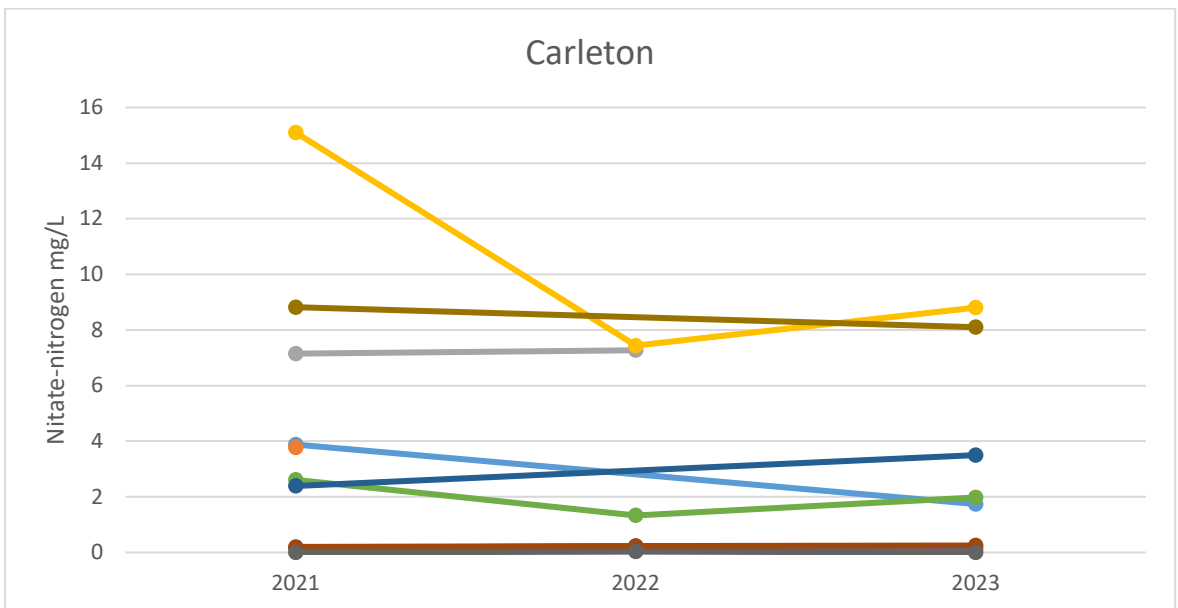
- 4.7. It is not possible to assess statistically robust trends yet in nitrate concentration from only five data points for Eyreton and Cust wells, and three data points for Carleton and Swannanoa wells (see Figures 2-5). Nitrate leaching into groundwater is known to increase due to higher precipitation levels. Precipitation records for the District show that 2023 had above average rainfall compared to the 20216-2023 period. There was a notable flood event on 23-24 July 2023.



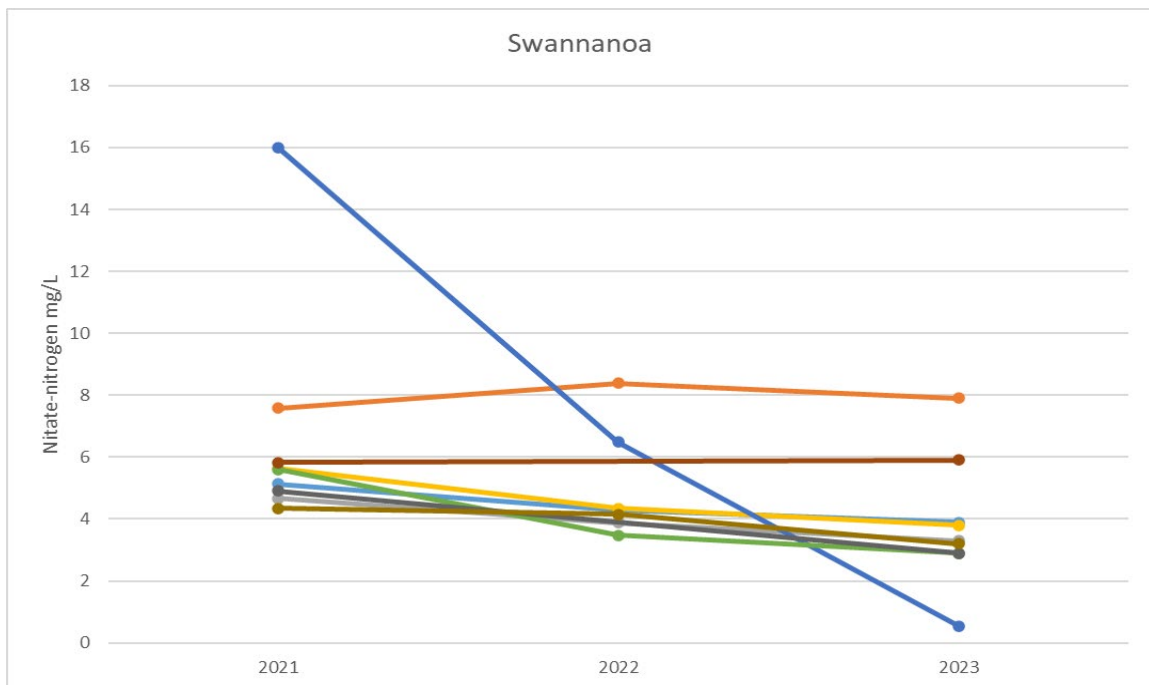
**Figure 2:** Eyreton well results for 2019-23. Each colour is an individual well in the study.



**Figure 3:** Cust well results for 2019 – 2023. Each colour is an individual well in the study.



**Figure 4:** Carleton well results for 2021 – 2023. Each colour is an individual well in the study.



**Figure 5:** Swannanoa well results for 2021 – 2023. Each colour is an individual well in the study.

### Well Depth

- 4.8. As with the 2019-2022 study results, the highest three nitrate-nitrogen concentrations in 2023 were found in relatively shallow wells (7.6 m, 13 m and 11.3 m deep). Increasing well depth was found to have a weak correlation of decreasing nitrate-nitrogen levels in 2023, as found in previous years.

### Next steps

- 4.9. 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).
- 4.10. 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 or shared resourcing is required. It is intended for WDC to continue a programme of 40 wells in 2024-25 in the four existing sampling areas. However, if additional resourcing could be obtained, WDC staff could recommend a roll-out of a more extensive programme (i.e. gradually scaling up to 180 wells) from 2024-25 onwards.
- 4.11. 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.
- 4.12. 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**

- 4.13. 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.
- 4.14. 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.



Rangiora Stormwater Network Discharge Consent

# Annual Report 2021-2023

Prepared by Waimakariri District Council for CRC184601  
March 2024



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Appendix List

A list of appendixes is provided with this report submission, as follows:

**Appendix 1.** Rangiora Stormwater Monitoring Programme Report 2022-2023

**Appendix 2.** Delta Stormwater Maintenance Works 2021-2023

**Appendix 3.** List of Drain Channels and SMA Rangiora

**Appendix 4.** All WDC WQ Rangiora Data 2021-2023

**Appendix 5.** Stormwater Assets Vested to WDC Rangiora 2021-2023

## 1. Purpose of the Annual Report

In May 2021, Environment Canterbury Regional Council (ECan) granted the Rangiora Global Stormwater Network Discharge consent CRC184601 to the Waimakariri District Council (WDC). As per Condition 35, WDC must produce an Annual Report each year, to report on the previous 12-month period of consent activities undertaken. This Annual Report is provided to the Canterbury Regional Council, Attention: Regional Leader – Compliance Monitoring and Te Ngāi Tūāhuriri Rūnanga.

This first Stormwater Network Discharge Consent (SNDC) Annual Report for Rangiora covers two reporting periods from July 2021 to 30 June 2023. It also summarises information from the 2021-22 and 2022-23 Monitoring Programme Reports. This is due to resourcing reasons at council in preparation for the implementation of this consent, as outlined in the next section.

## 2. Introduction

The Territorial Authorities within the Canterbury region are required to submit Stormwater Network Discharge Consent Applications for all major towns in their district. The Waimakariri District Council (WDC) lodged an application for a Stormwater Network Discharge Consent (SNDC) for Rangiora township, which was approved in May 2021 (CRC184601).

As part of the conditions for consent, WDC is required to report to ECan for each financial year on a series of information outlined in Condition 35 of CRC184601. This includes a report on water quality based on our approved Stormwater Monitoring Programme for Rangiora.

The reporting period is the financial year of 1 July – 30 June. Since this consent was approved (May 2021), the reporting period came into effect on the 1 July 2021. WDC is therefore due to submit an Annual Report on the following years of 2021 – 2022 and 2022 – 2023.

Due to various reasons, including increasing Council's capacity to implement the consent, and the first time compiling an annual report for this consent, WDC has not been able to report fully on these conditions. Most of the information is recorded within Council. However, there are challenges that have been encountered in compiling the data such as:

- a) interpreting the consent wording and what is required;
- b) understanding with whom and within which department the information requested is stored;
- c) compiling this information between WDC departments and setting up these systems;
- d) onboarding staff to coordinate and develop the annual report.

In 2023, a water quality report (TRIM 220512075696) was provided to ECan, presenting the results for the WDC Rangiora Stormwater Monitoring Programme from 2021-2022. This Annual Report also includes information from that monitoring report. During the preparation of this report, information was requested and collected from our different Council departments between the dates of July 2021 and 30 June 2023.

A Stormwater Monitoring Programme report for 2022-2023 has also been prepared separately. This document is submitted separately under the title "Rangiora Stormwater Monitoring Programme Report 2022-2023" (Appendix 1). Other documents included within this report are supplied in the Appendices.

### 3. Background

Resource Consent CRC184601 condition 35 requires Waimakariri District Council to submit an annual report to both the Canterbury Regional Council and Te Ngāi Tūāhuriri Rūnanga.

The specific contents of this report are defined by Conditions 35(a) to (l). Information for compliance with these conditions is presented in the following sections. The structure and headings for this report are aligned with these consent conditions. Information on this is presented in order of appearance within Condition 35, from section 10 to section 19.

Additionally, information for further compliance is found outside of Condition 35. These have been included as part of this annual report, and are listed first, in order from sections 5 to 9.

Sections 12, 13 and 14 relate to results previously outlined in the Stormwater Monitoring Programme Report 2022-2023 (water quality report). Therefore, a summary and discussion are presented here, while all specific details are provided in the original report.

In addition to that, a WDC assessment is included at the beginning of each section, stating the evaluation by WDC in terms of compliance with the condition. Categories used to describe this include “compliant (information provided), no data to report, non-compliance, N/A (non-applicable)”.

Table 1 lists all the sections that relate to each consent condition. These headings have made clickable (*Control + click*) for easier navigation:

**Table 1. Summary of conditions corresponding to sections in this report and where to find them**

<b>Condition</b>	<b>Description</b>	<b>Section</b>	<b>Assessment</b>
<b>Condition 14 and 21</b>	List of Development sites approved to discharge under CRC184601 consent and a summary of sites discharging in accordance with this consent (Condition 35k)	5. List of development sites approved to discharge and summary of sites	Compliant
<b>Condition 15</b>	Stormwater discharges approved located within domestic and community drinking water supply protection zone (DWPZ) (Condition 15)	6. Stormwater discharges in drinking water protection zones (DWPZ)	Compliant
<b>Condition 16</b>	An update on the water quantity and flood modelling	7. Update on Water Quantity and Flood Modelling	Compliant
<b>Condition 24</b>	Update on the high-risk site assessment and management programme	8. Update on the high-risk site assessment and management programme	N/A (until January 2025)
<b>Condition 26</b>	Update on how WDC is ensuring compliance with condition 26, and whether there have been any spills of significance since the consent was granted	9. Spills of Significance and condition 26	Compliant

<b>Condition 35</b>	Provide an Annual Report including:		Compliant
<b>35a, condition 22 and 23</b>	Maintenance works undertaken	10. Maintenance works	Compliant; non-compliant; Data deficient (see section 10.8)
<b>35b</b>	Monitoring Programme Updates and list of changes made	11. Stormwater Monitoring Programme Updates 11.1 List of informal Changes between 2021-2023	Compliant
<b>35c</b>	Results of Monitoring in a suitable format to upload to CRC water quality database, including:	12. Results 12.2 Data in a suitable format (Appendix 3) 12.4 Monitoring Results (Appendix 1)	Compliant. See table 12.
<b>35c-i</b>	Name of the person who collected samples, date and time samples were collected	12.2 Data in a suitable format Appendix 3	Compliant
<b>35c-ii</b>	Rainfall Data associated with Stormwater sampling events, including: date, time, duration, rainfall depth of the storm event	12.3 Rainfall data for sampling events	Compliant
<b>35d</b>	Interpretation of any long term or site-specific trends in surface water quality, stormwater quality, ecology, or soil quality, including comparisons to previous years' monitoring and reference to monitoring data for the other environmental factors in the stream health sections	13. Interpretation of Trends	Compliant
<b>35e</b>	Interpretation of significance and possible reasons for any change in long term or site-specific trends	13.1 Interpretation of significance and reasons for changes	Compliant
<b>35f</b>	Report on the investigation undertaken and further actions and responses planned or undertaken in accordance with conditions 16 to 19	13.2 Investigations undertaken and responses planned	Compliant
<b>35g</b>	Discussion of Compliance with condition 8 (Receiving Environment Objectives) and	14. Discussion of compliance	Compliant

	condition 14 (Stormwater System Management); and results of investigations undertaken in accordance with condition 34 (Actions in response to monitoring), including but not limited to		
<b>35g-i</b>	i. documentation of and possible reasons for, trigger value exceedances, and further action taken or proposed in response to exceedances, including a timeline for future actions	14.1 Trigger value exceedances, actions and investigations	Compliant
<b>35g-ii</b>	ii. Documentation of service requests indicating any flooding of dwelling houses described in condition 8a	14.2 Service requests	Compliant
<b>35g-iii</b>	iii. A summary of any remedial or improvement works carried out to improve the quality of, or improve the management of quantify of stormwater discharges in that year, including any works planned or undertaken to address any flooding of dwelling houses described in condition 8a;	14.3 Remedial and improvement works	Compliant
<b>35g-iv</b>	iv. A summary of new stormwater systems vested to WDC during the preceding year which will discharge under this consent, and	14.4 New stormwater systems vested	Compliant
<b>35g-v</b>	v. a description of any future stormwater system proposals, including retrofitting of existing stormwater systems, to improve the management of stormwater within the Rangiora reticulated stormwater system;	14.5 Future Stormwater system proposals	Compliant
<b>35g-vi</b>	vi. Discussion of actions taken through management of stormwater discharges to protect and enhance mahinga kai species of value to Te Ngai Tuahuriri Runanga, and any enhancement of mahinga kai areas	14.6 Protecting and enhancing mahinga kai	Compliant

<b>35h</b>	Any updated information as a result of further site investigations, including but not limited to the extent of or changes to catchment boundaries, groundwater levels, and a discussion of the implications of the updated information	15. Sites investigations	Compliant
<b>35i</b>	Details of site audits undertaken of sites with pollution prevention plans that discharge under this consent, including a summary of compliance and whether corrective actions have been undertaken	16. Site Audits	Compliant
<b>35j</b>	A summary of sites that have been excluded from this resource consent in the last year, including an up-to-date version of the schedule of excluded sites	17. Sites Excluded from this consent in the last year	Compliant
<b>35k</b>	a summary of sites discharging in accordance with this consent for which erosion and sediment control plans were received by WDC in the last year, including a summary of sites where WDC have been advised that water treatment chemicals have been used and the date(s) of their use	5. List of development sites approved to discharge and summary of sites	Compliant
<b>35l</b>	report on breaches of the bylaw over the previous year which WDC is aware of	18. Breaches of the Bylaw	Compliant



#### 4. Recommendations

To improve WDC reporting for 2023-34 and onwards, a list of recommendations and actions has been compiled and is presented as an improvement plan as follows:

Who	Task / Action	Timeframe
WDC Stormwater Engineer	To start recording and keep track of the frequency of inspection and servicing of soakage chambers.	Commence now and on-going
CORDE and Delta	To report back to WDC by the end of each financial year on maintenance works carried out as per Schedule 2 frequencies and requirements, with a clear description of the asset maintained, inspection date and frequency of maintenance aligned with the Schedule.	By July 2024
WDC Roding Team; WDC Operations Team and Greenspace; Stormwater Engineer; 3 Waters Compliance Officer	To improve CON 19/43 (Roding/CORDE) and CON 16/51 (Greenspace/Delta) to align better with stormwater maintenance works and compliance with this consent. Ensuring that work contracted meets the stormwater maintenance schedule and compliance requirements, identifying overlaps or gaps between contracts, amending contract conditions as required and ensuring a clear and consistent reporting system is set up. In collaboration with Stormwater Engineer, 3 Waters Compliance Officer, 3 Waters, Roding and Greenspace teams.	By July 2025
Stormwater Engineer	To review the Delta maintenance contract and create a contract variation to ensure that all basins are included and being maintained as per Schedule 2 frequencies.	By July 2025
3 Waters Compliance Officer	To retrieve a snapshot of the maintenance works done in RAMM (sump cleaning) at the end of each financial year from Roding team.	On 30 June 2024 and so on (at the end of each financial year)
3 Waters Compliance Officer	To propose an updated Schedule 2 in collaboration with WDC teams and ECan to streamline reporting on maintenance works and give a wider picture of all types of maintenance works, such as road sweeping and gross pollutant trap cleaning.	By July 2024
WDC Roding Team; 3 Waters Compliance Officer	To increase road sweeping frequencies in industrial areas, such as Southbrook, to improve stormwater quality in areas that need it most, in collaboration with WDC Roding team.	By November 2025
For the Stormwater Monitoring Programme reporting:		
Water Environment Advisor; 3 Waters Compliance Officer	To seek approval for the revised first flush conditions from the Regional Manager Compliance at Environmental Canterbury.	By July 2024

3 Waters Compliance Officer	To improve trend analysis methodology.	By June 2024
3 Waters Compliance Officer; Lutra	To audit the stormwater data app (Infrastructure Data) for data quality, to address solutions in collaboration with the App manager (Lutra), to facilitate a streamlined process for data download for the 2023-24 reporting onwards.	By June 2024
Environment Canterbury (ECan)	To provide information to WDC on which discharge consents are currently active in Rangiora, and the latest compliance monitoring that has been undertaken as per their consent, to inform WDC in decision making of high-risk sites.	By June 2024

## 5. List of development sites approved to discharge and summary of sites

WDC assessment: [Compliant \(information provided\)](#)

From 2021 to 2023, there is only one approval under sections 5 and 7.3 of the WDC Stormwater Drainage and Watercourse Protection Bylaw 2018 and Rule 5.93A of the Canterbury Land and Water Regional Plan, to discharge **construction and operational phase stormwater** into the WDC stormwater network.

<b>Consent Reference</b>	For works related to RC225258 & RC225257
<b>Address</b>	2 Todds Road, Rangiora
<b>Holder name</b>	Southbrook Holdings Limited
<b>Date of discharge approval</b>	7/12/2022
<b>Expiry</b>	7/12/2024
<b>Duration</b>	2 years
<b>WDC Document reference</b>	CRC184601 / 221205210022
<b>Consent Type</b>	Construction phase stormwater and operational phase stormwater
<b>Stormwater Catchment Area</b>	No.7 Drain
<b>Notes</b>	First approval granted under Rangiora Global Consent. Addresses removal of contaminated land first, before accepting any stormwater discharge

Table 2. Information of development authorised to discharge stormwater under CRC184601 in Rangiora 2021-2023. This includes both construction phase and operational phase stormwater.

### 5.1. Interpretation of Conditions

From Conditions 14 and 21, WDC is required to report on the following:

*“List of all development/redevelopment sites including greenfield sites approved to discharge under this consent, and information relating to the quality and quantity mitigation required for that site (**Condition 14 and 21**).”*

In January 2024, the 3 Waters Compliance officer sought clarification from ECan on what this related to, with the answer being the above related to “**Operational phase stormwater**”.

In addition to that, **condition 35k** requires WDC to provide the following:

*“A summary of sites discharging in accordance with this consent for which erosion and sediment control plans were received by WDC in the last year, including a summary of sites where WDC have been advised that water treatment chemicals have been used and the date(s) of their use”*

The same clarification was sought, with ECan’s response being the above relates to “**Construction Phase Stormwater**”.

In view of the discussion above, this information provides answer to the consent requirement 35k, and the additional information requested under Condition 14 and 21.

## 5.2. Further commentary

It is noted that the number of stormwater approvals does not match the number of stormwater assets vested to WDC (see section 14.4 *New Stormwater systems* vested). The reason for this is:

- Any new developments planning on discharging stormwater onto a receiving waterway, require a consent with ECan. Receiving waterways are shown on Plan CRC184601A as per consent documents. Any stormwater discharges planned for any of WDC network drains, as per Plan CRC184601A, require WDC written approval.
- For the latter, new developments are required to develop their stormwater systems in accordance with WDC CRC184601 conditions and best practices, with WDC development team reviewing, accepting, or requesting amends of such proposed plans.
- New private developments are required to maintain their stormwater systems for a 2 year “maintenance period”, after which time, if there are no issues, the system can then be vested with council.
- Additionally, those Stormwater systems which have been vested to Council after the 2-year timeframe, require written approval from WDC to discharge under our network and our global consent.
- WDC received a series of requests from developers between 2022-2023, seeking approval to discharge stormwater under clause 5.93A of the CLWRP. From those requests, only one was approved, as presented in this section.
- Based on all the above, a list of 24 other active discharge consents discharging stormwater to water bodies, were identified within the Rangiora urban limits falling under ECan.
- All of the above provides further explanation for the discrepancy.

## 6. Stormwater discharges in drinking water protection zones (DWPZ)

WDC assessment: [Compliant \(information provided\)](#)

### 6.1. Context

Under Condition 15, WDC is required to not approve any stormwater discharges for any developments that fall within an ECan Community Drinking Water Protection Zone (CDWPZ), unless under (i), these developments have a reticulated water supply available.

It is noted, the following developments below do not present a stormwater discharge as such, rather they have a stormwater connection to our existing stormwater reticulated network.

### 6.2. Methodology

WDC has undertaken a search using the CDWPZ layer available from Environment Canterbury and has identified the following developments (Table 3). All resource consent decision letters were checked from our records for each development.

### 6.3. Results and information

Consent Code	Address	Applicant	Status	Date approved	Approved under condition
RC225001	269 West Belt	Helen Gwynne Andrews	Decision issued	2/11/2022	i (consent holder has made a reticulated water supply available to the property prior to discharge)
RC225173	276 King Street	Urban Arch Limited	Decision issued	3/05/2023	i (consent holder has made a reticulated water supply available to the property prior to discharge)
RC235162	46 Enverton Drive	David F Allaway & Estelle G Allaway	Decision issued	25/7/2023	i (consent holder has made a reticulated water supply available to the property prior to discharge)
RC235124	5-7 Lindon Street	Kainga Ora – Homes and Communities	Decision issued and under construction	11/09/2023	i (consent holder has made a reticulated water supply available to the property prior to discharge)
RC235123	61–65 Church Street	Kainga Ora – Homes and Communities	Decision issued and under construction	26/09/2023	i (consent holder has made a reticulated water supply available to the property prior to discharge)

**Table 3. List of all developments identified between 2021-2023 that fall within a Drinking Water Protection Zone (DWPZ) in Rangiora**

It is noted, for RC235162, 46 Enverton Drive, there was an existing connection to WDC drinking water supply and an existing stormwater connection to the kerb channel available, prior to submission and approval of this building consent.

#### **6.4. Commentary**

Since the approval of this consent in May 2021, there are no new development sites privately discharging stormwater within any community drinking water supply protection zones. All stormwater discharges from the identified developments are connected to WDC stormwater reticulated network. In addition to this, all developments that fall within a CDWPZ are required to connect to WDC existing water reticulation network as required by Condition 15.

## 7. Update on Water Quantity and Flood Modelling

WDC assessment: **Compliant (information provided, nothing to report)**

There have been no major updates to our existing Rangiora Urban Stormwater Model from 2021-2023.

However, there have been small updates undertaken on the model to account for new subdivision areas constructed between 2021 and 2023. This includes updates to the catchments and the network as well as the inclusion of any associated Stormwater Management Areas (SMAs). There have also been some technical and software updates.

The hydrological parameters used in WDC flood model come from a combination of NIWA rainfall data, Landcare soils, and parameters derived through high-level calibration undertaken a few years ago. The 2D infiltration parameters were derived from work undertaken by DHI Ltd using available soil parameters from ECan.

WDC uses the CCC Water and Wetlands Drainage Guide as a guideline. WDC models use parameters which have largely been developed in-house using data sources listed above.

## 8. Update on the high-risk site assessment and management programme

WDC Assessment: N/A (condition does not apply until 1 January 2025)

There has been no update to what was already established in our consent conditions between 2021-2023 as this condition does not apply until 1 January 2025.

WDC has begun implementing initial measures to meet this requirement for the financial year of 2024-2025. The initial measures include:

- Scoping a list of stormwater consents within Rangiora urban limits that will be assessed for potential exclusion under this consent, including:
  - Requesting a list of consents from ECan for Rangiora, and associated consent assessments
  - Undertaking a consent search within WDC internal records
- Preparation for the implementation of a Pollution Prevention Plan (PPP) as required under the Stormwater, Drainage and Watercourse Protection Bylaw (2018)
- Developing a Pollution Prevention Plans templates and processing procedures
- Initiating a test case (Southbrook Resource Recovery Park) to create a PPP to test processes.

There are other steps and actions not listed here as they are beyond the reporting requirements of 2021-2023. These actions will be reported in a future Annual Report.

### 8.1. Commentary

From our records, WDC identified a list of 24 other discharge consents that are currently active within the Rangiora urban limits. It is our understanding that these consents are monitored by ECan, with expiry dates beyond 2030 for all of them. A list of these consents is available on request.

The nature and responsibilities of these consents was discussed and clarified in a meeting with ECan on 2 February 2024. It is our understanding that, when ECan consents expire, if the discharge is into WDC Stormwater Network, these consents will fall under the current Rangiora Stormwater Network Discharge consent, after seeking written approval from council. However, if the discharge is into the receiving waterway or environment, as per Plan CRC184601A, these consent holders will need to apply for a new consent from ECan. The process for high-risk sites management will transfer gradually to WDC, starting in 2024 with testing our systems for processing Pollution Prevention Plans, and WDC criteria of medium-risk and high-risk sites.

Likewise, from the same meeting, an action was recorded by ECan to provide WDC with data relating all consents in Rangiora that currently are monitored by ECan and identified issues with compliance. The information above will inform WDC in our risk assessment and potential exclusion of high-risk sites.



## 9. Spills of Significance and condition 26

WDC assessment: 26a. **Compliant (information provided)**; 26b. **Compliant (information provided)**;  
26c. **N/A (Condition does not apply until 1 January 2025)**

### 9.1. Requirements of condition 26 “Management of Spills”

WDC is ensuring compliance with condition 26a with the implementation of the WDC *Stormwater Drainage and Watercourse Protection Bylaw 2018*.

In the event of a spill, WDC has multiple teams responding, depending on the nature of the risk, from Civil Defence and Emergency Management, Roading, the Environmental Services Unit and 3 Waters.

These teams stay in communication during a spill event, follow up and ensure the contaminants are cleaned up and prevented from affecting the stormwater network. The response entails communicating with all parties, on-site assessments and organising the deployment of the appropriate clean-up method to mitigate contaminants. WDC is reviewing the current spill response to streamline how each team interacts with each other during a spill response.

For 2021-2023, WDC has documented the response to spill events in accordance with the conditions set up in the monitoring program. These are (as detailed in the Rangiora Stormwater Monitoring Programme Section 3.2):

*Report on any spills that occurred over the previous year exceeding 5 litres that discharged via the reticulated stormwater system into the receiving environment, including the following information on each spill, if available:*

- (i) Adherence to spill response timeframes set out in this programme section 3.2.1*
- (ii) The time, date, location and estimated volume of spill;*
- (iii) The cause of the spill;*
- (iv) The type of hazardous substance(s) spilled;*
- (v) Clean up procedures undertaken;*
- (vi) Details of the steps taken to control and remediate the effects of the spill on the receiving environment;*
- (vii) An assessment of any potential effects of the spill; and*
- (viii) Measures to be undertaken to prevent a recurrence.*

See Tables 4 and 5 for a list of spill events responded to from 2021-2023 (TRIM 220215019302) that meet reporting requirements of Section 3.2.

In the event of detecting a spill with potential for stormwater runoff, WDC follows up with the site managers or site owners to ensure they remain accountable for cleaning up and installing appropriate sediment and erosion control measures that could enter the stormwater network. We have determined that proactive preparation and prevention before a rain event where a problem is identified, is most effective. WDC also receives notifications of any discharges or spills that are witnessed by members of the public. The same actions described above apply for this instance. These requests are received by WDC Customer Service team and directed to WDC 3 Waters team or other teams as a service request.

Date	2/09/2022
WDC Service Request number (or ECan pollution incidence response number if applicable)	HE2200473
Adherence to spill response timeframes set out in the monitoring programme section 3.2.1	Yes
The estimated time (and duration) of spill	N/A Natural source of oil and iron oxide
Location of spill (GPS and/or address)	21 Kowhai Avenue, Rangiora
Estimated volume of the spill	N/A Natural source of oil and iron oxide
The cause of the spill	Red and oily residue is believed by 3 Waters is from an iron pan layer in the soils in the area causing the discolouration.
The type of hazardous substance(s) spilled;	natural source of oil and iron oxide
Clean up procedures undertaken;	Boom used to soak up the oil. Oil was from Natural source, so not a spill response after event was investigated further.
Details of the steps taken to control and remediate the effects of the spill on the receiving environment;	N/A
An assessment of any potential effects of the spill;	N/A
Measures to be undertaken to prevent a recurrence.	N/A

**Table 4. Part 1. List of spill events WDC responded to from 2021-2023 that meet CRC184601 requirement for reporting.**

Date	<b>17/03/2023</b>
WDC Service Request number (or ECan pollution incidence response number if applicable)	N/A Trim 230321038729
Adherence to spill response timeframes set out in the monitoring programme section 3.2.1	Yes
The estimated time (and duration) of spill	Spill located at 9am, however it is believed to have been caused by vandals overnight
Location of spill (GPS and/or address)	47 White Steet
Estimated volume of the spill	5 L
The cause of the spill	Loader on construction site syphoned by vandals overnight. Diesel spilt on road in the process. Overnight rain may have increased likelihood this spill moved to stormwater network (North Brook Drain).
The type of hazardous substance(s) spilled;	Diesel fuel
Clean up procedures undertaken;	Spill kit used on area on diesel spill including absorbent matts and sawdust. V channel to stormwater network sump was blocked off. Bidim fabric was already in the sump from start of Job on 13/03/23. Mats were used in the water receiving environment to remove diesel sheen.
Details of the steps taken to control and remediate the effects of the spill on the receiving environment;	Same as previous box.
An assessment of any potential effects of the spill;	Moderate as small diesel spill and little displacement of diesel in receiving environment.
Measures to be undertaken to prevent a recurrence.	Loader with Diesel to be parked away from V channel and cameras were installed onsite.

**Table 5. Part 2. List of spill events WDC responded to from 2021-2023 that meet CRC184601 requirement for reporting.**

## 10. Maintenance works

WDC assessment: see each sub-section individually, and final section 10.8 for summary.

As part of consent condition 35a, WDC is required to report on maintenance works undertaken as below:

*a. Maintenance works undertaken in accordance with conditions (22) and (23).*

22

*Stormwater systems which form part of the Rangiora reticulated stormwater network, for which the WDC is responsible, shall be maintained in accordance with the “WDC Stormwater Maintenance Schedule”, referenced as **CRC184601 – Schedule 2**.*

23

*WDC shall undertake all practicable measures to ensure that stormwater systems owned and operated privately, which discharge from the private system into the reticulated stormwater system and are covered under this resource consent, are **maintained in accordance with best practice** and to ensure that conditions (8) and (14) are given effect to.*

These are the details outlined in Schedule 2:

### Waimakariri District Council

#### STANDARD STORMWATER MAINTENANCE SCHEDULE

Task	Minimum frequency of maintenance visit					
	Sumps			Swales		Infiltration and dry basins
	Key sumps	Non-key sumps	To soakage chambers	Urban	Rural-residential	
Removal of debris, and litter likely to adversely affect the operation of the system, within 10 working days of the maintenance visit	Yearly	Two Yearly	Yearly	6 monthly	Yearly	6 monthly
Removal of sediment likely to adversely affect the operation of the system, within 10 working days of the maintenance visit	Yearly	Two Yearly	Yearly	N/A	N/A	N/A
Removal of hydrocarbons that are visible over a total area of greater than 0.5 square metres (swales and basins) or a layer greater than 5 millimetres thick (sumps), within 10 working days of the maintenance visit	N/A	N/A	6 monthly	6 monthly	Yearly	6 monthly
Repair or stabilisation of erosion and scour, within 20 working days of the maintenance visit	N/A	N/A	N/A	6 monthly	Yearly	6 monthly
Replanting, where bare or patchy soil cover or sediment build up is greater than 10 square metres, or a total of five percent of the area of the device, whichever is the lesser, within 10 working days of the maintenance visit	N/A	N/A	N/A	6 monthly	Yearly	6 monthly
Weed control	N/A	N/A	N/A	6 monthly	Yearly	6 monthly

Figure 1. Stormwater Maintenance Schedule 2 for CRC184601.

### 10.1. Limitations of the Maintenance Schedule

It is noted, it is not possible for WDC to adequately report on the compliance with the Maintenance Schedule 2 at present for this Annual Report in Rangiora. Therefore, we are needing to adopt a more workable Maintenance Schedule 2 for future annual reports. For this purpose, a new proposed Maintenance Schedule has been created in collaboration with WDC teams in 3 Waters, Roding, Project Delivery Unit (PDU) and external contractors. This new Maintenance Schedule will be proposed for our stormwater network discharge consents coming up for our other towns (Oxford, Woodend, Kaiapoi).

However, for the purposes of reporting for the current consent, and given the current limitations, WDC reports as follows with the information that we have available to meet the current requirements set up in Schedule 2 to the best of our capabilities.

An example where the Maintenance Schedule is not fit for purpose is there are no swales as such in Rangiora. There are stormwater bubble-up systems in The Oaks subdivision, and open stormwater channels for non-urban areas in Rangiora. Therefore, the column “swales” does not apply. New stormwater systems have been added to the Contract CON 19/43 as developments were created. These specific stormwater retention systems are maintained at different frequencies within the Contract, which means they report under a separate schedule. These fall under the “dry basins” category of Schedule 2 and include the Oaks, Arlington Park and Ashley Bridge.

There is a total of 26 stormwater basins in Rangiora, which includes infiltration basins, dry ponds, wet ponds, constructed wetlands and soaking chambers (or soak pits), are all referred to as basins for simplicity. These are all maintained through different contracts and at different frequencies. From these 26 Stormwater basins, 20 are maintained by Delta. The rest are either maintained by WDC Greenspace rangers or CORDE contract CON 19/43 (overseen by the WDC Roding Team).

Additionally, there are other items not included in Schedule 2 which are important in improving the water quality of stormwater, such as road sweeping frequencies. This item will be discussed here even though it is not a requirement for consent. As part of our improvement for future consents and reporting, we will work to include road sweeping frequencies in our maintenance schedule.

Given the complexity of maintenance in the stormwater basins, WDC is still assessing options to simplify maintenance and streamline reporting.

### 10.2. Contractors

WDC contracts CORDE, Delta and Hydrovac Ltd to undertake various maintenance works in the Rangiora stormwater network. These contractors are managed from different units within our team, and so they report to WDC in different ways.

In the following pages, we present an explanation of what each contractor covers, and how this relates to the different categories set up in Schedule 2.

Contractor	Items covered from Schedule 2	Items covered <u>not included</u> in Schedule 2
CORDE	<ul style="list-style-type: none"> <li>• Removal of debris and litter:               <ul style="list-style-type: none"> <li>a) Sumps (annually)</li> <li>b) Infiltration basins and specific stormwater retention systems (6 monthly)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Road sweeping frequencies</li> </ul>

Delta	<ul style="list-style-type: none"> <li>• Regular checks on Drains, clearance and weeding</li> <li>• Removal of debris and litter: <ul style="list-style-type: none"> <li>a) Trash grills</li> <li>b) Stormwater Management Areas (infiltration and dry basins)</li> </ul> </li> <li>• Mowing and weed control: <ul style="list-style-type: none"> <li>a) Swales</li> <li>b) Infiltration and dry basins</li> </ul> </li> <li>• Removal of sediment (when necessary and scheduled): <ul style="list-style-type: none"> <li>a) SMA (infiltration and dry basins)</li> </ul> </li> </ul>	
WDC Greenspace rangers	<ul style="list-style-type: none"> <li>• Maintenance of SMA (wet ponds and wetlands)</li> </ul>	
Hydrovac	<ul style="list-style-type: none"> <li>• Removal of sediment (on request from WDC): <ul style="list-style-type: none"> <li>a) Soakage chambers</li> </ul> </li> </ul>	

**Table 6. Maintenance frequencies as per our current contract with the contractors. It is noted, our contractor frequencies match those set up on Schedule 2.**

### **10.3. Delta: Maintenance of Drainage Channels and Stormwater Management Areas (SMA)**

WDC Assessment: **Compliant** (information provided)

Delta is managed by the 3 Waters team and our Greenspace team under the Greenspace Maintenance Contract CON 16/51 (TRIM 240312038072). Delta is responsible for maintaining open drainage channels and Stormwater Management Areas (SMA) in Rangiora township. Their duties include inspecting the stormwater drains, removing debris and litter, and addressing any obstructions. Additionally, they conduct routine weeding and garden maintenance. Upon clearing the drains, all debris is removed from the site within 7 days. These works are undertaken regularly as needed, with frequent visits to the stormwater sites. They report back to Council in the form of spreadsheets, which we receive monthly (Appendix 2).

In general, stormwater grills (drains) and SMA are checked regularly for debris and litter, including after storm events. See Appendix 2 for details.

A list of Drain Channels and Stormwater Management Areas, and their locations is provided in Appendix 3.

Maintenance works for stormwater drain channels and SMA's undertaken by Delta are summarized in Table 7. Each month, all 48 drain channels were inspected throughout each year. However, maintenance works were not required every time, as they were dependent on the condition of the drain channel. Similarly, all 20 SMA's were visited each month across the two financial years. An exception is the Townsend Fields SMA, which was included in the Delta contract 2023, two years after development and subsequent vesting to WDC. Consequently, our count for 2021-2022 shows 19 SMAs visited monthly, while in 2022-2023, the number of assets went up to 20 SMAs were visited monthly.

It should be noted that the Delta report for September 2022 is missing. For further details please refer to Appendix 2.

	<b>2021</b> (July 2021-June 2022)	<b>2022</b> (July 2022-June 2023)
<b>Drain Channels = 48</b>		
<b>Drain Channels average frequency of visit</b> (from Appendix 2)	Monthly (37 out of 48 assets, rotating each month)	Monthly (47 out of 48 assets, most months all 48 assets checked)
<b>Total visits</b> (total times an asset recorded a visit)	577	528
<b>Total checks</b> (times an asset was purposely checked)	452 (9 visits per drain on average)	516 (10 visits per drain on average)
<b>Total times drains cleared</b>	88	52
<b>Drains cleared on average each month</b>	7	5
<b>Weeding</b> <b>Total gardening work</b> (number of times gardening was done at an asset)	48	49
<b>Stormwater Management Areas (SMA) = 20</b>		
<b>SMA frequency of visit, check &amp; clearance on average</b> (from Appendix 2)	Monthly (15 out of 19 assets checked every month, with rotation)	Monthly (19 out of 20 assets where checked every month, most month all 20 assets)
Total times SMA mowed (weeding)	178	147
Total checks & litter cleared from trash grills	186	197
Gardening (weeding)	24	22
Other	Trash grills cleared: 3 *	

\* Note: in 2021, 3 trash grills recorded extra checks and clearing, specifically prompted by WDC in addition to regular checks. This was the case for assets in Oxford Park West & East SMA/Acacia Ave (west and east of SW Reserve) and Ballarat Rd SMA (River Road SW Reserve).

**Table 7. Summary of frequency of visits, checks and clear works undertaken for Stormwater Drain Channels and Stormwater Management Areas from 2021-2023. Source: Delta reports to WDC. Average values are provided, with a full monthly breakdown per asset provided in Appendix 2.**

### Clearing of Drains

A specific breakdown of which assets were cleared each month, is provided in Appendix 2. Not all drains needed clearing each time despite the visit and check, possibly due to a lack of heavy rain events.

In 2021-2022, on average, 37 assets were visited each month, and on average, 7 were cleared every month. As mentioned above, not all assets required clearing each time. WDC is satisfied that the frequency of visit,

checks and clearance to each asset meets the frequencies required to maintain them in line with compliance standards. In March, 46 assets out of 48 total were visited, with 3 drains cleared. The lowest month was November, which registered 24 visits to assets, with 15 drains cleared.

In 2022-2023, Delta checked all 48 assets almost every month, except August 2022 and October 2022, when they checked 47 and 37 assets, respectively, with 17 and 7 drains cleared respectively. Some months recorded 48 checks of assets with 0 drains cleared (May and June 2023). On average, 46 drains were checked every month and 4 were cleared every month. August 2022 was the month with the highest number of drains cleared (17), followed by November 2022 (15 drains cleared) and July (10 drains cleared).

There is an increase of drains checks and visits from 2021-2022 to 2022-2023.

### **Frequencies**

Based on the Stormwater Maintenance Schedule 2 (Figure 1), the frequency required for cleaning of debris/litter, hydrocarbons, repairing or stabilising scour, replanting, and weed control is 6 monthly .

Based on Table 7 results are undertaken at a frequency that meets or exceeds the frequency required by the Schedule.

Details as follows:

- Infiltration and dry basins, including stormwater drainage channels and SMAs, are visited at a frequency higher than 6 monthly; specifically at a monthly frequency.
- Drains are inspected on a monthly basis, with clearance conducted only when necessary. This approach is evident in the frequencies observed: in 2021, clearance occurred almost annually, in 2022 it was nearly biannually, and in 2023, clearance was conducted for three drains. This frequency is contingent upon rainfall events. Furthermore, the inspection frequency exceeds semi-annual intervals. Clearance is performed strictly based on the actual requirement, avoiding unnecessary intervention. WDC has not recorded any occurrences of hydrocarbons in drains or SMA's. However, in the event of such incidents, they would be promptly inspected and removed as outlined in Contract CON 19/43 (refer to section 10.4).
- There have not been any incidents recorded where discharges from WDC stormwater network have caused erosion or scour. Therefore, these works are not recorded.
- Weed control is undertaken at a frequency higher than 6 monthly (see Table 7)

### **10.4. CORDE: Sump Cleaning and Road Sweeping – CON 19/43**

WDC Assessment: **2021-2022 Non-compliant** (contractor did not meet frequencies);  
**2022-2023 Non-compliant** (contractor did not meet frequencies)

CORDE are responsible for the maintenance of road reserves, with the specifications detailed in CORDE Contract CON19/43 (Road and Drainage Maintenance Contract). A portion of this contract includes maintenance of stormwater structures and channels, detritus removal, street cleaning, litter control, vegetation control, land drainage, public drains, and waterways. When works are completed our service provider invoices for a lump sum payment. For this payment, there are a series of requirements they need to meet.



Items from Schedule 2 that are covered by CORDE are:

- **Sump cleaning.** This includes key sumps and non-key sumps:
  - removal of debris, litter, and
  - sediment
- **Dry basins,** such as special SMA's at The Oaks, Arlington Park, Ashley Bridge.

A key sump (or critical sump) is a sump that requires regular maintenance due to getting blocked frequently, increased traffic flow, or increased flooding risk. A non-critical sump is a sump that does not meet any of the previously listed classifications.

The **frequencies** set up in the contract are:

- Key sumps and non-key sumps to be cleaned once a year, and to be kept functional at all times. The requirement frequency set up in the Maintenance Schedule 2 (Figure 1) is annually for key sumps, and every two years, for non-key sumps.
- Dry basins are to be maintained every 3 months. The maintenance Schedule 2 requires WDC to maintain dry basins every 6 months.

Based on the above, our contract frequencies have met the requirements of Schedule 2 for Maintenance works.

Another item not specified on Schedule 2 that is key for water quality, is the sweeping of roading channels. These frequencies are specified in the roading contract with CORDE as follows:

- Town centres – weekly sweeping
- Adjacent to CBD – 3 weekly sweeping
- All other areas in Rangiora – 6 weekly sweeping

In the following sections, we provide a summary of the maintenance works mentioned above, including sump cleaning, and sweeping of road channels.

#### **10.4.1. Roothing contract**

Maintenance of stormwater structures and channels for WDC, is covered in item 7.1.1 of the contract CON19/43 with CORDE, which specifies:

##### **Stormwater Structures and Channels**

**Item 7.1.1** Maintenance of Stormwater Structures and Channels includes the routine maintenance of stormwater structures and channels within the road reserve to meet the Contract Levels of Service (Refer to Appendix F for the RAMM list of culverts). The rate includes all work involved, including temporary traffic management, cleaning and the removal of surplus material and complying with resource consent conditions. It includes the removal of surplus material by handheld tools at the culvert inlet and outlet in rural areas, and the removal of debris from sump tops in urban areas to prevent flooding in between the regular mechanical sweeping rounds. The rate also includes the inspections and reporting on the stormwater systems at the Arlington Park Subdivision, New Arterial Road (Ohoka Road), The Oaks Subdivision and the Ashley River Bridge, as specified, and the maintenance of the kerb cut-outs in Pegasus.

#### 10.4.2. Sump Cleaning 2021-2023

There is a total of 1,937 sumps in Rangiora. The inspections and clean-up of these sumps are managed using the geospatial asset and maintenance management system, RAMM. RAMM is utilised by both the WDC Rooding Team and the maintenance contractor, CORDE. This platform enables real-time tracking of the maintenance program for both the contractor and WDC. See Figure 2.

While the contractual frequency for sump maintenance in our agreement with CORDE aligns with the requirements outlined in CRC184601, Schedule 2, it has not consistently been met.

Our contractors do not deliver their work based on financial years, rather based on their contract year, which runs from 1 November to 31 October.

A summary of 2021-23 for sump cleaning in Rangiora is presented in Table 8. Specific information on the sumps and cleaning frequency, is available on request in spreadsheet form. See Figure 2 for visual information on current sump cleaning status.

Sump cleaning work				
Financial year:	July 2021 – June 2022	July 2022 – June 2023		
1 Nov 2020-31 Oct 2021	1 Nov 2021-31 Oct 2022	1 Nov 2022- 31 Oct 2023	1 Nov 2023- 31 Oct 2024	
Completed.	Not completed, due to contractor resource constraints.	Not completed by the end of financial year, due to contractor resource constraints and staff shortage.  50% completed, as of October 2023*.  95% completed, as of April 2024. Awaiting data upload from contractor to confirm full completion of works.	Current Financial year at time of writing.  Currently contractor working on this year's annual sump cleaning.  Expected delivery by October 2024.	

**Table 8. Summary of sump cleaning maintenance works from 2021-2023 in Rangiora. See Figure 2 for visual info on current sump cleaning status. \* Note: sump cleaning was completed at 91% by 16<sup>th</sup> February 2024.**

The contractor did not complete the contracted 2021-22 sump work according to contract CON19/43 due to resourcing issues. Measures undertaken to avoid this from happening again include carrying out sump audits and monitoring progress (Rooding Team). The contractor was still working through the sump cleaning for the round of last financial year at time of writing. This work is currently completed at 91% by February 2024. In April 2024, the contractor communicated the completion of the 2022-2023 sump cleaning round and announced their start on 2023-2024 round. However, the data they provided does not match this information, and still shows at least 20 sumps to be completed. WDC is following up with the contractor. See Figure 2 for the latest status of sump cleaning (February 2024).

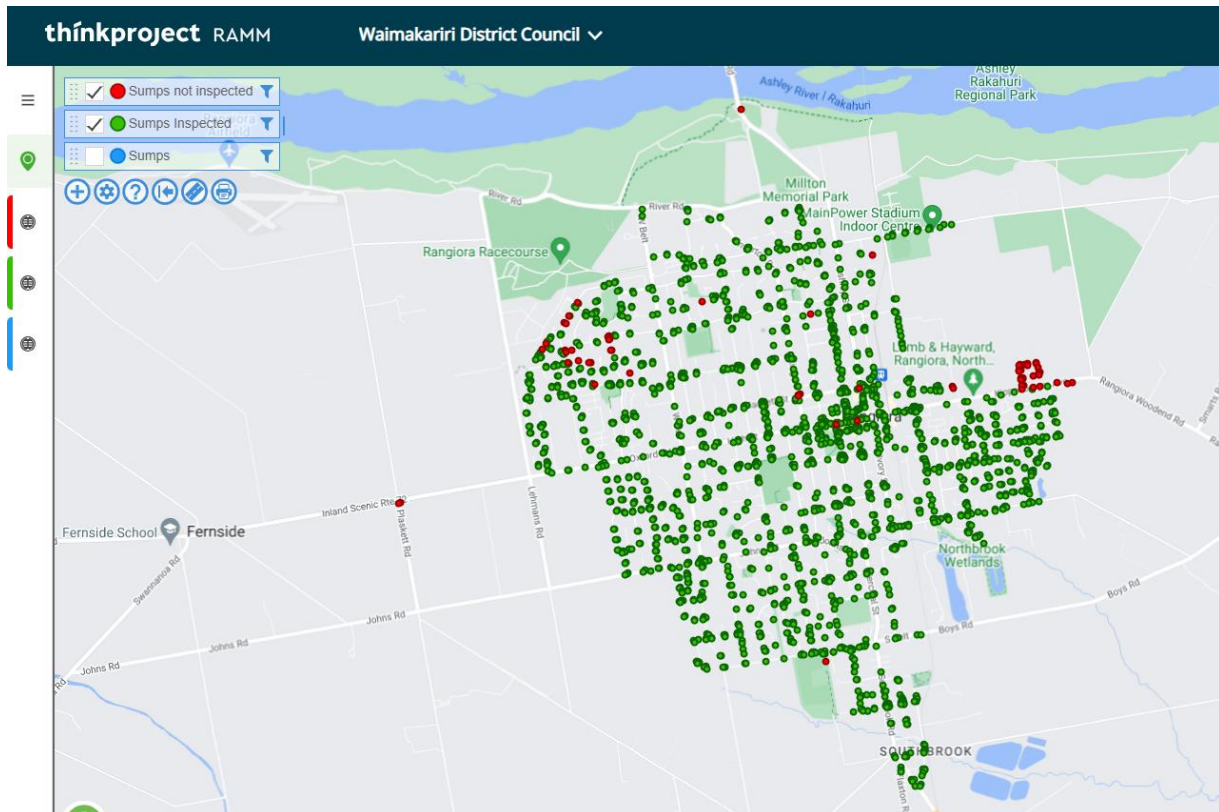


Figure 2. State of sump cleaning works completed in Rangiora area as of 16 February 2024. Source: RAMM.

### **Addressing the challenges**

Improvement in this area remains a primary focus for WDC as we look ahead to the period spanning 2023-2024 and beyond. The Roding and 3 Waters Teams have been actively collaborating with the contractor to address the identified issues. The contractor has been duly informed of WDC's apprehensions.

The contract CON19/43 is scheduled for renewal in November 2024, with plans for a fresh round of public tender in 2025. WDC acknowledges the challenges experienced during this contract and commits to addressing them when the contract is put out to tender in 2025. Through this process, WDC has gained valuable insights and lessons.

#### **10.4.3. Sweeping**

Concerning stormwater quality, WDC identifies an area for potential enhancement in the sweeping of the road channels. Although not specifically mandated in our maintenance obligation per CRC184601 consent conditions in Schedule 2 there is sufficient evidence supporting the relationship between road sweeping and improved quality of stormwater runoff.

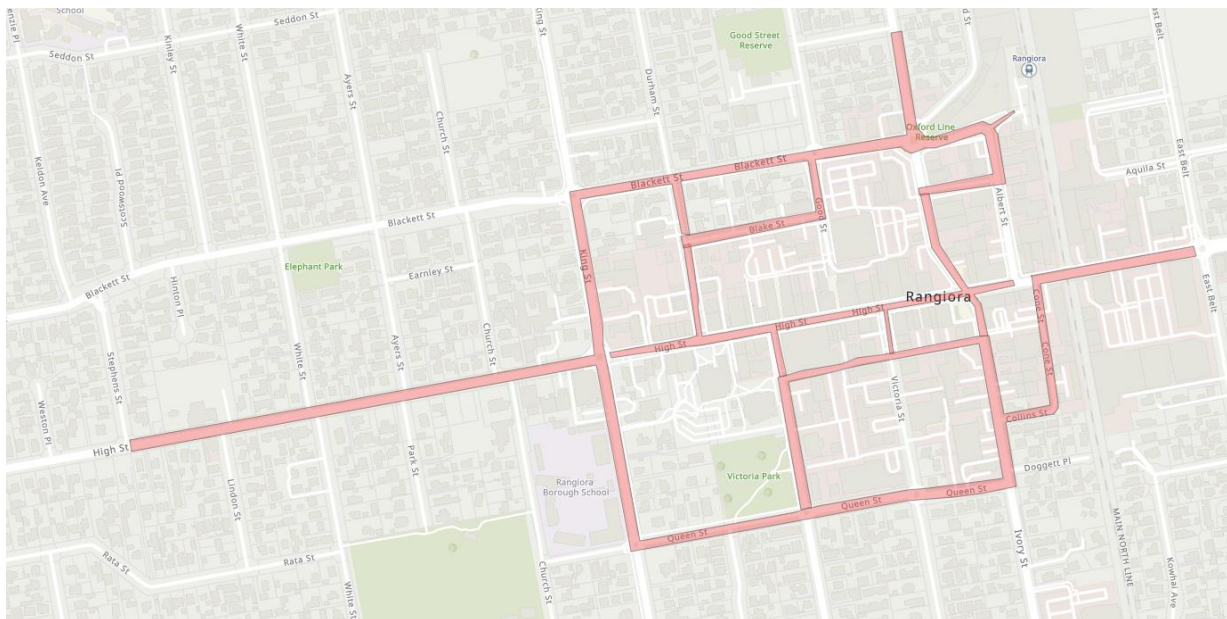
An Envirolink report prepared by NIWA for Nelson City Council in 2011 (see section 19 for references) assesses street sweeping as an effective Best Management Practice for improving stormwater quality. Consequently, despite not being stipulated in our resource consent conditions, WDC has opted to include street sweeping in this section of our reporting.

**Sweeping Frequencies**

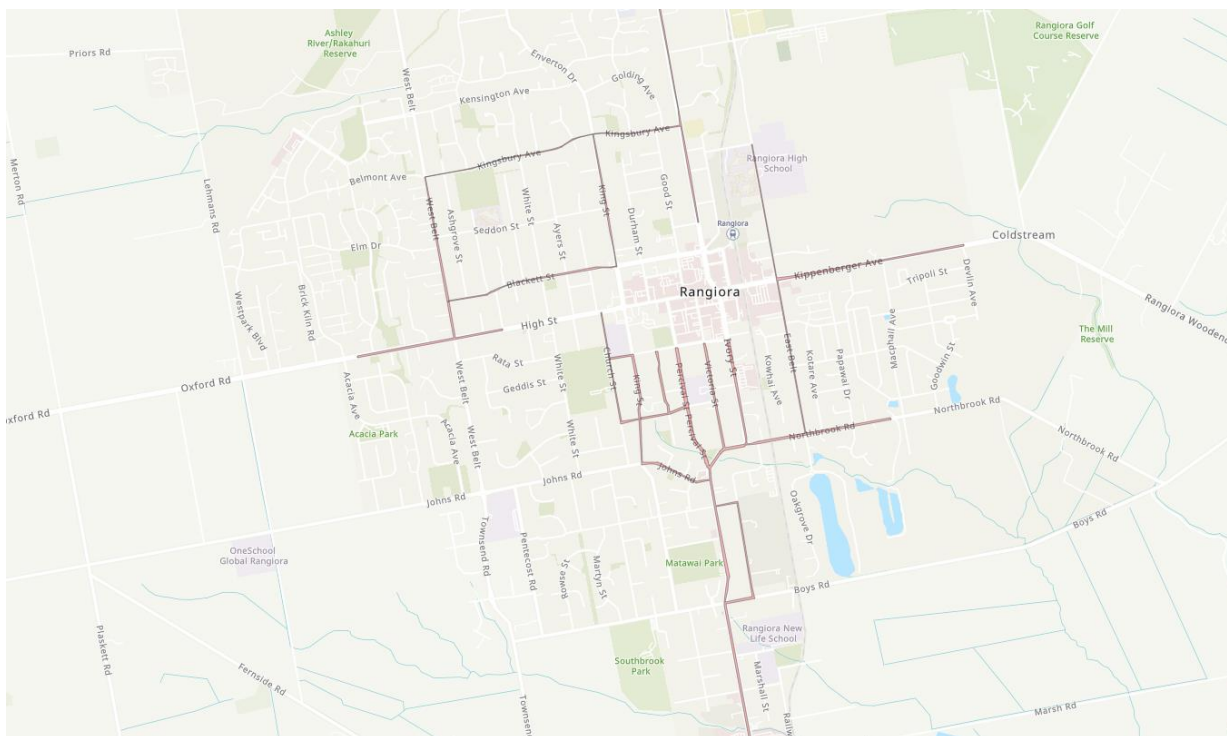
Under contract 19/43, the sweeping frequencies are established with CORDE as follows:

- Town centres – weekly (Figure 3)
- Adjacent to CBD – 3 weeks (Figure 4)
- All other areas in Rangiora – 6 weeks (Figure 5)

See Figures 3 to 5 below.



**Figure 3. Detailed weekly Sweeping in Rangiora, for town Centre areas depicted in red. Source: RAMM.**



**Figure 4. Detailed three-weekly sweeping in Rangiora, for areas adjacent to CBD depicted in red. Source: RAMM.**

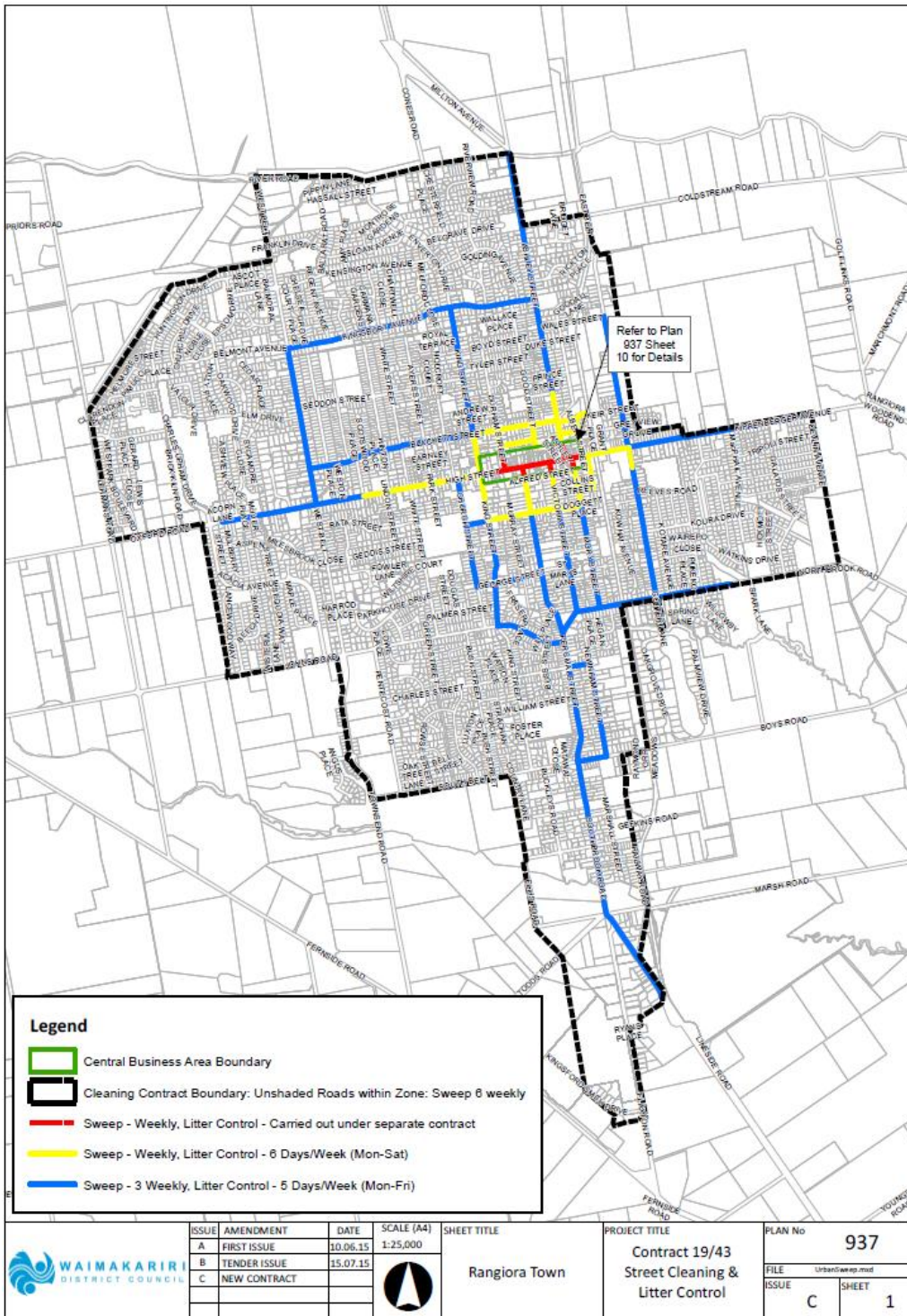


Figure 5. Summary of all sweeping frequencies in Rangiora, as per roading contract with Corde. Streets in yellow and red, depict weekly sweeping (as per Figure 3). Streets in blue, depict 3-weekly sweeping (as per Figure 4). All other streets contained within the town boundary, are on a 6-weekly sweeping frequency. Source: WDC internal records.

**Sweeping summary**

All sweeping in Rangiora township has been delivered from 2021-2023 as per contract 19/43 and frequencies stated in this section.

Further information Litter regarding road sweeping is available on request.

TRIM 240325047404

## **Recommendations**

It is recommended on this report and the Rangiora Stormwater Monitoring Programme Report 2022-2023, for WDC 3 Waters Compliance Officer to look at increasing sweeping frequencies for industrial areas such as Southbrook, in collaboration with Roding and 3 Waters teams. These actions would improve stormwater quality in this area.

### **10.5. Hydrovac: maintenance of soakage chambers**

WDC Assessment: Data deficient.

The WDC Stormwater Engineer carries out regular inspections of soakage chambers and arranges for their servicing through Hydrovac as required.

The frequency required by Schedule 2 for the removal of debris/litter and sediment, is set up as yearly and 6 monthly, respectively. It is noted these two are separate items in Schedule 2, with different clean up frequencies. WDC does not differentiate between the nature of the material that is causing the chamber to not function up to best practice standards. Rather, our standard is that the chamber requires maintenance when a problem is identified with either of those materials in the chambers after a site visit. These regular inspections to the soakage chambers fall with the stormwater engineer responsibilities, however frequency is not recorded in our records. WDC is satisfied that these were undertaken in accordance with Condition 23.

The Stormwater Engineer carried out regular inspections of the soakage chambers. Despite the regular inspections, service is not always required. The standards followed to decide when a clean-up is required, is when debris, litter, sediment, or other substances (e.g. hydrocarbons), are identified to cause a problem to the stormwater flow or its quality. When issues are encountered, WDC contracts the servicing of the chambers, and the contractor undertakes the work within 10 days. It is noted not all chambers have been serviced annually, primarily because not all of them required servicing.

Despite these inspections, no records of servicing for soakage chambers in Rangiora between 2021 and 2023 were found. This lack of documentation was largely due to the previous absence of a requirement for such records and WDC's failure to adequately maintain them. Going forward, WDC will ensure that all maintenance and inspection records for soakage chambers are documented annually.

## 10.6. Summary: Requirements met from Schedule 2 - Frequency of Maintenance Visits

As outlined on previous sections, Table 9 represents a summary on how we are reporting on the maintenance schedule frequencies. This aligns with condition 22.

	Sumps			Swales		Infiltration and dry basins
	Key Sumps	Non-key sumps	To soakage chambers	Urban	Rural-Residential	
Removal of debris and litter (within 10 working days of the maintenance visit)	<b>Requirement:</b> Yearly.  <b>WDC contract frequency:</b> Yearly, with CORDE. See table 8 for details.	<b>Requirement:</b> Two Yearly.  <b>WDC contract frequency:</b> Yearly, with CORDE. See table 8 for details.	<b>Requirement:</b> Yearly.  <b>WDC contract frequency:</b> As needed basis, regular checks from 3 Waters Stormwater Engineer, with servicing by Hydrovac Ltd. See section 10.5.	<b>Requirement:</b> 6 monthly.  <b>WDC contract frequency:</b> N/A. See section 10.1	<b>Requirement:</b> Yearly.  <b>WDC contract frequency:</b> N/A. See Section 10.1.	<b>Requirement:</b> 6 monthly.  <b>WDC contract frequency:</b> Higher, with Delta. See section 10.3.
Removal of sediment	<b>Requirement:</b> Yearly.  <b>WDC contract frequency:</b> Yearly, with CORDE. Removal of sediment from sumps undertaken with sump cleaning work. See table 8 for details.	<b>Requirement:</b> Two yearly.  <b>WDC contract frequency:</b> Yearly, with Corde. Removal of sediment from sumps undertaken with sump cleaning work. See table 8 for details.	<b>Requirement:</b> 6 monthly.  <b>WDC contract frequency:</b> As need basis, regular checks by Stormwater engineer. Work contracted with Hydrovac. See section 10.5.	N/A	N/A	N/A
Removal of hydrocarbons	N/A	N/A	N/A	<b>Requirement:</b> 6 monthly.	<b>Requirement:</b> Yearly.	<b>Requirement:</b> 6 monthly.
Repair or stabilization of erosion and scour				<b>WDC contract frequency:</b> N/A. See section 10.1	<b>WDC contract frequency:</b> N/A. See section 10.1	<b>WDC contract frequency:</b> N/A. See section 10.3.
Replanting where bare or patchy soil cover or sediment build up is greater than 10 m <sup>2</sup>						
Weed Control						

**Table 9. Summary of Maintenance works compliance, maintenance frequencies how this information is recorded in line with Schedule 2 from CRC184601.**

### 10.7. Condition 23

This condition is met with WDC Development and Subdivisions team, by adhering to best practice when reviewing any developments and plans. This is also met by not acquiring any stormwater assets until after 2 years of proven functionality of the system.

### 10.8. Assessment Summary

#### WDC assessment:

Condition 35a. **Non-compliant** (information provided, contracts matching Schedule 2, not always delivered):

- contractor frequencies match those set up on Schedule 2;
- maintenance frequencies for Drain channels and SMA are met with monthly visits (which are higher frequencies than those required by Schedule 2 – 6 monthly);
- sump cleaning frequency matches Schedule 2
- **annual sump cleaning not always delivered by contractor**
- **soakage chambers: data deficient (not enough information recorded)**

Condition 22. **Compliant**

Condition 23. **Compliant**



## 11. Stormwater Monitoring Programme Updates

WDC assessment: **compliant**

There are no official changes made to the Rangiora stormwater monitoring programme between 2021-2023. There were only informal changes submitted to a ECan Water Quality Scientist for discussion. These were to adjust sampling locations to a more accurate representation, changes to the description of sites for a more accurate description and a relaxing of first flush criteria for stormwater sampling in order to facilitate more sampling opportunities.

The following changes to the Monitoring Programme are intended to be submitted for formal approval to the Regional Leader - Compliance Monitoring shortly.

### 11.1. List of informal Changes between 2021-2023

For full details, refer to document submitted on 21 September 2021 to ECan, "Proposed Stormwater Monitoring Programme".

List of changes made between 2021-2023:

- New maps, displaying further clarity of sampling sites, such as:
  - Visual Discharges:
    - RRSB046: changed to RRSB046A, to distinguish it as a discharge outlet, separate from the South Brook (at Townsend Fields)
    - RRSR026: changed to RRSR026A, to distinguish it as at the discharge outlet from Pond C, not downstream after a mixing zone
    - RRMB017: changed to RRMB017A, to distinguish it as a discharge outlet, separate from the Middle Brook (at Gefkins Road)
- New site descriptions, amended for accuracy, in sites such as:
  - Visual Discharges:
    - RRMB017A: edited to "Middle Brook at Gefkins Road"
    - RRER006: edited to "Goodwins (Horncastle) Stormwater Pond Outlet, Northbrook"
    - RRNB015: edited to "Northern branch of the North Brook **pipe outlet**, Cotter Lane"
    - RRMB022: edited to "Middle Brook, at **Clearbrook Lane**"
    - RRSB046A: edited to "South Brook, at Townsend Fields **Stormwater Management Area outlet**"
    - RRSB035: edited to "South Brook, **pipe outlet off Coronation Street**"
    - RRSB032: edited to "South Brook at Southbrook Road (**west** side at pipe outlet)"
    - RRSB030: edited to "South Brook, **pipe outlet** on west side of Railway Road"
  - Urban Impact:
    - RRNB044: edited to "North Brook, on Church St across from Dudley Park"

### **11.2. Meeting first flush criteria**

On 9/06/2022 advice was received from ECan via email on meeting first flush requirements for Rangiora stormwater sampling. Due to the difficulty in meeting first flush requirements, these recommendations were adopted for all sampling starting from that date onwards. This change to the monitoring programme is recommended to be submitted to Environment Canterbury for formal approval.

Details adopted are as follows:

- Maintaining a minimum of 72h antecedent dry period prior to sampling
  - If necessary, this can be reduced to no less than 24h antecedent dry period to allow for contaminants to build up
- Rainfall depth criteria to minimum of 3 mm total rainfall depth
- Aim for sampling within 1-2h of the desired rainfall depth
- No less than 24h antecedent dry period to allow for contaminants to build up
- Document rainfall and dry conditions prior and during sampling to allow for interpretation of results

## 12. Results

This report compiles water quality information and results from the Stormwater Sampling in Rangiora from 1 July 2021 to 30 June 2023. For the first time, trend analysis was incorporated into these results. The trend analysis was undertaken with historical data from the baseline monitoring carried out from 2014-2017, prior to approval of the stormwater global consent CRC184601. Full details of water quality data, sampling results and trends are available in the Rangiora Stormwater Monitoring Programme Report 2022-2023 (TRIM 230919146639). This document is submitted with this Annual Report as Appendix 1. A 2021-2022 Stormwater Monitoring Programme Report was previously submitted to ECan in 2023 (TRIM 220512075696).

### 12.1. Consent Conditions

WDC assessment: **Compliant** (data provided in suitable format; .csv file attached to this consent)

Condition 35, requires WDC to provide an Annual Report including the following (conditions 35c, d and e):

- c. *Results of the monitoring carried out in that year in accordance with condition (31), in **a format suitable for automated upload to the Canterbury Regional Council's water quality database**, including:*

- i. The name of the person(s) who collected the samples, the date and time the samples were collected; and*
- ii. The rainfall data associated with stormwater sampling events, including, but not limited to, date, time, duration and rainfall depth of the storm event.*

- d. Interpretation of any long term or site-specific trends in surface water quality, stormwater quality, ecology, or soil quality, including comparisons to previous years' monitoring and reference to monitoring data for the other environmental factors in the stream health sections of the monitoring programme;*

- e. Interpretation of the significance and possible reasons for any change in long term or site-specific trends;*

### 12.2. Data in a suitable format

All monitoring data from WDC is provided in Appendix 4. To have a suitable format for direct upload of laboratory results in future years to ECan, WDC has received SQ codes for each sampling sites.

However, at the request of Environment Canterbury, this has only been provided for sites with associated water quality data. Therefore, there is no SQ code for historical sites. Location coordinates for all WDC sampling sites have been provided to Environment Canterbury.

Appendix 4 is provided as an attachment csv file with this report submission and includes all WDC data available between 2021-2023 with name of person who sampled, date, time, and SQ code available.

SQ number	Monitoring site code	Site Description
<b>SQ36781</b>	RRND012	North Drain, Coldstream Road
<b>SQ36784</b>	RRNB045	North Brook, at Dudley Park, White Street pipe outlet
<b>SQ36792</b>	RRNB033	Northern branch of the North Brook, west side Kowhai Avenue
<b>SQ36804</b>	RRNB009	North Brook, outlet of the North Brook Ponds
<b>SQ34187</b>	RRMB017A	Middle Brook at Gefkins Road
<b>SQ36802</b>	RRSB030	South Brook, pipe outlet on west side of Railway Road
<b>SQ36799</b>	RRSS026	South-South Brook Stormwater Pond Outlet, Lineside Road
<b>SQ36806</b>	RRSR026A	South Rangiora, Stormwater Pond C Outlet, Flaxton Road
<b>SQ36800</b>	CRCR120	Cam River, on the southern side of Kippenberger Avenue
<b>SQ30382</b>	RRNB017	North Brook, on the northern side of Boys Road
<b>SQ36473</b>	RRNB036	North Brook, Lilybrook Park
<b>SQ36787</b>	RRNB044	North Brook, on Church St across from Dudley Park
<b>SQ36788</b>	RRNB055	North Brook, at Aspen Street Park
<b>SQ36789</b>	RRMB017	Middle Brook, Gefkins Road east of the Railway, upstream side of the bridge
<b>SQ36790</b>	RRMB029	Middle Brook, on the western side of Bush Street
<b>SQ32914</b>	RRSB046	South Brook, on the east side of Townsend Road
<b>SQ30414</b>	RRSR026	South Rangiora, No. 7 Drain immediately south of Fernside Road (allows for mixing zone)

**Table 10. List of Rangiora sampling sites with equivalent Environment Canterbury code. All data ready to upload is attached in Appendix 4 with this report.**

For condition 35c i, the sampling data collected includes the following:

- name of the person who collected the sample,
- date and time that the sample was collected.

### 12.3. Rainfall data for sampling events

WDC Assessment: **Compliant** (information provided)

All rainfall data has been documented for each sampling round. WDC has also documented rain events that have been missed, because of rain not meeting first flush requirements, or rain falling outside of normal working hours.

This information is documented in our data spreadsheet. WDC has a rain gauge in Ayers St, Rangiora, which has precipitation SCADA data that is available to WDC staff (with a 15-minute delay). However, this ease of staff access was only set up after February 2022. A summary of rainfall data associated with stormwater sampling events, is provided below:

Date	15/12/2021	16/12/2021	10/02/2022	28/03/2023	28/06/2023
<b>Time</b>	02:00pm	08:40am	08:50am	10:30am	8:50am
<b>Antecedent dry weather</b>	72h	72h	72h	72h (nominal 0.2 mm of rainfall fell)	72h (nominal 0.4 mm of rainfall fell)
<b>Rainfall Depth (mm)</b> <i>sampling commenced</i>	24.40mm	50 mm	38.60mm	2.4mm	14.4mm
<b>Rainfall Depth (mm)</b> <i>sampling finished</i>				6.4mm	14.4mm
<b>Duration</b>	14h	32h 40min	16h 50min (rain started 4pm on 9/02/2022)	1h 50min	11h 50 min
<b>Event Description</b>	Heavy rain. Part 1 of sampling (Part 2 completed next day)	Torrential Rain. Part 2 of sampling event.  Very large rain event (too large to meet first flush criteria). Rain event had ceased by sampling start but discharge still occurring.	Torrential Rain. Too much rain for a first flush event (over 25mm rain). It was dry 3 days beforehand.	Moderate Rain. The only rain event occurring during work hours.	Heavy Rain. Rain ceased at about 3am on 28/06/23, but still sampled as needed sampling events. Outlets were flowing.
<b>Type of Sampling</b>	Visual Discharge, Major Network Discharges	Visual Discharge, Major Network Discharges	Urban Impact	Visual Discharge, Major Network discharges, Urban Impact	Urban Impact
<b>Reporting Year</b>	2021-22	2021-22	2021-22	2022-23	2022-23

**Table 11. Rainfall and dry weather data associated with each sampling event, for Rangiora 2021-2023. Colours display different financial years. Event description standards: from MetService. Rainfall depth source: SCADA (WDC Ayers St rain gauge)**

**Note on sampling undertaken below 3mm of rain and over 25mm of total rainfall**

With regards to sampling undertaken outside of 3mm and 25mm of total rainfall, these sampling events occurred when WDC staff were setting up to receive the appropriate rainfall information to measure this in almost real time. This means that at times sampling was undertaken before knowing the exact rainfall depth for Rangiora itself. Tools available at the time were used to estimate rainfall depth, however most forecasts available would show the rainfall depth for Christchurch city, which is different than that of Rangiora. Priority was given to undertake sampling whenever there was a rain event. Therefore, sampling staff would learn about the exact rainfall depth after having undertaken the sampling. This was the case for sampling round on 10/02/2022.

In addition, advice was sought from Environment Canterbury on the difficulty of meeting first flush requirements for Rangiora Stormwater Sampling on 9/06/2022 (see *section 11.2, Meeting First Flush Criteria*). Adopting these recommendations from ECan assisted WDC to undertake sampling more effectively after that date. Before then, WDC staff rationalised that undertaking sampling outside of first flush conditions was preferable to no sampling being carried out due to a lack of sampling events.

In conclusion, having a more relaxed first flush criteria, setting up WDC staff access to nearly real time SCADA rain gauge data helped WDC staff to be more precise with our sampling for 2023-2024 financial year.

The sampling data presented in this report represents the highest quality information that WDC could offer using the tools and resources available at the time of data collection.

## 12.4. Monitoring Results

WDC Assessment: as below and Appendix 1

As mentioned above, all details from the Monitoring Programme between 2021-2023 are presented in two reports:

- Rangiora Stormwater Monitoring Programme Annual Report 2021-22
  - TRIM 230919146639 (previously submitted to ECan, not provided with this submission)
- Rangiora Stormwater Monitoring Programme Report 2022-2023
  - TRIM 230919146639 (attached with this submission, Appendix 1)

Here is a summary of monitoring results, also found in Appendix 1.

Contaminant		Notes
<b>Wet weather sampling (urban impact and major outlets)</b>		
Total Suspended Solids	Compliance	All sites were compliant for TSS in 2022-23 sampling. Note only one sampling round was carried due to weather and resource limitations.  Only one major discharge outlet during a moderate rain event was non-compliant in 2021 financial year.  Compliance was also met for all stream health sites (dry weather sampling).
Dissolved copper	Non-compliance	7 sites exceeded the guideline value during wet weather sampling
Dissolved zinc	Non-compliance	7 sites exceeded the guideline value during wet weather sampling
Dissolved Reactive Phosphorus	Non-compliance	Not met for all sites except Cam River. Actions recommended in the Rangiora Stormwater Monitoring Programme Annual Report 2022-2023.
<i>E. coli</i>	Non-compliance	Not met for all sites except Cam River, and some sites in North Brook on the latest sampling. Refer to the Rangiora Stormwater Monitoring Programme Annual Report 2022-2023 for comments and recommendations.
Total Ammoniacal Nitrogen	Compliance	
<b>Dry weather sampling (Stream Health)</b>		
Dissolved oxygen	Guideline met*	Not used for compliance. All following results are from Stream Health (dry weather sampling).  * if one low oxygen value is confirmed to be due to large groundwater inflows at the site - North Brook at Lilybrook Park (RRNB036)
Temperature	Guideline met	
pH	Guideline met	
Conductivity	Guideline value not met	Not met for 3 sites, all other sites were met (Middle Brook, South Brook, No. 7 Drain)
Dissolved Inorganic Nitrogen	Guideline value not met	Guideline value exceeded for 6 sites (North Brook, Middle Brook, South Brook, No. 7 Drain)
Total Ammoniacal Nitrogen	Guideline met	
Total Suspended Solids	Guideline met	
Dissolved Reactive Phosphorus	Guideline met	
<i>E. coli</i>	Guideline not met	3 sites exceeded guideline values of <i>E. coli</i> (North Brook, Middle Brook, No. 7 Drain)

**Table 12. Summary of compliance with CRC184601 guideline values in 2022-23**

### 13. Interpretation of Trends

WDC Assessment: **Compliant** (information provided)

From consent conditions, this section covers the following:

- a. *Interpretation of any **long term or site-specific trends** in surface water quality, stormwater quality, ecology, or soil quality, including **comparisons to previous years' monitoring and reference to monitoring data** for the other environmental factors in the stream health sections of the monitoring programme;*
- b. *Interpretation of the significance and possible reasons for any change in long term or site-specific trends;*
- c. *Report on the investigation undertaken and further actions and responses planned or undertaken in accordance with conditions (16) to (19).*

Trends have been interpreted as much as possible within the water quality report 2022-2023.

Here is a summary of significant trends encountered:

#### For Urban Impact

- **RRNB055: North Brook, at Aspen Street Park**
  - A trend was identified for Dissolved Zinc levels increasing at this location ( $R^2=0.7$ ,  $n=9$ )
  - A tendency to increase for Dissolved Copper was found, however no significant differences were found. Dissolved Copper levels were above the guideline.
  - A non-significant, upward trend for Dissolved Reactive Phosphorus was identified. The R-squared value did not show statistical significance, but it was close ( $R^2=0.4$ ,  $n=5$ ). DRP values were above the guideline.
- **RRMB029: Middle Brook, western side of Bush Street**
  - A non-significant, increase trend was identified for Total Ammoniacal Nitrogen in this location, although not statistically significant ( $R^2=0.48$ ,  $n=6$ ), but close. The values were not above the guideline.

Other trends are possible, but analyses did not show significant differences. Further sampling over the next financial years will increase sample size and confidence in trend assessment. No other significant differences were found for contaminants over time, other than those reported above.

#### For Major Network Outlet

- Not enough data to assess trends for sites RRNB009, RRNB045, RRMB017A
- Not significant trends found for RRNB033, RRSB030

#### For Pond C (RRSR026)

- Not enough data to get significant trends

Due to time constraints and results not being a consent requirement, trends have not been analyzed for Stream Health results.

For other non-significant trends, refer to the Stormwater Monitoring Programme report 2022-2023.



### 13.1. Interpretation of significance and reasons for changes

WDC Assessment: **Compliant** (information provided)

Increases of dissolved zinc levels in the North Brook for this area are likely from urban runoff, including from road surfaces and roofs. Zinc can also come in particulate form from tyre wear and brake pads. Site RRNB055, North Brook, at Aspen Street Park is in a residential area. Historically, this site had high levels of Zinc due to a stock race discharging directly into the stream. Once the stockwater was removed in 2018, results improved.

Other specific findings of significance and changes have been discussed in the Stormwater Monitoring Programme Report 2022-2023.

It is noted that for dissolved zinc, significant differences were found over time at RRNB055 with much lower dissolved zinc levels, than for other sites with higher exceedances, such as RRRMB029 (Figure 7). The absence of significant differences in dissolved Zinc values, which are higher, is believed to stem from the nature of the trend analysis conducted in this case. The trend analysis will be improved in the next annual report for accuracy. In terms of the high levels of Zinc found, this is explained with the Middle Brook being a much older catchment, which means older residential catchments containing corrugated iron and unpainted roofs, which causes spikes in Zinc as shown (Figure 7, Appendix 1).

This is thought to be the case for other contaminants, i. e. no significant differences were found from trends due to quarterly levels of contaminants closely resembling historical levels. This doesn't necessarily reflect or support the need to action. However, there is room for improving trend analysis for the next financial year. WDC is already exploring ways to increase the reliability of trend analysis. Increasing our sample size with continuous sampling and expanding on our data analyses will provide greater clarity with the results.

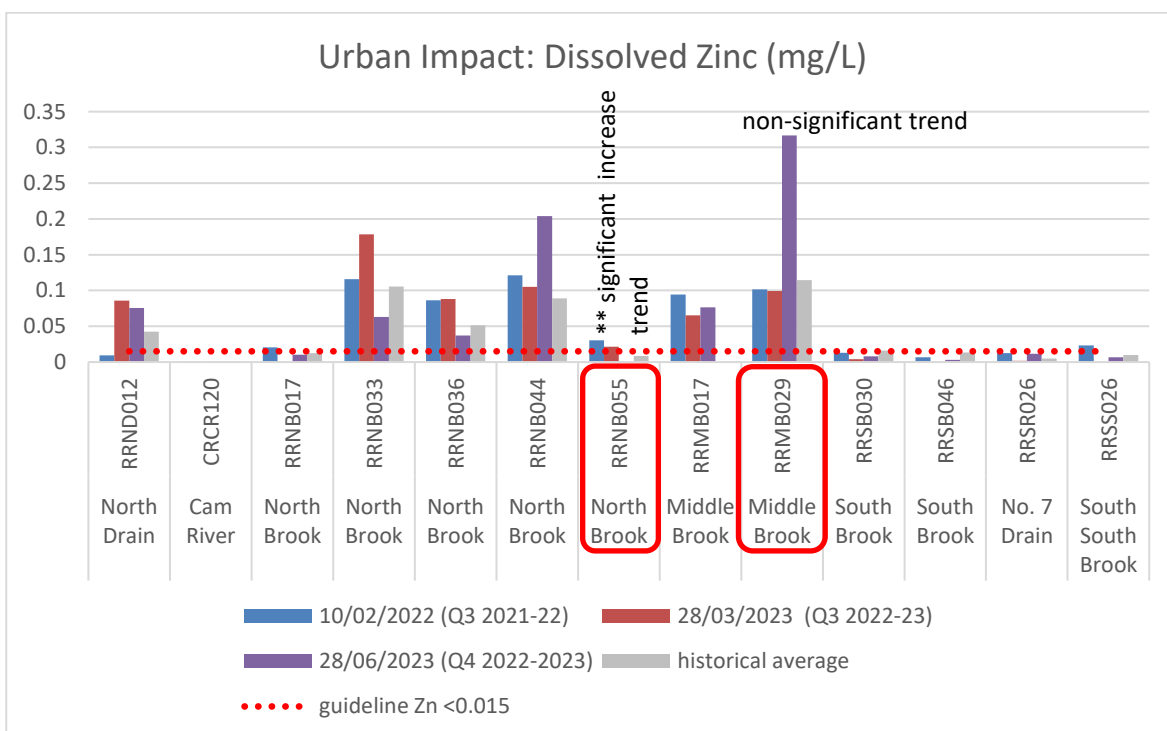


Figure 6. Dissolved zinc Levels from Urban Impact Sampling 2021-2023. From the two sites highlighted, the North Brook site presented significant differences in dissolved zinc levels through time, while the Middle Brook site did not show statistically significant differences over time after trend analyses, despite showing higher levels of dissolved Zinc.

### 13.2. Investigations undertaken and responses planned

WDC Assessment: **Compliant** (information provided)

Condition 35f states:

*“Report on the investigation undertaken and further actions and responses planned or undertaken in accordance with conditions (16) to (19).”*

#### Antecedents

All investigations led and undertaken by WDC between 2021-2023, are tracked and documented below.

Date	Winter 2021	27 July 2021 (and 2018)
WDC contact person	Sophie Allen	Sophie Allen
Who	Koura Creek	McAlpines investigation - TSS, Zinc, copper, chromium and arsenic
Situation/Project	Sophie spotlighted the population of freshwater crayfish (wai koura) at Koura Creek. One large longfin eel was found in the waterway. Tried to relocate it downstream unsuccessfully. Sophie has observed a large drop in the wai koura population, likely due to predation pressure from the longfin. Trout gillnetting was carried out in 2019 which found none above the trout barrier. The trout barrier is unlikely to be able to be modified to exclude eels.	High sediment was observed during a rain event to be coming from McAlpines on Todds Road. Sophie took a sample on 27 July 2021. High levels of arsenic, copper, chromium and TSS were found - Also sampled in 2018.
Reference		TRIM 210805128931
Actions	Spotlighting was carried out again in 2023 - Koura population is still low and has not recovered. The eel was not seen but might still be living in that waterway. Continue to monitor eels and trout in Koura Creek.	Sophie referred this to Kiri Kirkwood and Shania Vargas at ECan to respond as a consent issue (with high-risk sites not covered by CRC184601 yet)
comments	Koura population has also been found to be genetically in-bred.	No outcome of these results was received from ECan or McAlpines back to WDC
recommendations	Translocate koura from other streams to increase genetic variability.	Need to follow up with ECan how compliance is tracking with McAlpines

**Table 13. Part 1. List of Site investigations led by WDC and undertaken in Rangiora, from Consent CRC184601 approval in May 2021, until 30 June 2023. Please note we have also included other projects not led by WDC where we have been engaged.**

Date	1/11/2021	1/04/2021	31/01/2020
WDC contact person	Sophie Allen (ECan-led project by Irai Weepu)	Sophie Allen	Kitty Waghorn
Who	Irai Weepu	North Brook low flows investigation	PDP
Situation/Project	Watercress- support for Irai Weepu and the Tuia team at ECan to look at enhancing watercress mahinga kai sites - November 2021 weeding was carried out of water speedwell and monkey musk. Watercress protection (no cleaning) sites along the Cam River above Bramleys Road Bridge were identified in the WDC Drainage Maintenance Management Plan.	North Brook flows were raised as being too low and dropping. This investigation confirmed that this is a trend.	WDC engaged PDP to carry out a soil sampling investigation to comply with conditions 5 and 6 of ECan CRC971142.3, which authorises the discharge of stormwater containing contaminants to land via a grass swale at the Southbrook Recovery Park (284 Flaxton Road, Southbrook, Rangiora)
TRIM references / Service request references	240228030719, 240228030722	210408056928	200131013083
Actions	This project was put on hold by ECan or Ngai Tuahuriri members as needing better scoping - before the project pause: better signage, improved bank access, as well as a repeat of the weeding were suggested as actions that WDC could support	Next stage is to examine how to improve flows or to just decide to leave as is	6 soil samples were collected in the associated swale areas and the associated ponding area
comments			Results showed that all analyses for heavy metals and PAH were below consent levels. This was identified as an acceptable low risk to the receiving environment by PDP as a result of stormwater discharge via the swales.
recommendations	Follow up with ECan Tuia team Irai Weepu, Arapata Rueben and John Cooke (WWZC reps) if this project will start up again		

Table 14. Part 2. List of Site Investigations led by WDC and undertaken in Rangiora, from before consent was approved in May 2021, until 30<sup>th</sup> June 2023. Please note we have also included other projects not led by WDC where we have been engaged.

## 14. Discussion of compliance

WDC Assessment: **Compliant** (information provided; WDC uses the guides stated in Condition 14).

Condition 35g requires WDC to provide the following:

- d. *Discussion of compliance with **condition (8) (Receiving Environment Objectives) and condition (14) (Stormwater System Management)**, and results of investigations undertaken in accordance with condition (34), including but not limited to:*
- i. *Documentation of, and possible reasons for, trigger value exceedances, and further action taken or proposed in response to exceedances, including a timeline for future actions;*
  - ii. *Documentation of service requests indicating any flooding of dwelling houses described in condition (8)(a);*
  - iii. *A summary of any remedial or improvement works carried out to improve the quality of, or improve the management of quantity of stormwater discharges in that year including any works planned or undertaken to address any flooding of dwelling houses described in condition 8(a); and*
  - iv. *A summary of new stormwater systems vested to WDC during the preceding year which will discharge under this consent; and*
  - v. *A description of any future stormwater system proposals, including retrofitting of existing stormwater systems, to improve the management of stormwater within the Rangiora reticulated stormwater system; and*
  - vi. *Discussion of actions taken through the management of the stormwater discharges to protect and enhance mahinga kai species of value to Te Ngai Tuahuriri Runanga, and any enhancement of mahinga kai areas.*

In alignment with Condition 8, WDC keeps track of stormwater and flooding damage through various processes within the 3 Waters Operations team. This process occurs either via service requests from the public, or direct report from WDC staff. There are no reports of stormwater discharging directly to any dwellings or houses. No erosion or scour has been encountered or recorded with stormwater as the cause. When it comes to the receiving environment objectives to manage the quality of discharge, as presented in the Stormwater Monitoring Programme Report, WDC documents, analyses and reviews the results from the monitoring program, recommending actions to be taken. Results have been shared within the team. Projects to follow up on those actions, are being discussed as part of the Stormwater Management Program (SMP), to be presented by January 2025.

WDC is working with Ngāi Tūāhuriri Rūnanga to identify and protect wāhi tapu and wāhi taonga, such as via protections in the District Plan and Proposed District Plan for silent file areas, and tūranga tūpuna. Mahaanui Kurataiao Ltd produced a report in 2017 which identified wāhi tapu and wāhi taonga within the District as a basis for these layers in the Proposed District Plan. WDC has also engaged Ngāi Tūāhuriri Rūnanga (via MKL) to propose projects under CRC184601 Conditions 8d and e for inclusion in the Rangiora Stormwater Management Plan.

With regards to condition 14, WDC ensures compliance with Water Quantity and Quality conditions with due diligence undertaken by the Network Planning Team (who undertake stormwater modelling) and the Development Team (who apply consent conditions to developments and monitor the implementation of those consents). These teams work using The Christchurch City Council's Waterways, Wetlands and Drainage Guide, WDC's Engineering Code of Practice (which includes guideline document prepared by Auckland Council, currently referred to as GD01, formerly known as TP10) and the Stormwater Drainage and Watercourse Protection Bylaw 2018.

### 14.1. Trigger value exceedances, actions and investigations

WDC Assessment: **Compliant** (information provided)

Guidance value exceedances for contaminants are supplied in the stormwater monitoring programme reports for 2021-2022 and 2022-2023. It is noted that more data will continue to improve WDC analysis to determine where and how it is best to act and where to invest resources.

A series of recommendations were issued within the stormwater monitoring programme report 2022-2023 to act on exceedances of guidance values for:

- Dissolved Copper levels in the North Drain, North Brook, Middle Brook and South Rangiora (No. 7 Drain)
- Dissolved Zinc in the North Drain, North Brook and Middle Brook
- E. coli levels in North Drain, North Brook, Middle Brook and South Brook

These will be addressed in the Rangiora Stormwater Management Plan to be presented by 1 January 2025 to ECan, and with implementation after this date. Other projects are also already underway, which are outlined in condition 35ii.

### 14.2. Service requests

WDC Assessment: **Compliant** (information provided)

All flooding is documented by WDC (Figures 8 to 12), and reported on as quarterly performance measure to the Department of Internal Affairs. This measure is determined by service requests within our urban schemes that have had house flooding as a result of the Council stormwater system. There have been cases of house flooding in urban schemes over the past two years. However, these service requests were investigated and determined to be not as a result of the Council stormwater system (i.e. household flooding due to on-site drainage issues) for both 2021-2022 and 2022-2023. Therefore, there have been no service requests lodged indicating flooding of houses as per condition 8a.

Level of Service	Measure (from Annual Plan)	Target	Q1 Performance	Q1 Comments	Q2 Performance	Q2 Comments
<b>Drainage</b>						
<b>System Adequacy</b> The stormwater system is adequately sized and maintained. Rural drainage areas are adequately maintained.	<b>Urban Stormwater</b> a) The number of flooding events that occur as a result of overflow from the stormwater system that enters a habitable floor.	Nil in less than 50 year storm events.	Nil	There were no flooding events of habitable floor levels during the first quarter.	Nil	No habitable floor levels were inundated in less than a 50 year storm event.  There were five garages flooded during the 15 December 2021 storm event, three in Kaiapoi and two in Waikuku Beach. This event was determined to have a return period in excess of the 50 year storm event over a 12 hour duration in the coastal area of the district.

Figure 7. Part 1. Summary of non-Financial Performance Measures - Drainage & Stockwater for 2021-2022. No actions required from these investigations. No actions required.

Level of Service	Measure (from Annual Plan)	Target	Q3 Performance	Q3 Comments	Q4 Performance	Q4 Comments
<b>Drainage</b>						
<b>System Adequacy</b> The stormwater system is adequately sized and maintained. Rural drainage areas are adequately maintained.	<b>Urban Stormwater</b> a) The number of flooding events that occur as a result of overflow from the stormwater system that enters a habitable floor.	Nil in less than 50 year storm events.	Nil	No habitable floor levels were inundated in less than a 50 year storm event.  There were three garages flooded during the 12 February 2022 storm event, one in Kaiapoi, one in Waikuku Beach, and one in Cust. This event was determined to have a return period of about a 20 year storm event over a 24 hour duration in the coastal area of the district.	Nil	There were no flooding events of habitable floor levels during the fourth quarter.

Figure 8. *Part 2*. Summary of non-Financial Performance Measures - Drainage & Stockwater for 2021-2022. No actions required from these investigations. No actions required.

Level of Service	Measure (from Annual Plan)	Target	Q1 Performance	Q1 Comments
<b>Drainage</b>				
	<p><b>Urban Stormwater</b></p> <p>a) The number of flooding events that occur as a result of overflow from the stormwater system that enters a habitable floor.</p>	Nil in less than 50 year storm events.	Nil	<p>There were no flooding events of habitable floor levels reported during the first quarter.</p> <p>There were four significant rainfall events in July which caused flooding across the district, the largest event occurred on the 26 July which was determined to have a return period of approximately 30 years over a 24 hour period. There were 41 garages / sheds that were reported as flooded and 4 habitable floor levels - two in rural areas (Greigs Road and Tram Road) and two in urban areas (Kinley Street, Rangiora and Queens Ave, Waikuku Beach). The flooding in the urban area related to private issues and not overflow from the public stormwater system.</p>

Figure 9. Part 1. Summary of Non-Financial Performance Measures - Drainage & Stockwater for 2022-2023. No Actions required.



Level of Service	Measure (from Annual Plan)	Target	Q2 Performance	Q2 Comments	Q3 Performance	Q3 Comments
<b>Drainage</b>						
	<b>Urban Stormwater</b> a) The number of flooding events that occur as a result of overflow from the stormwater system that enters a habitable floor.	Nil in less than 50 year storm events.	Nil	There were no flooding events of habitable floor levels reported during this quarter.	Nil	There were no flooding events of habitable floor levels reported during this quarter.

Figure 10. *Part 2. Summary of Non-Financial Performance Measures - Drainage & Stockwater for 2022-2023. No Actions required.*

Level of Service	Measure (from Annual Plan)	Target	Q4 Performance	Q4 Comments	YTD Performance	YTD Comments
<b>Drainage</b>						
	<p><b>Urban Stormwater</b></p> <p>a) The number of flooding events that occur as a result of overflow from the stormwater system that enters a habitable floor.</p>	Nil in less than 50 year storm events.	Nil	There were no flooding events of habitable floor levels reported during this quarter.	Nil	<p>No habitable floor levels were inundated in less than a 50 year storm event.</p> <p>There were four significant rainfall events in July which caused flooding across the district, the largest event occurred on the 26 July which was determined to have a return period of approximately 30 years over a 24 hour period. There were 41 garages / sheds that were reported as flooded and 4 habitable floor levels - two in rural areas (Greigs Road and Tram Road) and two in urban areas (Kinley Street, Rangiora and Queens Ave, Waikuku Beach). The flooding in the urban area related to private issues and not overflow from the public stormwater system.</p>

Figure 11. *Part 3. Summary of Non-Financial Performance Measures - Drainage & Stockwater for 2022-2023. No Actions required.*

### 14.3. Remedial and improvement works

WDC Assessment: **Compliant** (information provided)

As described in section 14.2, there has been no flooding caused by stormwater, therefore no remedial or improvement works have been carried out.

There are projects that have been carried out by WDC related to stormwater, such as Enviroschools and Ecoeducate.

Another improvement has been the increased capacity within the 3 Waters team, with recruitment process of new staff initiated in 2022-2023, with the improvement in the quality and quantity of stormwater discharges as a key responsibility of their roles. However, the outcome of this investment will be seen in future years, as new staff started in November 2023.

### 14.4. New stormwater systems vested

WDC Assessment: **Compliant** (information provided)

A list of all new Stormwater assets vested to WDC in Rangiora from 2021-2023 was requested from our Asset Information Management Team. The result is a list which includes all Stormwater assets in Rangiora, which have been acquired by council after development.

This list is provided in Appendix 5.

### 14.5. Future Stormwater system proposals

WDC Assessment: **Compliant** (information provided)

The following table represents all future stormwater proposals to improve both quantity and quality of stormwater management in Rangiora.

It should be noted that the following projects are in alignment with the actions recommended in the stormwater monitoring programme report: North Drain Treatment, Middle Brook Treatment and Three Brooks Enhancement Work.

Project Name	Description	Start Year	Complete Year
North Drain Treatment	Investigate and implement SW treatment options for the North Drain catchment. Includes enhancement to landscaping and amenity of the drain.	2028	2031
Middle Brook Treatment	Investigate and implement SW treatment options for the Middle Brook Catchment	2028	2029
Network Discharge Consent Implementation Works	Implementation of water quality improvement works identified in the Rangiora Stormwater Management Plan	2026	2034
Blackett Street Piping	Pipe upgrade through Ashley Street roundabout.	2025	2027
Johns Road Stormwater Main	New pipe along Johns Road, from Townsend Road to east boundary of 163 Johns Road.	2025	2025
Wiltshire / Green Pipework Upgrade Stage 2	Design and construction of pipe upgrade from Parkhouse Drive to Green Street	2026	2027
Railway Drain Treatment	Stormwater treatment improvements at the northern end of Railway Drain.	2024	2026
East Belt to Cam River Connection	Primary and secondary flow connection from East Belt / Keir Street to the headwaters of the Cam River. To align with development of the northeast area of Rangiora.	2026	2027
Three Brooks Enhancement Work - North Brook / Geddis Street	Repair and replacement of timber lined drain. Section of Geddis Street drain between High Street and Geddis Street. Section of North Brook between West Belt and Elisabeth Street.	2026	2026
Three Brooks Enhancement Work - Middle Brook Tributary	Repair and replacement of timber lined drain and vegetation work. Section of Middle Brook tributary upstream of Bush Street.	2026	2027
Three Brooks Enhancement Project - North Brook Victoria to Newnham	Channel naturalisation and retaining wall replacement. Section of North Brook between Victoria Street and Newnham Street.	2027	2028
Three Brooks Enhancement Work - Middle Brook Martyn to Bush	Naturalisation and vegetation clearance in the Martyn Street / Bush Street area.	2029	2029
Three Brooks Enhancement - Middle Brook Bush to King	Replacement of retaining wall and timber lined drain and naturalisation / vegetation clearance work. Section of Middle Brook between Bush Street and King Street.	2030	2031
North Brook Retaining Wall - Janelle to White	Installation of timber retaining walls on both sides of the North Brook between Janelle Place and White Street.	2026	2027
North Drain Piping - Ashley to Edward	Piping of the North Drain adjacent to the Anglican Cemetery between Ashley Street and Edward Street.	2026	2027
Belmont Avenue Drainage Upgrades	Drainage upgrades in Belmont Avenue, Rangiora	2028	2028

**Table 15. Future Capex stormwater projects in the WDC draft Long Term Plan 2024-34**

Other works completed in 2024 include retrofitting of raingardens along East Belt. These are due for reporting in the 2023-2024 annual report.

## 14.6. Protecting and enhancing mahinga kai

WDC Assessment: **Compliant** (information provided)

A summary of actions is presented below, extracted from a previous table of actions presented:

Date	WDC contact person		Situation/Project	Actions
<b>August 2021</b>	Sophie Allen	Koura Creek	Sophie spotlighted the population of freshwater crayfish (wai koura) at Koura Creek. One large longfin eel was found in the waterway. Tried to relocate it downstream unsuccessfully. Sophie has observed a large drop in the wai koura population, probably due to predation pressure from the longfin. Trout gillnetting was carried out in 2019 which found no above the trout barrier (but trout have been caught in the past I think). The trout barrier is unlikely to be able to be modified to exclude eels.	Spotlighting was carried out again in 2023 - Koura population is still low and has not recovered. The eel was not seen but might still be living in that waterway. Keep an eye on eels and trout in Koura Creek.
<b>November 2021</b>	Sophie Allen (ECan-led project by Irai Weepu)	Irai Weepu	Watercress- support for Irai Weepu and the Tuia team at ECan to look at enhancing watercress mahinga kai sites - November 2021 weeding was carried out of water speedwell and monkey musk. Watercress protection (no drain cleaning) sites along the Cam River above Bramleys Road Bridge were identified in the WDC Drainage Maintenance Management Plan.	This project was put on hold by ECan or Ngai Tuahuriri members as needing better scoping - before the project pause: better signage, improved bank access, as well as a repeat of the weeding were suggested as actions that WDC could support

Table 16. Actions taken to enhance mahinga kai between 2021-2023

## 15. Sites investigations

WDC Assessment: **Compliant** (no info to report)

As far as we are aware, between 2021-2023, there have been no further investigations undertaken because of catchment boundary or groundwater levels changes. Therefore, there is no information to report.

## 16. Site Audits

WDC Assessment: **Compliant** (no info to report)

There have been no site audits undertaken yet. This is because the Pollution Prevention Plans (PPP) have not been implemented yet. At time of writing, PPP are in the trial stage.

There is no information to report between 2021-2023.

## 17. Sites Excluded from this consent in the last year

WDC Assessment: **Compliant** (no info to report)

No sites have been excluded yet from CRC184601. Therefore, there is no information to report between 2021-2023.

### 17.1. Comments

From our records, WDC identified a list of 24 private discharge consents that are currently active within the Rangiora Urban limits. It is our understanding that these consents are held and monitored by ECan, with expiry dates beyond 2030 for all of them. A list of these consents is available on request.

The nature and responsibilities of these consents was discussed and clarified in a meeting with ECan on 2 February 2024. It is our understanding that, when ECan consents expire, they will fall under our Rangiora Network Stormwater Consent. However, this process is to be led gradually starting in 2024, testing our system for Pollution Prevention Plans.

Likewise, from the same meeting, a data request was recorded by ECan to provide WDC with data relating all consents in Rangiora that currently fall within ECan.

All the above will inform WDC in our assessment and exclusion of high-risk sites.

## 18. Breaches of the Bylaw

WDC Assessment: **Compliant** (no info to report)

No information to report between 2021-2023. There probably have been breaches of the bylaw, but none that WDC is aware of.

## 19. References

Depree, C. (2011). Street sweeping: an effective non-structural Best Management Practice (BMP) for improving stormwater quality in Nelson? Report No. HAM2011-043. NIWA. <https://envirolink.govt.nz/assets/Envirolink/934-NLCC51-Street-sweeping-an-effective-non-structural-best-practice-for-improving-stormwater-quality.pdf>



# Rangiora Stormwater Monitoring Programme Report 2022-23

Prepared by Waimakariri District Council for CRC184601  
March 2024





**Prepared for:** Regional Leader - Monitoring and Compliance, Environment Canterbury and Ngāi Tūāhuriri Rūnanga, for consent CRC184601

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## 1. Executive Summary

This report summarises the results and provides analysis and discussion for stormwater sampling in Rangiora as per the consent CRC184601 from 1 July 2022 – 30 June 2023.

For the first time, a preliminary trend analysis is provided, using historical data from Waimakariri District Council baseline survey data from 2014-2017.

As per the monitoring programme, there are 21 visual discharge inspection outlets (6 of which are also sampled for Total Suspended Sediment), 13 sites in receiving waters for urban contaminants, and 6 sites for stream health sampling.

Visual discharge inspections of outlets did not raise any issues such as odour or hydrocarbons present. The guidelines threshold for Total Suspended Solids (TSS) was not exceeded in any of the sites. This is different compared to 2021-2022, when site RRSR026A (Pond C outlet on the corner of Flaxton and Fernside Roads), exceeded the guideline threshold for Total Suspended Solids (TSS). RRSR026A had elevated levels of *E. coli*. A decreasing trend was not able to be identified. However, values of Dissolved Copper, Dissolved Zinc and Dissolved Reactive Phosphorus (DRP) were lower for 2022-2023, compared to 2021-2022.

Guideline values for 'Urban Impact', (which are compliance points under the Rangiora Stormwater Monitoring Programme), were not exceeded for TSS nor Total Ammoniacal Nitrogen. They were exceeded for Dissolved Copper, Dissolved Zinc, Dissolved Reactive Phosphorus (DRP) and *E. coli*. Guideline values were not exceeded for Total Ammoniacal Nitrogen (TAN). Urban Impact sampling was undertaken during a moderate wet weather event and a heavy rain event. Both rain events met the first flush criteria, with total rainfall depths of 6.4mm and 14.4mm.

For dry weather 'Stream Health' sampling, guideline values were not exceeded for TSS, pH, temperature, TAN, DRP, and dissolved oxygen (except a low value at the North Brook at Lilybrook Park (RRNB036) possibly due to low oxygen in groundwater inflows). Guideline values for Dissolved Inorganic Nitrogen (DIN) and *E. coli* were not met in North Brook, Middle Brook, South Brook, or the No. 7 Drain.

Recommendations to address contaminants and actions in waterways are presented in this report. Investigations into contaminants in groundwater inflows, and further characterisation of rural versus urban sources is also recommended. It is believed that some exceedances of *E. coli*, DRP and DIN, could be due to rural inputs, beyond the scope of the Consent.

Long term or site-specific trends in water quality were analysed, with some statistically significant trends encountered. There are limitations with data size and the type of analyses implemented (linear regression model). However, trends have been investigated where possible. Trend analyses will be improved for the next reporting period.

Annual stream sediment deposition sampling found that sediment depth cover was nil at selected sites in the Middle Brook; in the North Brook from nil to 300mm; South-South Brook presented sediment build up with a sediment depth of 100mm-400mm; No. 7 Drain had nil sediment depth cover with some patches of 30mm (it had been cleaned a few weeks prior sampling).

Stream health ecological sampling (every 3 years) and stormwater management area sediment sampling programmes (every 5 or 10 years depending on the basin) have been carried out in 2023-24.

There was one diesel spill of 5L reported at 47 White Street. A vehicle was vandalised with diesel siphoned off and some of this spilt onto the road. Rain washed this into the stormwater network and into the North Brook. WDC responded and deployed clean up measures.

## 2. Introduction

Resource consent CRC184601 requires Waimakariri District Council to submit an annual report to both to the Canterbury Regional Council and Te Ngāi Tūāhuriri Rūnanga which details compliance with the most recent Rangiora Stormwater Monitoring Programme and other consent requirements.

This report is required to detail results of the monitoring carried out for each section of the monitoring programme for a 12-month period.

This report is complemented with the following information, which is found in this report and in the Rangiora Stormwater Annual Report 2021-2023:

- A summary and discussion of results from each section of the monitoring programme
- Interpretation of any long term or site-specific trends in surface water quality, stormwater quality, ecology, or soil quality where data was available (Annual Report)
- Interpretation of the significance and possible reasons for any change in long term or site-specific trends where data was available (Annual Report)
- Discussion of compliance with the “urban impact” Receiving Environment Objectives.
- Documentation of, and possible reasons for exceedances, and further action taken in response to exceedances (Annual Report)
- A report on any spills that occurred exceeding 5 litres that discharged via the reticulated stormwater system into the receiving environment (this report, full details in Annual Report)

Although included within the Rangiora stormwater monitoring programme as a part of the consent, the stream health component is not assessed as a compliance component of the Rangiora Stormwater Network Discharge Consent. The stream health water quality results have been included in this annual report to provide context and allow for the analysis of trends over time.

This annual report does not include results from ecological surveys in Rangiora streams, stormwater basin monitoring or stream sediment monitoring as these were not required in the 2022/2023 year.

### 2.1. Rangiora Stormwater Monitoring Programme

The Rangiora Stormwater Monitoring Programme focuses on the Rangiora urban stormwater discharge impact on waterways. The programme covers monitoring of discharge points, receiving waters and stormwater ponds within the Rangiora urban limits.

Within the Rangiora urban limits, the main natural streams are; North Brook, North-North Brook, South Brook, Middle Brook, Cam River, Taranaki Stream, Crayfish (Kōura) Creek, the South-South Brook, and the No.7 Drain. These waterways receive stormwater discharge from the Rangiora urban stormwater network (other than Crayfish (Kōura) Creek which receives no stormwater discharges and is entirely spring flow) and are therefore considered to be receiving waters. The receiving waters have yearly baseflow, apart from the upper North Brook which is ephemeral. All the streams provide habitat for aquatic ecology. Taranaki Stream does not contain sampling sites on this financial year. A new sampling site has been added in Taranaki Stream as part of the new Bellgrove subdivision, within the new Stormwater Management Program.

Using the requirements in the Canterbury Land and Water Regional Plan (CLWRP), the WDC Rangiora stormwater monitoring programme includes:

#### **“Urban Impact” Component:**

1. **Visual Discharge Inspections** - to check for water clarity, oil, grease films, scums, foams, suspended materials, odour and erosion at the major discharge points.

2. **Major Discharge Inspections** – to sample TSS discharges from selected major discharge points.
3. **Urban Impact Inspections**- where dissolved metal samples, pH, Dissolved Reactive Phosphorus (DRP), *E.coli* and Total Ammoniacal Nitrogen are retrieved from the receiving waters, and sent to a laboratory for testing. For dissolved metals, this enables direct compliance assessment against the Schedule 5 water quality standards of the CLWRP and allow the effects of the discharges on the ecological health of the urban streams to be understood. For DRP, *E.coli* and Total Ammoniacal Nitrogen, these provides an indication of the rate of reduction of wastewater overflows during the consent term in association with the wastewater capacity upgrades which are currently underway.
4. **Stormwater Basin Monitoring** – This was not carried out in 2022-23, as it is required only every 5 or 10 years (industrial and residential basins respectively).
5. **Stream Sediment Monitoring** - This analysis, carried out for the first time in 2022-23, looked at sediment particle size and depth of fine sediment.

In addition to the specific monitoring of urban stormwater impacts, the WDC also monitors stream health.

#### **“Stream Health” Component:**

1. **Stream Health Inspection** - Water quality samples of dissolved oxygen, pH, temperature, Total Suspended Solids (baseline purposes), Total Ammoniacal Nitrogen, Dissolved Inorganic Nitrogen, *E.coli*, Dissolved Reactive Phosphorous and Specific Conductance (portable probe) sampled within the Rangiora streams.
2. **Ecological surveys in Rangiora streams**- This was not carried out in 2022-23, as it is required only every 3 years before 2025.

## **2.2. Sampling Sites**

### **2.2.1. Discharge Inspections**

All practicable major discharge points from the WDC stormwater network into the receiving waters are visually monitored.

21 observation points for discharge inspections are presented in the following list and Figure 1.

RRND012: North Drain, Coldstream Road.

RRNB057: North Brook, at Oxford Road.

RRNB049: North Brook, at Geddis Street.

RRNB045: North Brook, at Dudley Park, White Street pipe outlet.

RRNB039: North Brook, at Ward Park, drain inflow from Fraser Place

RRNB038: North Brook, at Ward Park, drain inflow from Ward Place

RRNB035: North Brook, drain inflow into eastern side of Lilybrook Park

RRNB033: Northern branch of the North Brook, west side Kowhai Avenue

RRNB015: Northern branch of the North Brook pipe outlet, Cotter Lane

RRNB009: North Brook, outlet of the North Brook Ponds

RRER006: Goodwins (Horncastle) Stormwater Pond Outlet, Northbrook Road

RRWR013: Oxford Park East SMA basin outlet (West Rangiora) on Johns Road

RRMB026: Middle Brook, at King Street.

RRMB022: Middle Brook, at Clearbrook Lane

RRMB017A: Middle Brook at Gefkins Road

RRSB046A: South Brook, at Townsend Fields Stormwater Management Area outlet.

RRSB035: South Brook, pipe outlet off Coronation Street.

RRSB032: South Brook at Southbrook Road (west side at pipe outlet)

RRSB030: South Brook, pipe outlet on west side of Railway Road.

RRSS026: South South Brook Stormwater Pond Outlet, Lineside Road

RRSR026A: South Rangiora, Stormwater Pond C Outlet, Flaxton Road

RRSR025: South Rangiora, Outlet of Fernside/Flaxton Intersection SMARRSR025: South Rangiora, Outlet of Fernside/Flaxton Intersection SMA



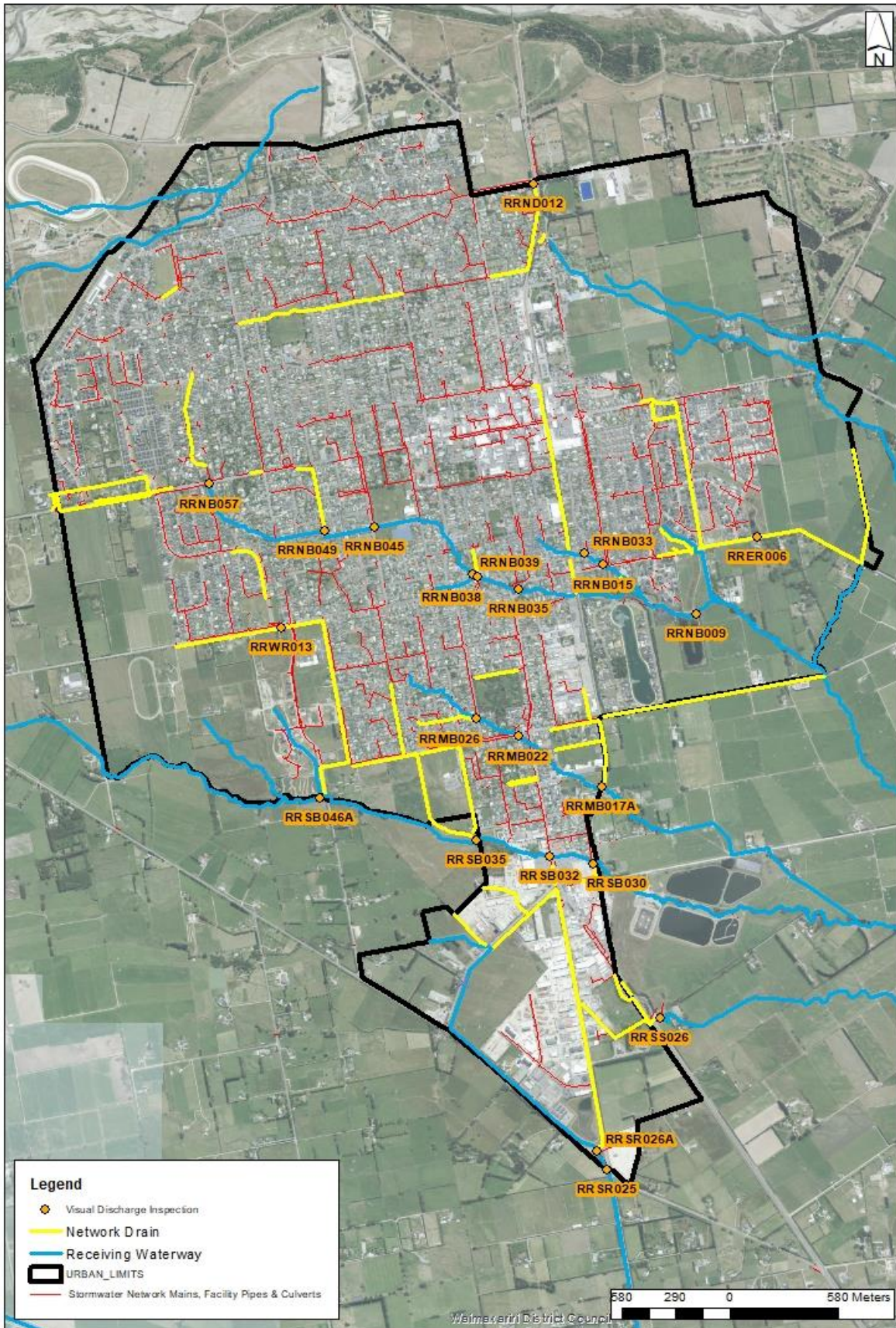


Figure 1: Discharge inspection locations

### **2.2.2. Major Network Outlets**

Six Major Network Outlet total suspended solids (TSS) sample locations are presented in the following list and Figure 2. Sample site RRSR026A (outlet to Pond C, major Rangiora industrial discharges) which has an extended sampling regime is included in this list.

RRNB009: North Brook, outlet of the North Brook and East Rangiora SW Basins

RRNB033: Northern branch of the North Brook, west side Kowhai Avenue

RRNB045: North Brook, at Dudley Park, White Street (discharge from 600mm diameter pipe on White St)

RRMB017A: Middle Brook, Gefkins Road (sample Railway Drain discharge from Hegan Reserve bank)

RRSB030: South Brook, pipe outlet on west side of Railway Road (discharge from 525mm diameter pipe into stream)

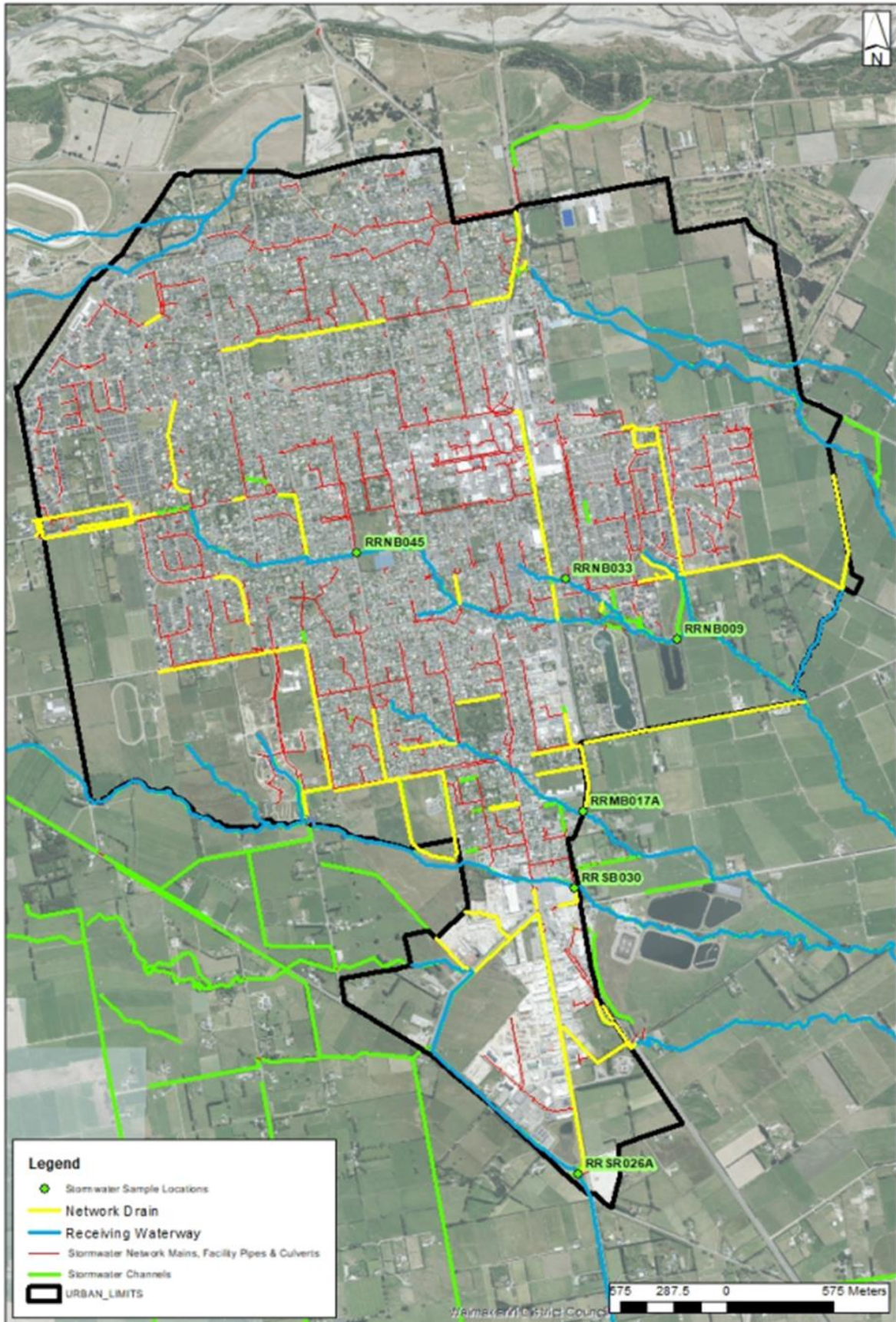


Figure 2: Sample locations for TSS and sample site RRSR026A at selected major discharge points

### 2.2.3. Urban Impact

The sample locations for urban impact monitoring are situated at either the beginning of the urban limits or the stream source, and a sample point at the downstream urban limit.

The Surface Water sample locations are listed and shown in Figure 3:

RRND012: North Drain, near Ashley River stop-bank

CRCR120: Cam River, on the southern side of Kippenberger Avenue

RRNB017: North Brook, on the northern side of Boys Road

RRNB033: North branch of the North Brook, on the western side of Kowhai Avenue

RRNB036: North Brook, Lilybrook Park

RRNB044: North Brook, on Church St across from Dudley Park

RRNB055: North Brook, at Aspen Street Park

RRMB017: Middle Brook, Gefkins Road east of the Railway, upstream side of the bridge

RRMB029: Middle Brook, on the western side of Bush Street

RRSB030: South Brook, on the west side of Railway Road

RRSB046: South Brook, on the east side of Townsend Road

RRSS026: South-South Brook, on the east side of Lineside Road

RRSR026: South Rangiora, No. 7 Drain immediately south of Fernside Road (allows for mixing zone).

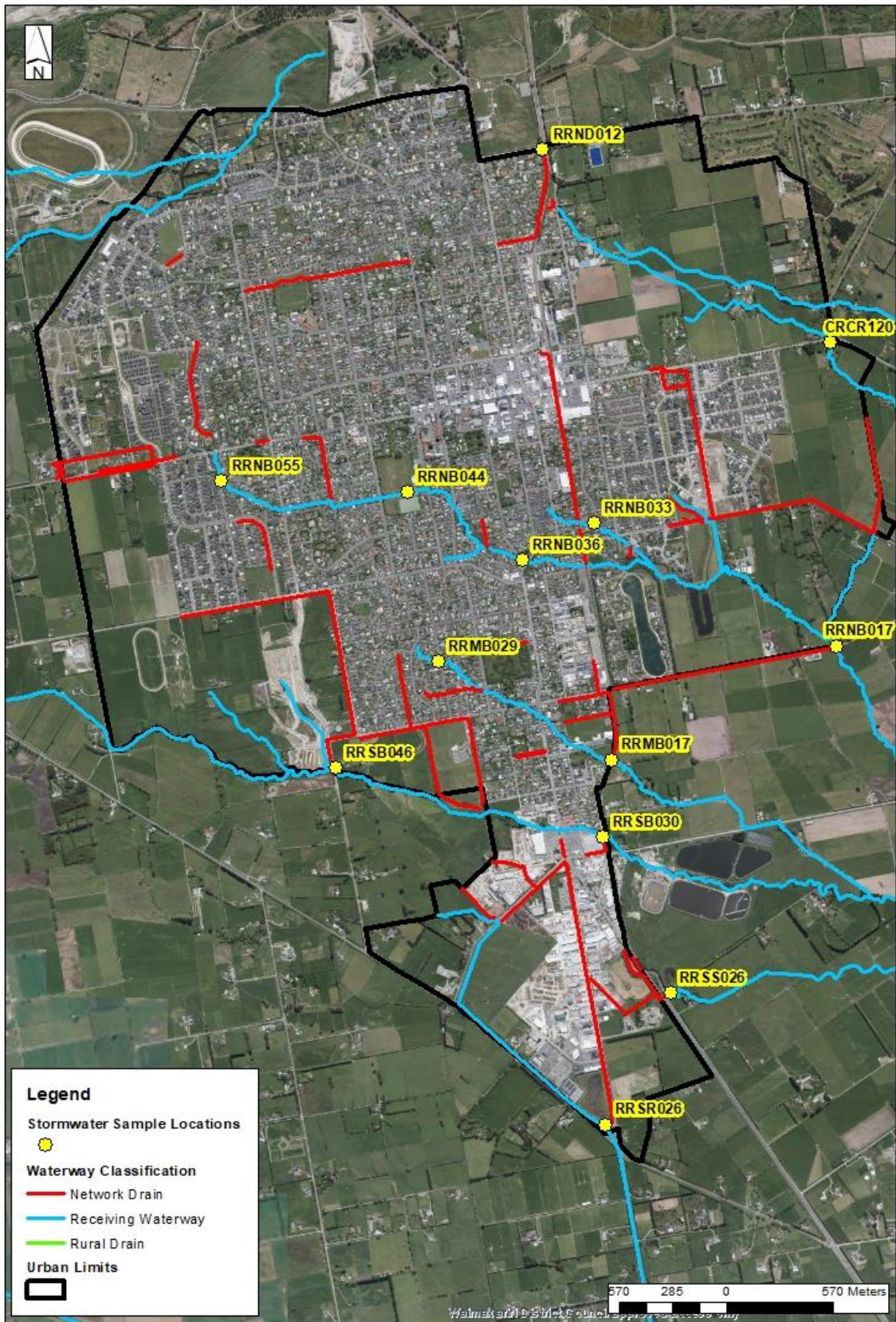


Figure 3: Sample locations for Urban Impact monitoring

#### **2.2.4. Stream Health**

The Stream Health monitoring component is for information and context only, with results unlinked to compliance conditions for the Rangiora Stormwater Network Discharge Consent.

The sample points are situated near either the beginning of the urban limits or the stream source, and a sample point near the downstream urban limit. The Stream Health sample locations are listed below and shown in Figure 4:

RRSR025: South Rangiora, downstream of Fernside / Flaxton Intersection SMA outlet

RRSB030: South Brook, on the west side of Railway Road

RRSB046: South Brook, on the East side of Townsend Road

RRMB017: Middle Brook, Gefkins Road, east of the Railway Line on upstream side of bridge

RRNB017: North Brook, on northern side of Boys Road

RRNB036: North Brook, Lilybrook Park

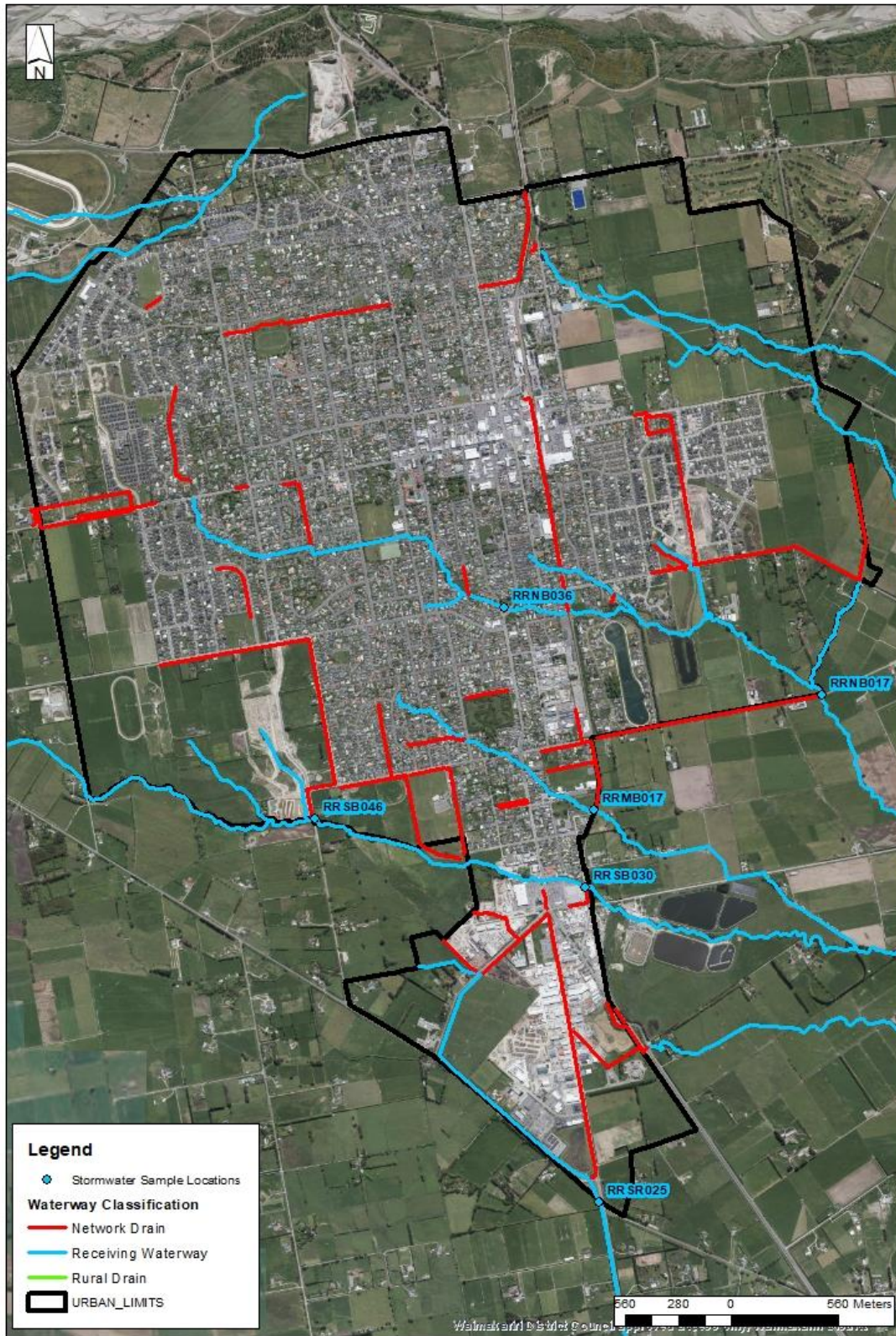


Figure 4: Sample locations for Stream Health

### 2.2.5. Stream sediment deposition and depth

Fine sediment cover and depth was measured in June 2023 at 6 sites in Rangiora as per the brief in TRIM 220513076614 (see Figure 5). This brief follows the protocols SAM1 and SAM6 of Clapcott et al. (2011).

A site on the North Brook at Dudley Park was intended to also be sampled but was dry at the time of sampling. This site is recommended to be replaced as it is regularly dry.

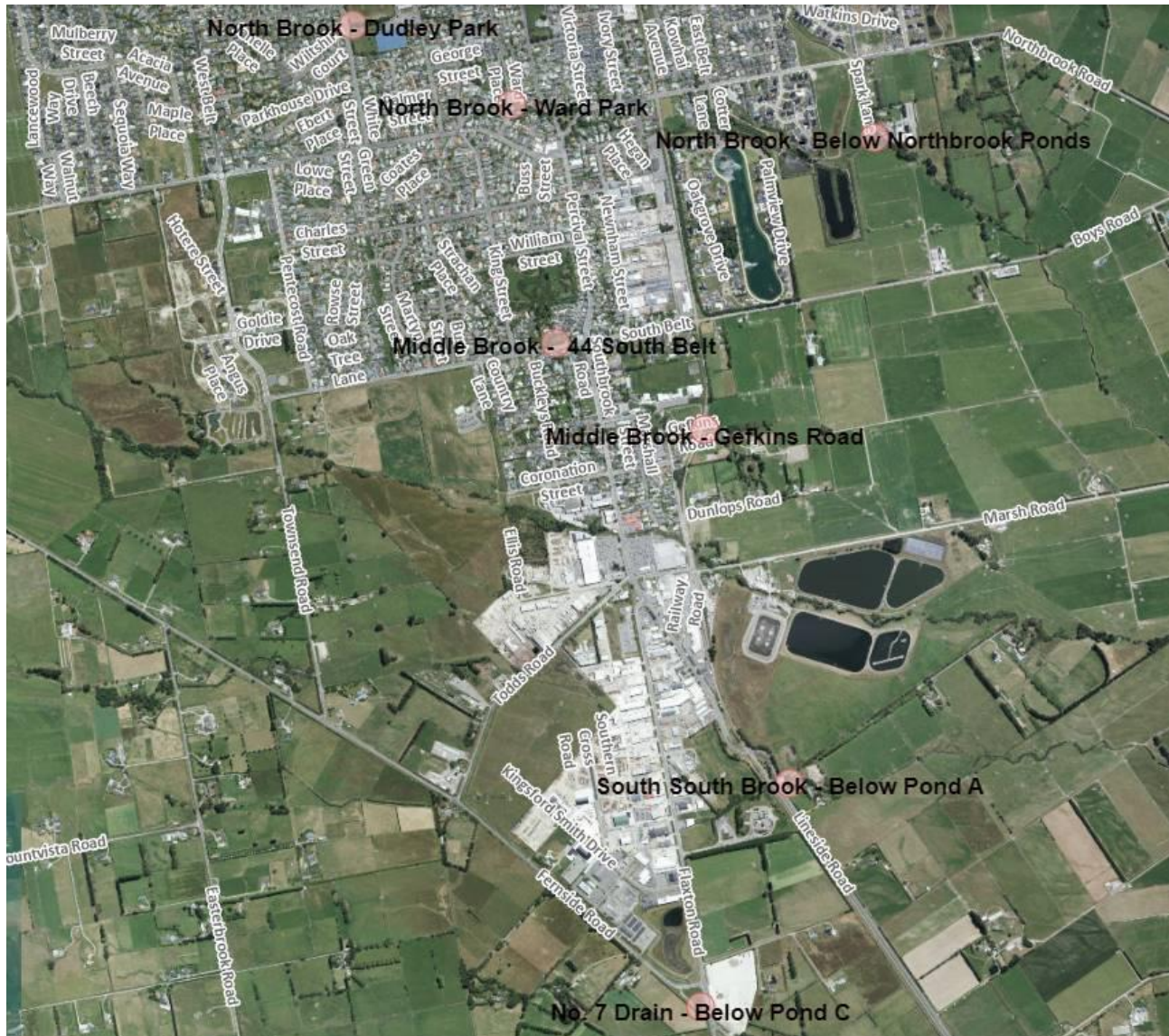


Figure 5. Map of sediment sampling sites 2021-2023 (June 2023)



### 3. Methods

An overview of sampling methods is provided in the CRC184601 Rangiora Stormwater Network Discharge Consent monitoring programme, and therefore is not repeated here for brevity.

A summary of sampling activity is provided in Table 1. Due to staff shortage and consent implementation issues, some scheduled sampling events did not occur during 2022/2023.

	2021-22			
	Q1	Q2	Q3	Q4
	<i>Jul, Aug, Sep</i>	<i>Oct, Nov, Dec</i>	<i>Jan, Feb, Mar</i>	<i>Apr, May, Jun</i>
Visual discharge inspections (quarterly) n=21	Monitoring programme had not commenced	15-16/12/2021	Not undertaken	Not undertaken
Major network outlet discharge (four times per year until 2025) n=6	Monitoring programme had not commenced	15-16/12/2021	Not undertaken - lack of first flush	Not undertaken - lack of first flush
Urban Impact (twice per year) (n=13)	Monitoring programme had not commenced		10/02/2022	Not undertaken - lack of first flush
Stream Health (quarterly)	Monitoring programme had not commenced	18/11/2021	31/03/2022	13/05/2022
Stream fine sediment deposition (annually)	Not undertaken in 2021-22			

Table 1. *Part 1. Summary of Rangiora CRC184601 sampling undertaken in 2021-23*

	2022-23			
	Q1	Q2	Q3	Q4
	<i>Jul, Aug, Sep</i>	<i>Oct, Nov, Dec</i>	<i>Jan, Feb, Mar</i>	<i>Apr, May, Jun</i>
Visual discharge inspections (quarterly) n=21	Not undertaken	Not undertaken	28/03/2023	Not undertaken
Major network outlet discharge (four times per year until 2025) n=6	Not undertaken	Not undertaken	28/03/2023	Not undertaken
Urban Impact (twice per year) (n=13)	Not undertaken		28/03/2023	28/06/2023
Stream Health (quarterly)	Not undertaken	Not undertaken	16/03/2023	23/05/2023
Stream fine sediment deposition (annually)	21/6/2023- 29/06/2023			

Table 2. Part 2. Summary of Rangiora CRC184601 sampling undertaken in 2021-23

Rainfall was monitored closely. All sampling attempts were also recorded by WDC. The challenges encountered to undertake sampling were:

- Staff shortage/availability
- Instrumentation failure (probes)
- Rain outside of working hours when no staff were able to undertake sampling.
- Rain too late in the afternoon and unable to take samples to the laboratory in time.

These issues have been addressed and continue to be addressed by:

- Employing a 3 Waters Compliance Officer to assist with monitoring and reporting as part of the role
- Resolving instrumentation issues with the WDC Water Unit
- WDC continues to explore and test out solutions for sampling outside of hours
- Relaxing first flush criteria with advice sought from Environment Canterbury directly

A full spreadsheet of sampling attempts and details is available on request.

Date	15/12/2021	16/12/2021	10/02/2022	28/03/2023	28/06/2023
Time	02:00pm	08:40am	08:50am	10:30am	8:50am
Antecedent dry weather	72h	72h	72h	72h (nominal 0.2 mm of rainfall fell)	72h (nominal 0.4 mm of rainfall fell)
Rainfall Depth (mm) <i>sampling commenced</i>	24.40mm	50 mm	38.60mm	2.4mm	14.4mm
Rainfall Depth (mm) <i>sampling finished</i>				6.4mm	14.4mm
Duration	14h	32h 40min	16h 50min (rain started 4pm on 9/02/2022)	1h 50min	11h 50 min
Event Description	Heavy rain.  Part 1 of sampling (Part 2 completed next day)	Torrential Rain.  Part 2 of sampling event.  Very large rain event (too large to meet first flush criteria). Rain event had ceased by sampling start but discharge still occurring.	Torrential Rain.  Too much rain for a first flush event (over 25mm rain). It was dry 3 days beforehand.	Moderate Rain.  First flush met after the start of sampling.  The only rain event occurring during work hours.	Heavy Rain.  First flush * met.  Rain ceased already about 3am of the 28/06/23, but still sampled as needed sampling events
Type Sampling Event	Visual Discharge, Major Network Discharges	Visual Discharge, Major Network Discharges	Urban Impact	Visual Discharge, Major Network discharges, Urban Impact	Urban Impact
Reporting Year	2021-22	2021-22	2021-22	2022-23	2022-23

**Table 3: Summary of Rangiora CRC184601 rain events 2021-23. Note only the last two columns are for the reporting period sampled in this report. Rain events included from 2021-22 to allow comparison between data in graphs presented here.**

*\* First flush conditions are defined as a rainfall event with rainfall no less than 3 mm and no greater than 25 mm, over 24 hours (CCC, waterways wetlands and drainage guide). Antecedent precipitation conditions should be considered, where a first flush storm needs to have a period of at least 72 hours of no measurable precipitation (Otago Regional Council).*

## 4. Results

### 4.1. Guideline values

Results for the 2022/2023 reporting year have been compared to the CLWRP guidelines and for trends over time within each waterway. This is the second year of sampling for CRC184601. Comparison has been made to 2021-22 results, baseline sampling results for Rangiora from 2014-17 (sourced from the Infrastructure Data app, TRIM 140728079529 and TRIM 230810122394) or other sampling results where possible. Trends have been analysed within catchments and over time where possible. Note that data available was not always sufficient to detect any significant trends. For this reason, available data for the 2023-2024 financial year has also been included in trend analysis, to increase the sample size. Data from 2023-2024 is not represented here. Despite this, another limitation is that not all sampling locations from the monitoring programme were sampled during baseline sampling. This means that not all sites have all data available for an effective trend analysis over time. To represent the historical data from the baseline sampling, the mean value was calculated for each site across time.

The Rangiora stormwater monitoring programme specifies that the Urban Impact and Major Discharge Outlet sampling should be undertaken in a first flush event. However, meeting first flush sampling criteria was difficult, resulting in sampling in conditions larger than first flush events.

Guideline values from the CLWRP are presented in Table 3. Hardness and Dissolved Organic Carbon were not measured in 2022-23, as are only required every 5 years for adjustment of results.

The following sections of this report look at each of the tested contaminants separately.

**Table 4: Urban Impact monitoring surface water guideline values**

Contaminant	Guideline	Guideline Source
<b>Total Suspended Solids</b>	<50 gm <sup>3</sup>	CLWRP
<b>Dissolved Copper</b>	< 0.0018 mg/L	CLWRP <i>spring fed – plains – Urban Water</i> 90% of the <b>ANZECC guideline</b>
<b>Dissolved Zinc</b>	< 0.015 mg/L	CLWRP <i>spring fed – plains – Urban Water</i>
<b>pH</b>	Shall be between 6.5 - 8.5	CLWRP, <i>section 16, schedule 5</i>
<b>Dissolved Reactive Phosphorus</b>	< 0.016mg /L	CLWRP, <i>section 16, schedule 5</i>
<b>E. coli</b>	95% of the samples should have less than 550 E. coli per 100 mL	CLWRP, <i>section 16, schedule 5</i>
<b>Total Ammoniacal Nitrogen</b>	Depends on pH level	CLWRP, <i>Table S5C, Schedule 5</i>
<b>Hardness</b>	5 yearly adjustment of Guideline Value	
<b>Dissolved Organic Carbon</b>	To characterise the waterway – adjust Guideline Value	

## 4.2. Trend Analysis

For the first time trend analyses was undertaken with the data available. This included historical data from 2014-2017, and data from the previous financial year 2021-22.

A linear regression model was used to represent data with a scatter plot graph, from which an R-squared test was calculated. This analysis was undertaken for all data available within each site, for each contaminant individually and checked for a significant linear trend over time. An  $R^2$  value  $\geq 0.5$  was considered a significant trend. Anything below 0.5, was not considered a significant trend. In addition, any contaminants, and sites where an  $R^2 \geq 0.4$  was identified, is recommended to be watched closely as WDC keeps increasing the dataset available with more stormwater sampling.

Values such as sampling size, where “n” equals the number of samples analysed, and the  $R^2$  value, have been provided with trend analysis to provide an idea of how strong the results are based on sample size and correlation value found from the regression model, to allow for a more concise interpretation of results.

Due to time constraints for the preparation of this report, WDC acknowledges that no preliminary descriptive data analyses were undertaken. From this, an understanding of what statistical distribution each data set follows, has not been investigated. Rather, we have worked under the assumption that our contaminant data follows a linear distribution. WDC is aware of these limitations when it comes to using water quality data. We plan to implement a different approach for the 2023-24 reporting, such as the use of Time Trends software.

Other limitations are noted in terms of data size. Not all sites and contaminants were covered during baseline sampling. Also, not all sites were sampled in 2022-23 runs. All details are outlined individually in the following sections.

## 4.3. Historical Data (Baseline sampling)

In some instances, such as for the Urban Impact analysis, historical data available from the baseline sampling (2014-2017) was undertaken at sites that do not necessarily match the current sampling site in the monitoring programme.

For example, in the Middle Brook, site RRMB019 was sampled historically since 2014. However, the site was moved to RRMB017, also in the Middle Brook but a little downstream from the baseline sampling. To avoid comparing data to sites that are not the same in location, in these instances data has been skipped and considered as “no data available” from a historical data perspective.

The only exception to this is has been made with Pond C, where historical data from site RRSR026 (after a mixing zone) has been compared with consent monitoring data from RRSR026A (with no mixing zone). This decision has been made in an attempt to increase the dataset however it is not a true baseline.

#### 4.4. Bar charts

All sampling data displayed in column graphs has been organised to display sampling sites from catchments upstream to downstream. These have been distributed in the X axis horizontally, to display information for an easier understanding and interpretation of results. Hence, data is visually represented for catchments in the following order: North Drain, Cam River, North Brook, Middle Brook, South Brook, No. 7 Drain and South-South Brook. See any of the figures in the following sections.

#### 4.5. Visual discharge inspections

Note only one of quarterly inspections was carried out in 2022-23 (see Table 1), during which 11 of the 21 outlets were inspected due to time constraints. See Table 5 for a summary of which outlets were inspected and which ones were not.

**Table 5. Summary of outlets where visual discharge inspections were undertaken in 2022-2023**

	Sampled?
RRND012: North Drain, Coldstream Road.	No
RRNB057: North Brook, at Oxford Road.	No
RRNB049: North Brook, at Geddis Street.	No
RRNB045: North Brook, at Dudley Park, White Street pipe outlet.	No
RRNB039: North Brook, at Ward Park, drain inflow from Fraser Place	No
RRNB038: North Brook, at Ward Park, drain inflow from Ward Place	No
RRNB035: North Brook, drain inflow into eastern side of Lilybrook Park	No
<b>RRNB033</b> : Northern branch of the North Brook, west side Kowhai Avenue	Yes
RRNB015: Northern branch of the North Brook pipe outlet, Cotter Lane	No
RRNB009: North Brook, outlet of the North Brook Ponds	No
RRER006: Goodwins (Horncastle) Stormwater Pond Outlet, Northbrook Road	No
RRWR013: Oxford Park East SMA basin outlet (West Rangiora) on Johns Road	No
<b>RRMB026</b> : Middle Brook, at King Street.	Yes
<b>RRMB022</b> : Middle Brook, at Clearbrook Lane	Yes
<b>RRMB017A</b> : Middle Brook at Gefkins Road	Yes
<b>RRSB046A</b> : South Brook, at Townsend Fields Stormwater Management Area outlet	Yes
<b>RRSB035</b> : South Brook, pipe outlet off Coronation Street.	Yes
<b>RRSB032</b> : South Brook at Southbrook Road (west side at pipe outlet)	Yes
<b>RRSB030</b> : South Brook, pipe outlet on west side of Railway Road.	Yes
<b>RRSS026</b> : South South Brook Stormwater Pond Outlet, Lineside Road	Yes
<b>RRSR026A</b> : South Rangiora, Stormwater Pond C Outlet, Flaxton Road	Yes
<b>RRSR025</b> : South Rangiora, Outlet of Fernside/Flaxton Intersection SMARRSR025: South Rangiora, Outlet of Fernside/Flaxton Intersection SMA	Yes

Results of visual discharge inspections are presented in Table 6.

##### 4.5.1. Colour and Suspended Sediment

There were instances in the 2022/2023 year that colour or suspended sediment from outlets into the Middle Brook, North Brook, South Brook and outlet from Pond C into the No. 7 Drain were identified as elevated during the discharge inspections (RRMB17A, RRMB022, RRMB026, RRNB033, RRSB032, RRSB035, and RRSR026A). Outlets into the Middle Brook (RRMB022), South Brook (RRSB035) and the Pond C outlet (RRSR026A) were also noted to be elevated in 2021-22.

##### 4.5.2. Hydrocarbons

There were no instances in the 2022/2023 year that hydrocarbons (oil, grease or other) were observed during the discharge inspections.

### 4.5.3. Visible contaminants

There were minor instances in the 2022/2023 year that visible contaminants, such as rubbish, vegetation or debris, were observed during the discharge inspections. None of the instances required immediate action such as trash grille cleaning.

Table 6. Summary of Results from Visual Discharge Inspections in Rangiora for 2022-2023.

Date and time	Sampler	Sampling Point	Colour and Suspended Settlement	Rubbish	Hydrocarbons	Odours	Vegetation and Debris	Additional Site Observation of Stream Bed or Bank Erosion
28 March 2023 at 11:06 am	Angela Burton	RRMB017A	Slightly Murky, slightly coloured	Yes, unable to access safely. One small item	No	No	Aquatic weed	Bank erosion on true right near railway Bridge
28 March 2023 at 12:12 pm	Angela Burton	RRMB022	Slightly murky but no worse than stream	Beer can	No, a few bubbles	No	A few leaves	No
28 March 2023 at 12:24 pm	Angela Burton	RRMB026	Slightly murky	No	No, some small bubbles	No	Willow roots and minimal aquatic weed	No
28 March 2023 at 1:43 pm	Angela Burton	RRNB033	Murky	One bottle removed	Bubbles	No	Vegetation debris on grate unable to remove	No
28 March 2023 at 10:49 am	Angela Burton	RRSB030	No	Road cone downstream	No	No	Vegetation overgrowth within channel	No
28 March 2023 at 12:08 pm	Angela Burton	RRSB032	Slightly Murky,	No	Small amount of foam	No	No	No
28 March 2023 at 12:43 pm	Angela Burton	RRSB035	Slightly murky similar to stream	No	Bubbles on surface	No	No	No
28 March 2023 at 12:54 pm	Angela Burton	RRSB046A	---	---	---	---	---	Not discharging
28 March 2023 at 11:38 am	Angela Burton	RRSR025	Fairly clear	Nil visible	Nil visible	Nil	<i>Carex secta</i> on banks, aquatic weeds including monkey musk, <i>Potamogeton</i> spp.	---
28 March 2023 at 11:58 am	Angela Burton	RRSR026A	Murky with some suspended sediment visible	No	No	No	Aquatic weed	---
28 March 2023 at 11:23 am	Angela Burton	RRSS026	Green algae on top, no visible suspended solids	No	No	No	Algae	No flow from ponds

#### **4.5.4. Odour**

There were no instances in the 2022/2023 year that odour from outlets was identified as unusual during the discharge inspections.

#### **4.5.5. Stream bed and bank erosion**

Stream bank erosion was observed in the 2022/2023 reporting year below RRMB017A (on the true right bank of the Middle Brook at Gefkins Road near the Railway Bridge). This is not thought to be erosion caused by the stormwater outlet and was not significant enough to require remediation.

#### **4.5.6. Additional information**

Site RRSB046A in the South Brook, at Townsend Fields Stormwater Management Area outlet, was not discharging at the time of sampling.



## 4.6. Major network outlets

### 4.6.1. Sampling Sites

Note that only 4 of 6 total sites were sampled for TSS on this round due to time, weather and staff constraint (see Table 6).

**Table 7. Summary of major network outlets sampled for TSS in 2022-2023 financial year.**

	Sampled?
RRNB009: North Brook, outlet of the North Brook Ponds	No
RRNB033: Northern branch of the North Brook, west side of Kowhai Avenue	Yes
RRNB045: North Brook, at Dudley Park, White Street pipe outlet	No
RRMB017A: Middle Brook, Gefkins Road	Yes
RRSB030: South Brook, on the West side of Railway Road	Yes
RRSR026A: South Rangiora, Stormwater Pond C Outlet, Flaxton Road	Yes

Not all these sites were included in the baseline sampling, therefore not always there was enough historical data for comparison and trend analysis over time at each site.

### 4.6.2. Total Suspended Solids (TSS)

Note only one major network outlet discharge sampling round was undertaken (Table 1). Two sampling sites were also missed on this sampling due to staff, time and weather constraints.

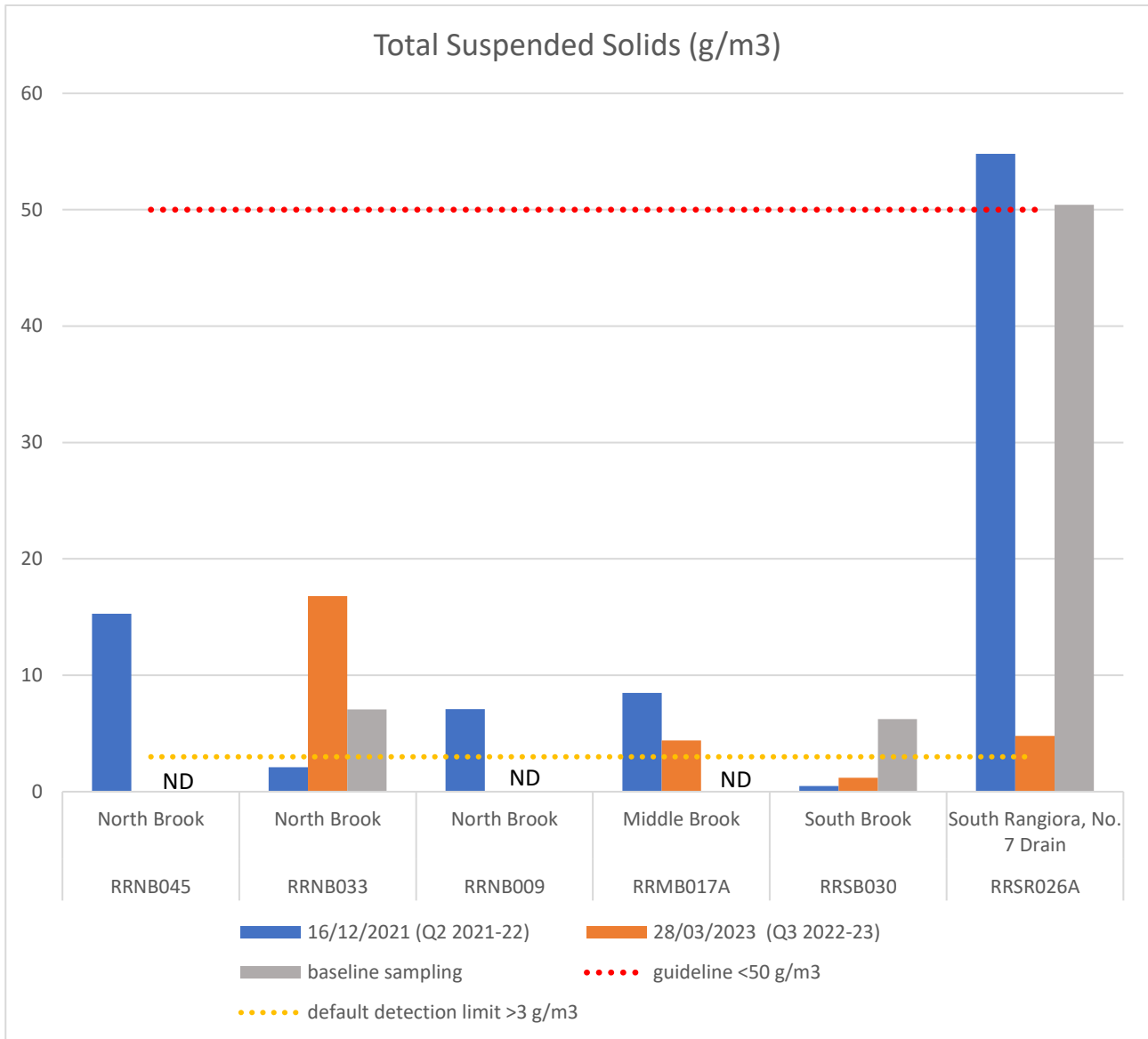
Figure 6 shows the TSS sampling results for the major network outlets in the 2022-2023 reporting year (orange), in comparison to 2021-2022 reporting year (blue). Site RRSB030 (South Brook west of Railway Road) was found to be below the default detection limit of 3 g/m<sup>3</sup> with a laboratory estimate of 1.2 g/m<sup>3</sup>.

All major network outlets sampled in the 2022-2023 reporting year met the guideline value of 50 g/m<sup>3</sup>. This indicates that TSS concentrations are not generally elevated at these locations. TSS levels are not thought to be impacting negatively aquatic life. This result was the same in 2021-2022, except for RRSR026A (South Rangiora, Stormwater Pond C Outlet, Flaxton Road).

Compared to 2021-2022 results, all sites except for the northern branch of North Brook RRNB033 (west side of Kowhai Avenue) showed lower TSS values in 2022-23. Nevertheless, it is observed that the rainfall depth was also lower for this second round of sampling. In 2021-22, the rainfall depth was 24mm and 50mm, while it only rained 2.4mm for 2022-23 sampling.

In 2022-23, major network outlet sampling for RRNB045 and RRNB009 was not undertaken, therefore there's no data available for comparison at these sites. These sites were not part of the baseline sampling either.

At RRSR026A, TSS values measured 5 g/m<sup>3</sup> in 2022-23, as opposed to 55 g/m<sup>3</sup> in 2021-22. These results show that TSS were lower at Pond C, in comparison to 2021-22 and historical levels. This site was not sampled in 2014 for baseline monitoring to be able to provide comparison, however it was sampled five times during rain events between 2015-17, a bit below of the original site with a mixing zone (RRSR026), exceeding the guideline for three of those events. The mean value of this baseline sampling is represented in Figure 6 (grey bars). Sediment discharge from the Pond C outlet therefore has previously been identified to regularly exceeded the guideline value. It is likely that TSS from Pond C is affecting the ecology of the No. 7 Drain below the pond. Improvements to the functioning of Pond C are recommended to be carried out.



**Figure 6. Total suspended solids for the Major Network Outlets 28/03/2023 Quarter 3 of 2022-2023 (orange). Results for previous financial year 2021-22 (blue) and baseline sampling mean results (grey) are included for comparison. ND = No Data. Where there are gaps, there is no data available due to a lack of sampling.**

### Trends

Trend analyses was undertaken for TSS with all the data available per each site. This included data from the 2021-22, 2022-23 and historical data (2014-2017). Historical data available for comparison was only available for the following sites: RRNB033, RRSB030 and RRSR026. The historical sampling site was sampled after a mixing zone, slightly downstream below from the current sampling outlet at RRSR026A. Despite this difference, data from these sites was used for comparison at Pond C due to limited data available.

There were no significant trends observed for the levels of TSS in the sampling locations over time.

### 4.6.3. Pond C Outlet

#### 4.6.3.1. Dissolved Copper (Pond C Outlet)

Levels of Dissolved Copper in 2022-2023 were found to be 0.00072 g/m<sup>3</sup>, below sampling for the previous financial year and below historical mean levels. In 2021, Pond C had higher levels of Dissolved Copper at 0.019 g/m<sup>3</sup>. Historically, levels of Dissolved Copper were also higher. See Figure 7.

Note that historical sampling for Pond C outlet was undertaken below a mixing zone with the No. 7 Drain (RRSR026) during rain events, where the mean Dissolved Copper value was 0.004 mg/L. This sampling site can therefore only be used as an indication of historic levels but is not a true baseline. Also note, there are no guidelines for Pond C, as we are sampling directly in the outlet. WDC seeks a decreasing trend for this.

#### Trends

There was not a significant trend identified associated with the levels of Dissolved Copper at Pond C ( $R^2=0.06$ ). The sample size was  $n = 7$  for sampling events in 2015, 2016, 2017, 2021 and 2023.

More sampling is required to determine Dissolved Copper levels and how they could be impacting the ecosystem health in the No. 7 Drain.

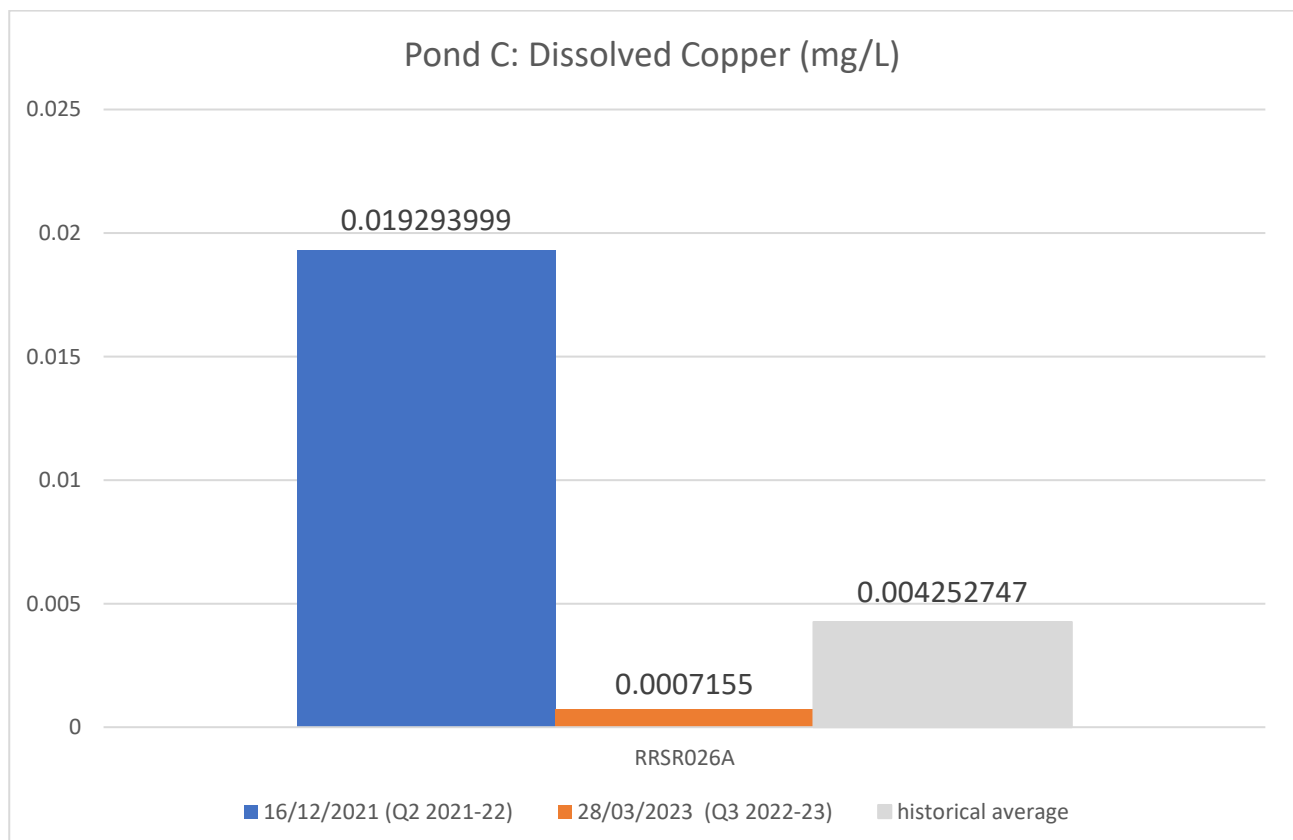


Figure 7. Dissolved Copper results at Pond C in 2022-2023 (orange), compared to previous financial year (blue) and mean historical values of dissolved copper (grey).

#### 4.6.3.2. Dissolved Zinc (Pond C Outlet)

Values of Zinc were found to be 0.0036 mg/L at Pond C outlet in 2022-23. Compared to the previous financial year, values detected were lower than the previous sampling round. Compared to historical sampling (mean value), the Dissolved Zinc found for this financial year was also lower. See Figure 8 for details.

## Trends

There were no significant trends found for Dissolved Zinc Levels over time at Pond C. Trend analysis was undertaken with the available data (n = 6) for the years 2015, 2016, 2017, 2021 and 2023.

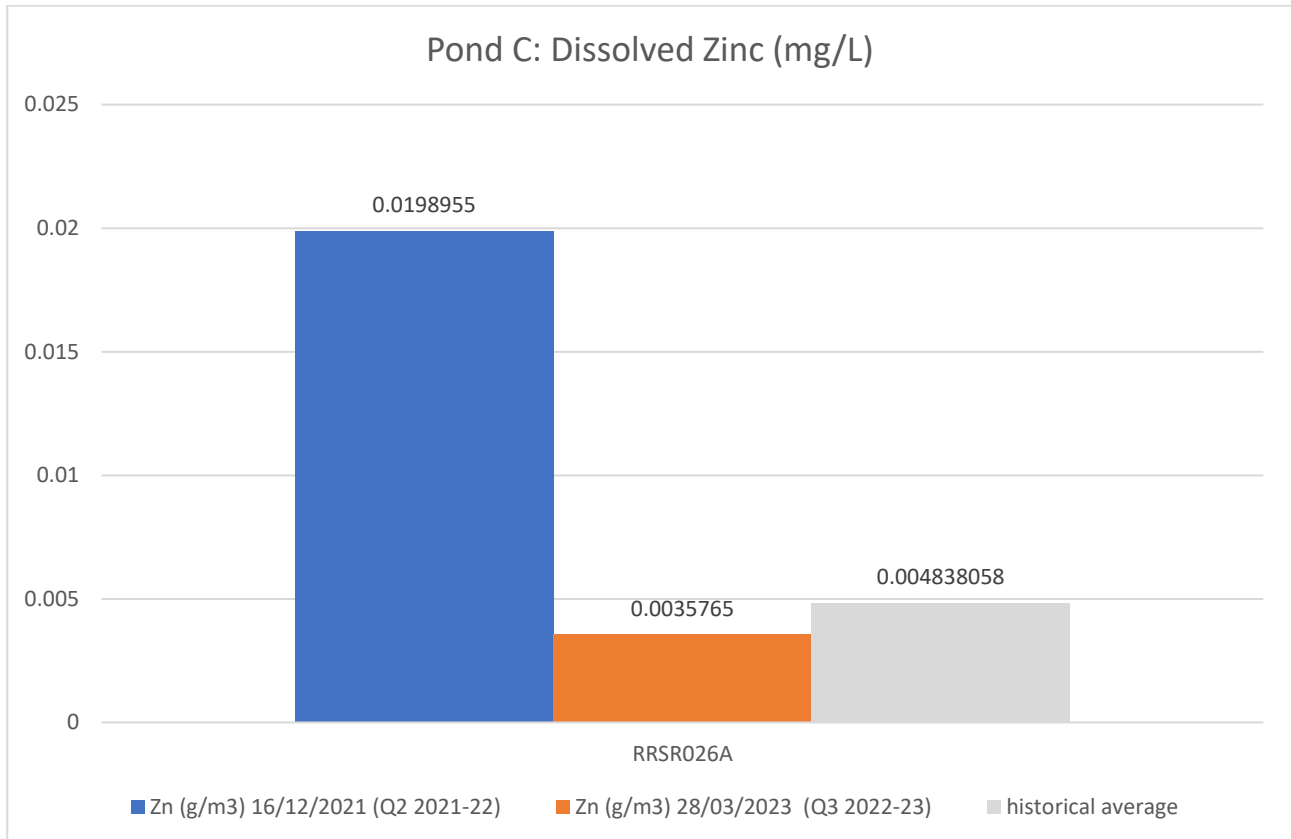
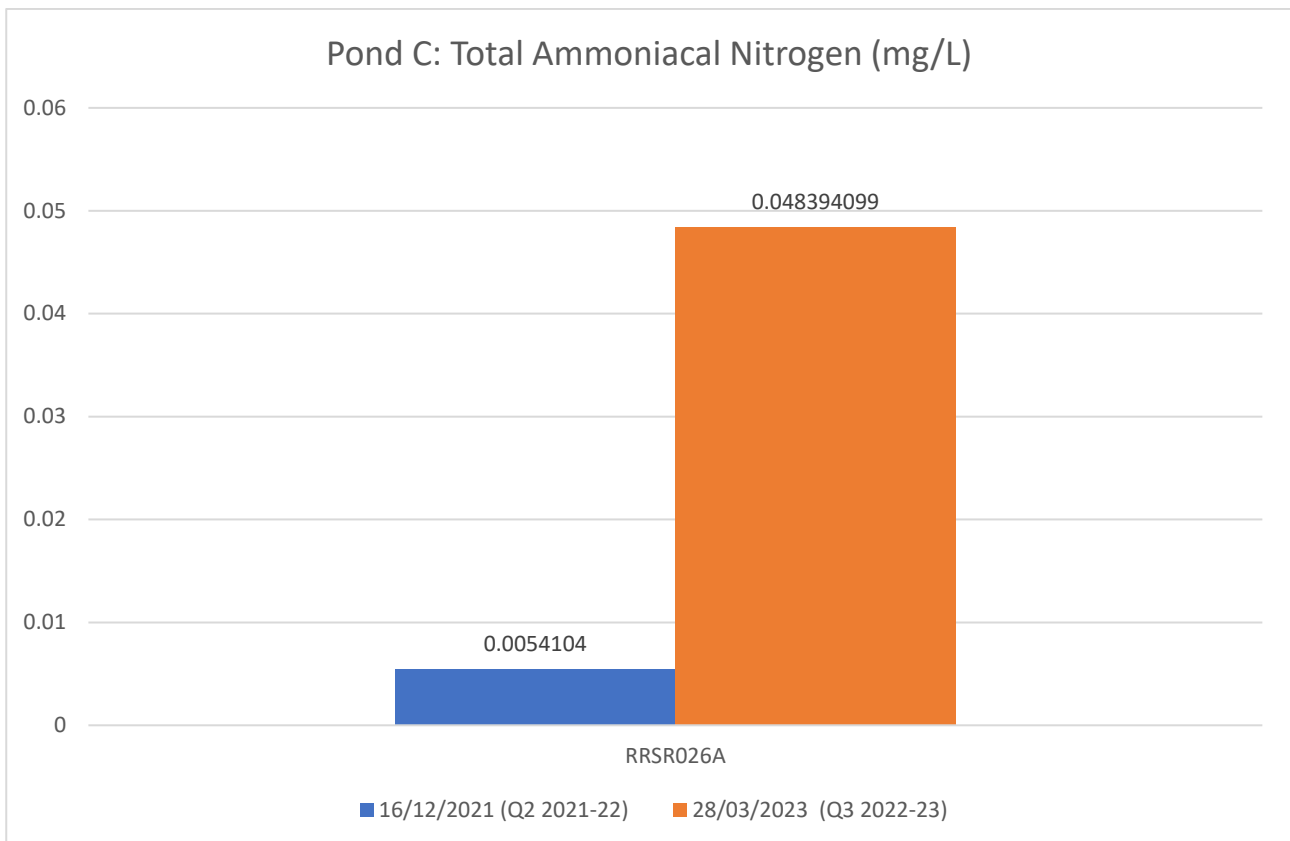


Figure 8. Dissolved Zinc results at Pond C in 2022-23 (orange), compared to previous financial year (blue) and historical levels (grey).

### 4.6.3.3. Total Ammoniacal-N (Pond C Outlet)

The Total Ammoniacal – N value of the Pond C outlet (RRSR026A) was found to be 0.048 mg/L. See Figure 9.

Results from 2021-22 showed a Total Ammoniacal Nitrogen value below the default detection limit of 0.01 mg/L. Total Ammoniacal Nitrogen from the Pond C Outlet was far below the guideline value required for 90% species protection, although the guideline value does not apply to this site (only seeking a decreasing trend). However, it is noted the levels have increased from 2021-22 to 2022-23. If an increasing trend was found, WDC staff could investigate potential sources of TAN to Pond C.



**Figure 9. Total Ammoniacal Nitrogen levels found at Pond C in 2022-23 (orange), in comparison to previous financial year (blue). There is no historical data associated with this site.**

### **Trends**

Due to a sample size of  $n = 2$ , trend analyses could not be carried out. More sampling is required.

There will be an indication of Total Ammoniacal Nitrogen levels from to the upcoming 2023-2024 Stormwater Annual Report.

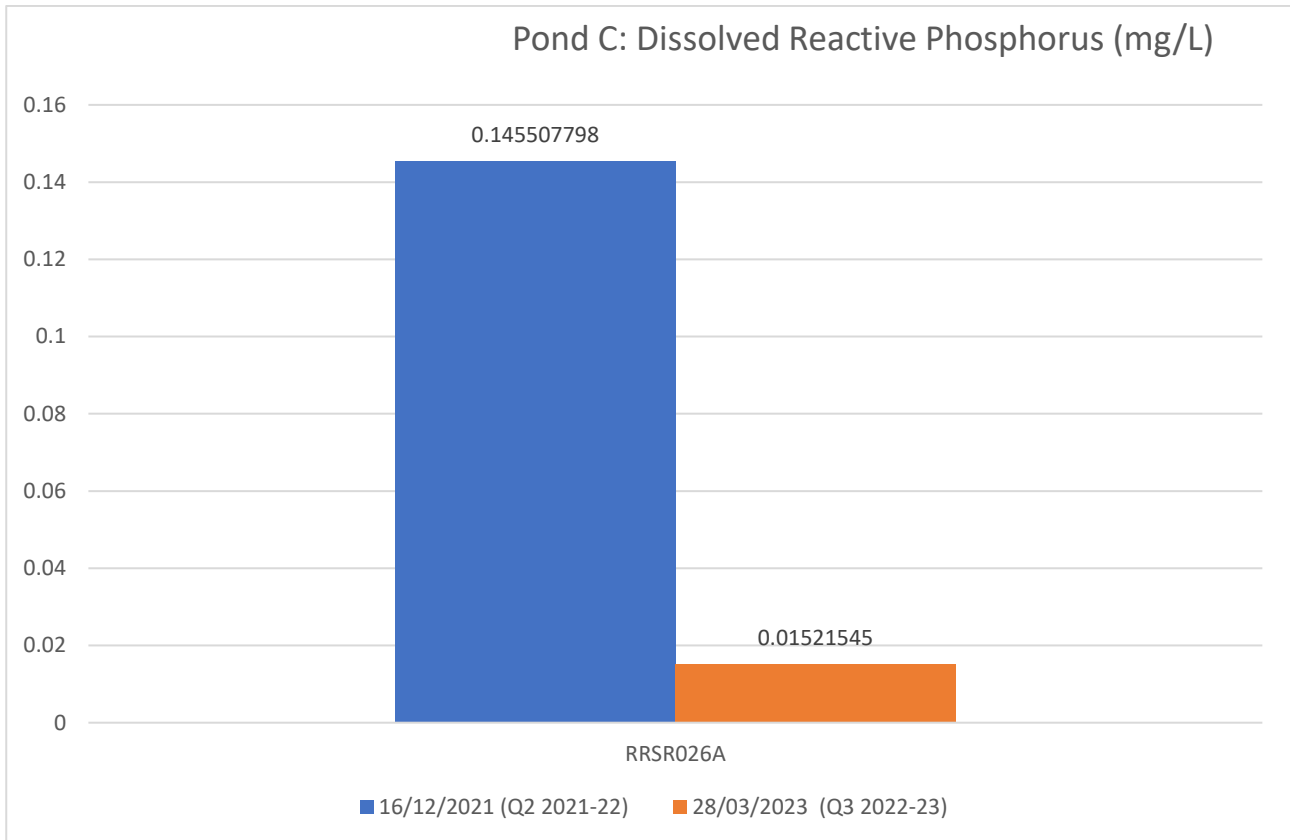
#### **4.6.3.4. Dissolved Reactive Phosphorus (Pond C Outlet)**

Sampling was undertaken in 2015, 2016, and 2017 at the Pond C outlet below a mixing zone (RRSR026) where the average (mean) Dissolved Reactive Phosphorus (DRP) value was below the detection level.

In 2022-2023, DRP levels were 0.015 mg/L. The DRP value found for DRP in 2021-2022 was 0.14 g/m<sup>3</sup>. See Figure 10.

Trend analysis could not be undertaken due to a sample size of  $n = 2$ . More sampling is required to determine stronger trends in the future.

In general, reduction of DRP levels is likely required to provide ecosystem health in the No. 7 Drain.



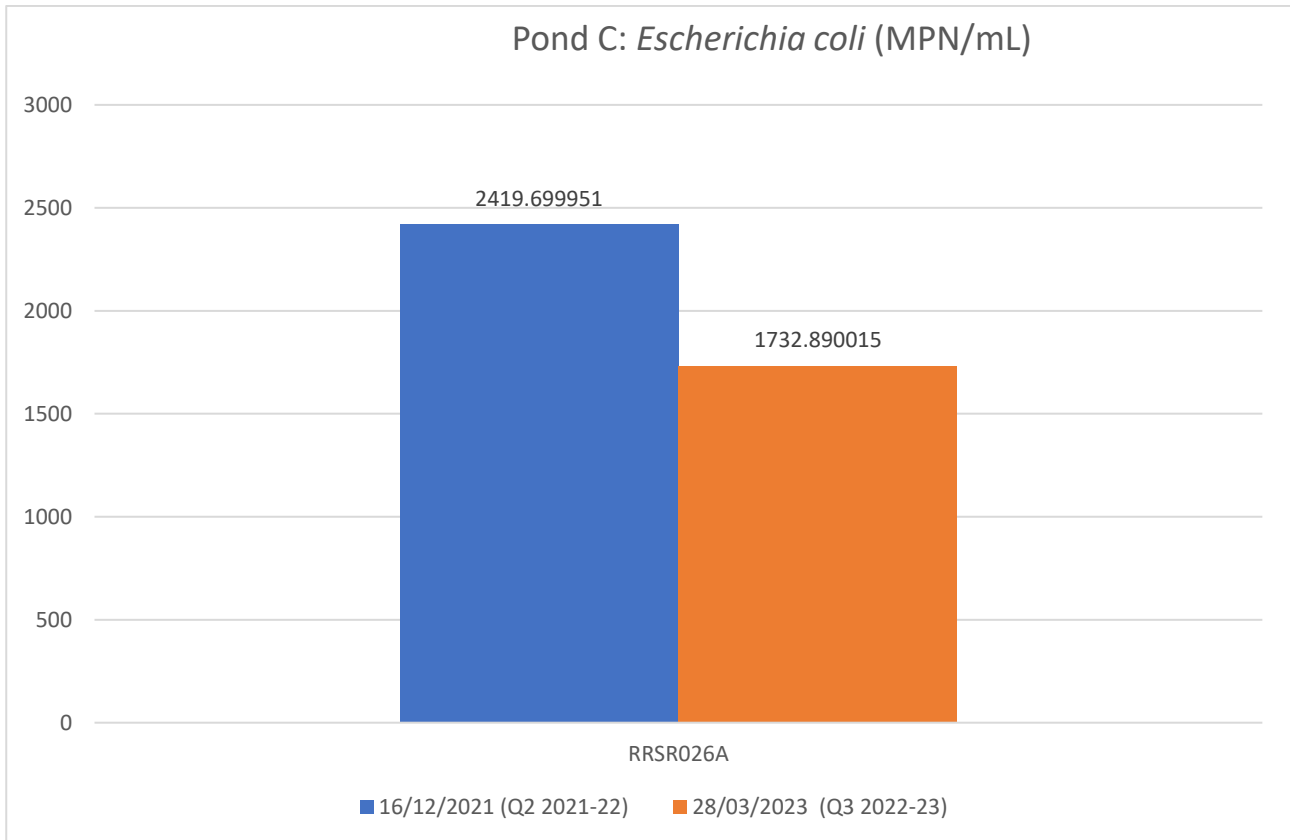
**Figure 10. Dissolved Reactive Phosphorus results found at Pond C in 2022-2023 (orange) compared to the previous financial year (blue). Historical values are not shown as they were close to 0.**

#### 4.6.3.5. Escherichia coli (Pond C Outlet)

In 2022-2023, *E. coli* levels were found to be 1733 MPN/100 mL. See Figure 11.

There is no historical data available for Pond C to compare on *E. coli* levels. A statistically significant and reliable trend was unable to be determined due to the size of the data set ( $n = 2$ ).

Reduction of *E. coli* levels are required to provide ecosystem health in the No. 7 Drain.



**Figure 11.** *E. coli* levels found at Pond C in 2022-2023 (orange), in comparison to previous financial year levels (blue). Historical values were below this sampling site with a mixing zone, and are not shown as it's not comparable.

## 4.7. Urban impact

### 4.7.1. Dissolved Copper

This contaminant is likely to be from urban sources, such as car brake pads and copper roofing.

Figure 12 shows the Dissolved Copper sampling results for the Urban Impact Sampling in the 2022/2023 reporting year (orange and yellow), compared to 2021-22 (blue).

It is observed that:

- 7 out of 13 sites exceeded the guideline of 0.0018 mg/L
- 7 out of 13 sites presented lower levels of Dissolved Copper than in 2021-22
- 2 out of 13 sites showed higher levels of Dissolved Copper than in 2021-22
- 3 out of 13 sites were not sampled, thus there is no data available for comparison

Dissolved Copper levels in the North Brook, Middle Brook and No. 7 Drain in particular, require attention, remediation, and mitigation to reduce the levels below the guideline value. The North Drain, South Brook, South-South Brook also had exceedances and should be watched for future trends. The Cam River has no exceedances of Dissolved Copper and does not require any action.

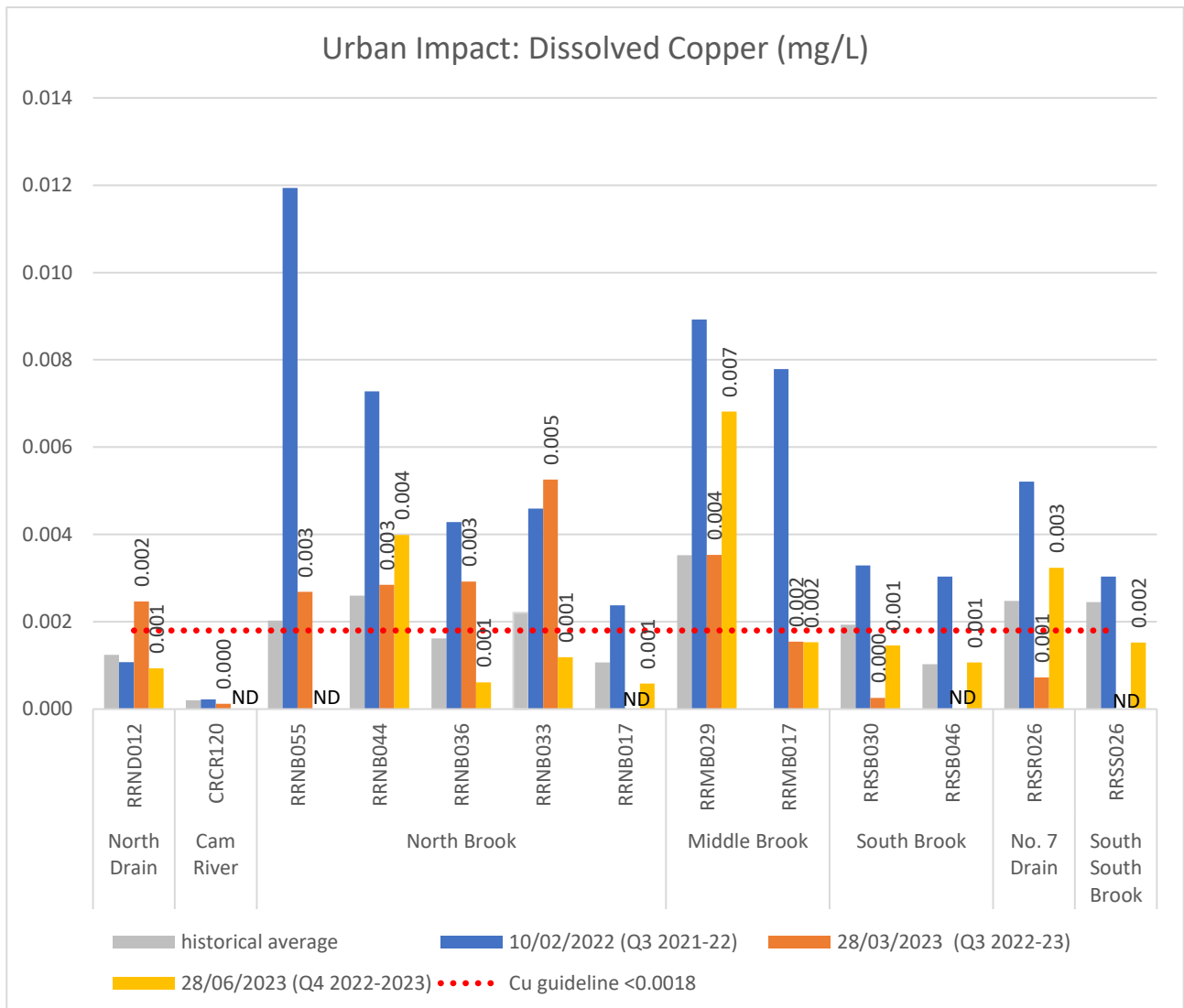


Figure 12. Urban Impact - Dissolved Copper sample results for financial year 2022-23 and 2021-22, in comparison to historical levels. ND = no data (data gaps where sampling was not undertaken).



It is noted in North Drain and two sampling sites in the North Brook (RRNB033, western side of Kowhai Ave, and RRNB036, Lilybrook Park), dissolved copper levels decreased on the second round of sampling of 2022-23 to below the guideline value.

In the North Brook, at site RRNB044 (Church St across Dudley Park), dissolved copper levels were higher in the last quarter of 2022-23. This could be due to a higher rainfall depth in sampling for Quarter 4. The North Brook will require actions towards improving Dissolved Copper levels.

Another point to note is the Middle Brook site RRMB029 (western side of Bush Street), where dissolved copper levels also increased in the last quarter 2022-23, compared to Quarter 3. The Middle Brook requires actions to decrease Dissolved Copper levels.

In the South Brook a site that requires attention is RRSR026 (No. 7 Drain, immediately south of Fernside Road (west side of Railway Road)).

Figure 12 represents the results of all consent monitoring sampling, in comparison to historical data from the baseline sampling. From this, it is observed that:

- In general, sites in the North Brook, Middle Brook and South Brook which presented high exceedances of Dissolved Copper in 2021/22, shown lower levels of Dissolved Copper in 2022/23 sampling, despite some of them still not meeting the guideline values
- Only 1 site in the Middle Brook (RRMB017) had no historical equivalent to compare against.

### **Trends**

Levels of Dissolved Copper in the North Drain (RRND012) increased in 2022-23 compared to 2021-22. During Quarter 4 of 2022-23 (28/6/2023 sampling round), guideline levels of Dissolved Copper were exceeded. In trend analysis, no clear trend is shown ( $n = 7$ ,  $R^2 = 0.01$ ).

In Cam River, CRCR120, levels stayed below the guideline historically and for all financial years. No significant trends were found.

It is noted in the North Brook, Dissolved Copper levels appeared visually to increase, despite no significant trend being identified. For sites RRNB044 ( $n = 8$ ) and RRNB055 ( $n = 9$ ), the R-square values were  $R^2=0.30$  and  $R^2=0.36$ .

In the Middle Brook, there were not enough sample rounds on Dissolved Copper sampling to provide for a statistical significance. A non-statistically significant upward trend is shown for site RRMB029 ( $n = 11$ ,  $R^2=0.2465$ ).

In the South Brook, no clear or significant trend has been identified for Dissolved Copper, despite having good data sets over time for sites RRSR026 ( $n = 7$ ) and RRSS026 ( $n = 9$ ).

### **4.7.2. Dissolved Zinc**

Zinc is an urban contaminant, from sources such as vehicle brake pads, tyres and galvanised roofs.

Figure 13 shows the Dissolved Zinc (Zn) sampling results for the Urban Impact sampling in the 2022/2023 reporting year.

The guideline value from the CLWRP for Dissolved Zinc is  $< 0.015$  mg/L. Sampling sites on the North Drain, North Brook and Middle Brook were over the guideline value. In particular, the sites in North Drain RRND012,

North Brook sites RRNB033, RRND036, RRNB044 and Middle Brook sites RRMB017 and RRMB029, were elevated. All these sites also showed elevated levels of Zn in the baseline sampling (except for RRMB017, not sampled historically).

Specifically North Brook sites and Middle Brook Sites are recommended to be targeted to reduce Dissolved Zinc levels.

Trend analysis identified a statistically significant increase in levels of Dissolved Zinc only for site RRNB055, North Brook, Aspen Street Park (n = 9,  $R^2=0.7$ ). No other trends were statistically significant. While the R-square value is below 0.5 for all other North Brook and Middle Brook sites, the linear trend is hinted as increasing for almost all, except sites RRMB017 and RRSB030 (decrease linear trend hinted).

Peak inputs of Dissolved Zinc in the North Brook and Middle Brook catchments appear to be from predominantly older residential catchments which have a prevalence of older iron roofing materials. The link between older roofing material and Dissolved Zinc inputs into the streams should be further investigated. Cam River, South Brook, No. 7 Drain sites and North Brook RRNB017 were below the guideline value. RRND012 (North Drain) and RRSB030 (South Brook, Railway Road) were above the guideline value in some of the 2014 baseline sampling events and in 2015-2016 sampling. Trend analysis did not identify a significant decrease for the sites above, despite showing a decreasing line in the regression model. Further sampling over time is required to see if there is a decreasing trend at these sites.

In 2018, there was a stock water race closure at the end of Oxford Road (R3N1, TRIM 180516053605[v2]), which discharged intermittently into the headwaters of the North Brook. Hence, dissolved Zinc levels and other contaminants are thought to be from urban source.

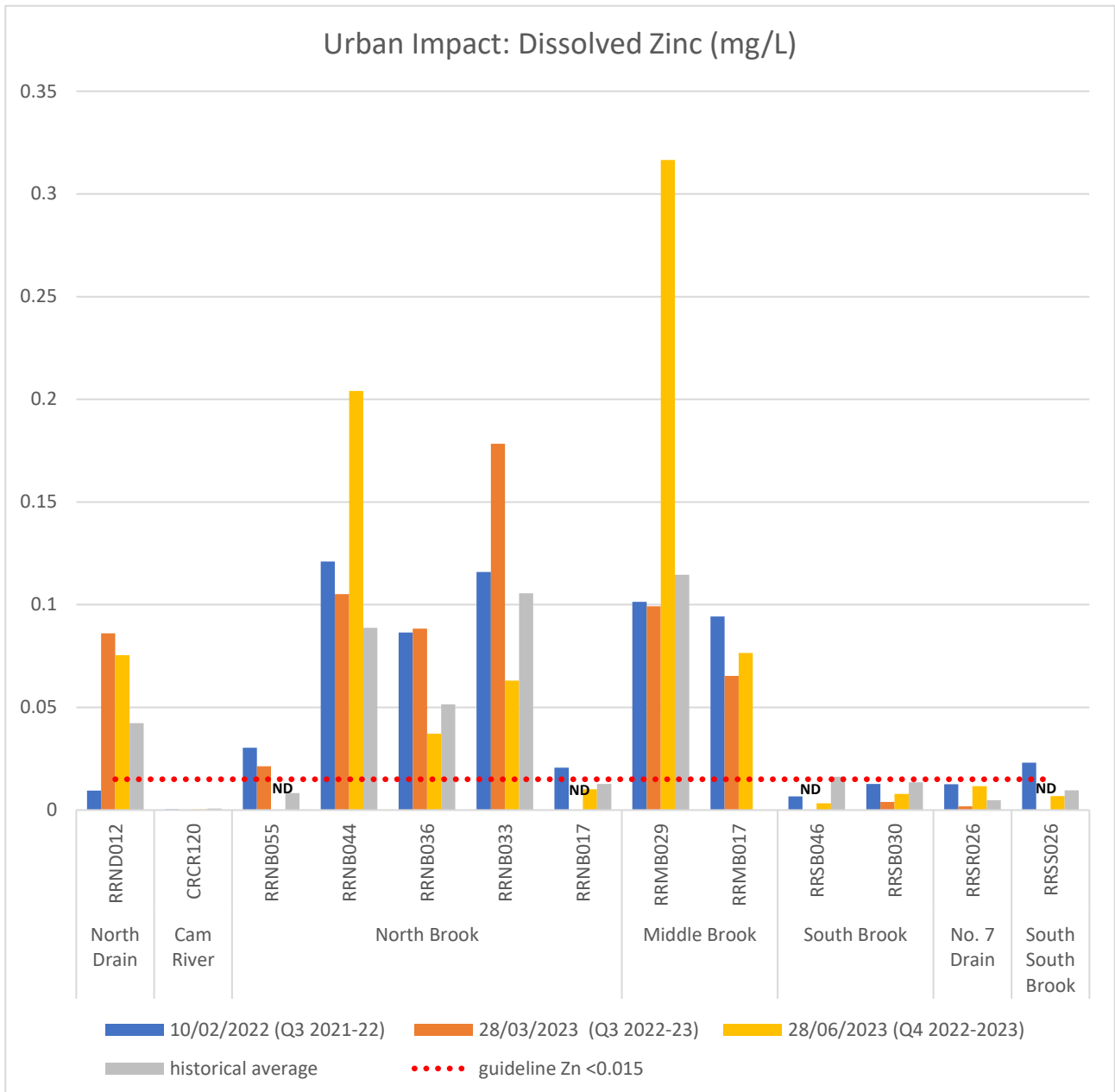


Figure 13. Urban Impact - Dissolved Zinc sample results for 2022-2023. Levels for 2021-22 and a historical mean 2014-17 are also shown. ND = no data (data gaps where sampling was not undertaken). Note: Cam River site presented values below the detection limit, with only data missing for 2022/23 Q3.

### 4.7.3. Hardness

Hardness samples are required periodically every 5 years. Samples were not taken in the 2022-23 year.

### 4.7.4. Dissolved organic carbon

Dissolved Organic Carbon samples are required periodically every 5 years. Samples were not taken in the 2022-23 year.

### 4.7.5. pH

The guideline for pH is between 6.5-8.5. In general, all sites were between the guideline, towards the acidic side. The exception was during Quarter 3, when sites in North Drain, Cam River and two North Brook sites showed pH values lower than 6.5 (Figure 14). In Quarter 4, only the Cam River site CRCR120 remained just below the guideline at 6.44. The Cam River site is primarily spring fed with low contaminant levels, so no further investigation action is recommended from this low pH reading at this unless the trend continues.

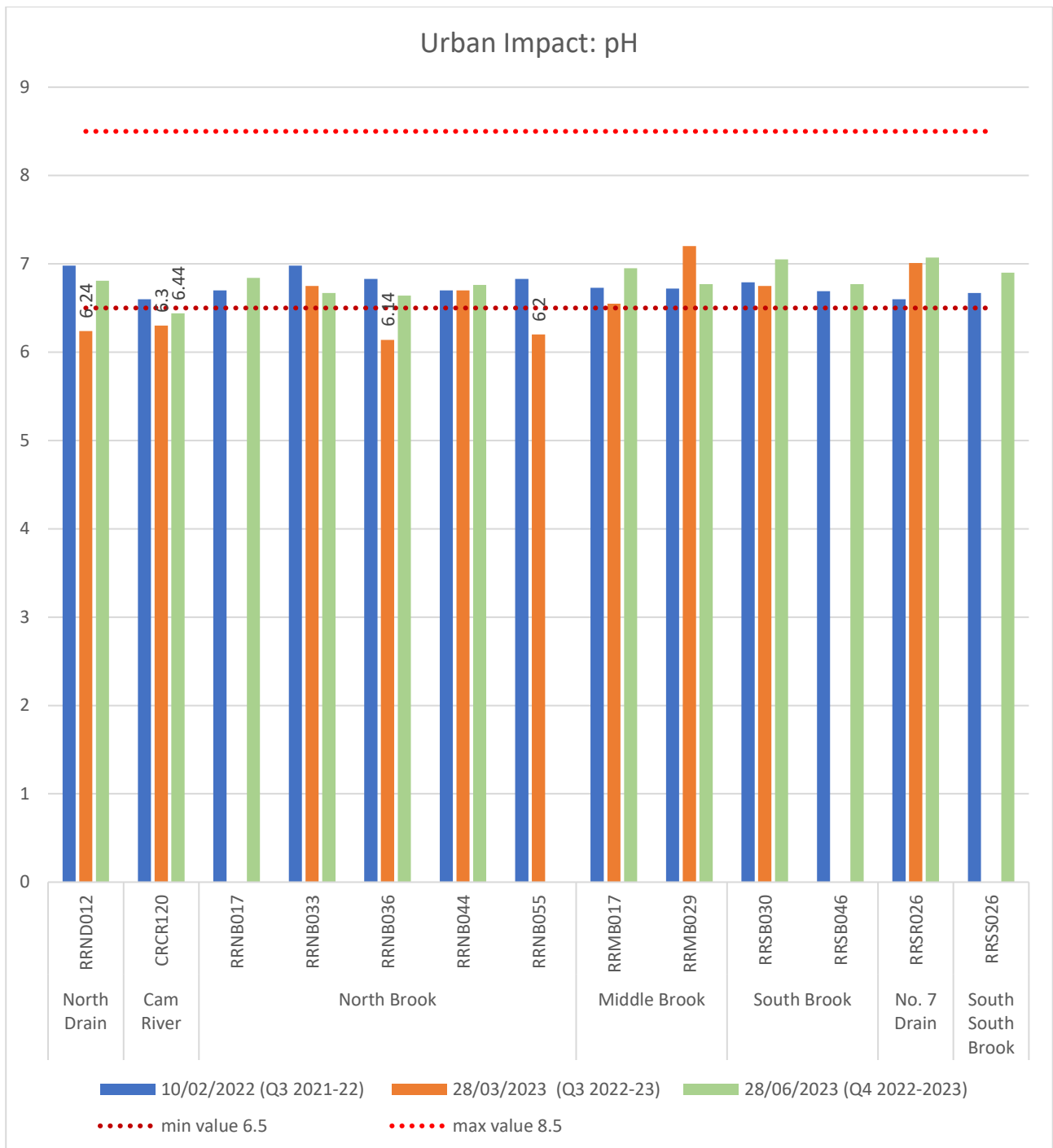


Figure 14. pH values from Urban Impact sampling 2022-2023, with 2021-22 results for comparison.

#### 4.7.6. Escherichia coli (E. coli)

Figure 15 shows the *E. coli* results for the Urban Impact sampling in the 2022/2023 reporting year.

The guideline value derived from the CLWRP for *E. coli* is < 550 MPN / 100 mL. All sites, except Cam River sampling site (CRCR120) exceeded the guideline value for at least one of the stormwater sampling rounds at some point of the 2022-23 stormwater sampling. These results are similar to 2021-22. It is also noted, some sites historically showed high levels of *E. coli* in the baseline sampling (grey columns, Figure 16), such as North Drain, North Brook and South Brook.

It is noted, the counting protocol for *E. coli* changed at Hill Labs in 2021 and a full count stopped being provided. This means that samples with counts over 2240 MPN/100mL do not report on higher results. This explains why in figure 16 results are capped at 2240 MPN/100mL for all catchments with high counts of *E. coli*. This also means a comparison with historical results is not possible.

Actions to reduce sources of faecal contamination are likely to be required in all Rangiora catchments except the Cam River. Sources of faecal contamination could be rural as well as urban in catchments with headwaters in rural areas.

#### Trends

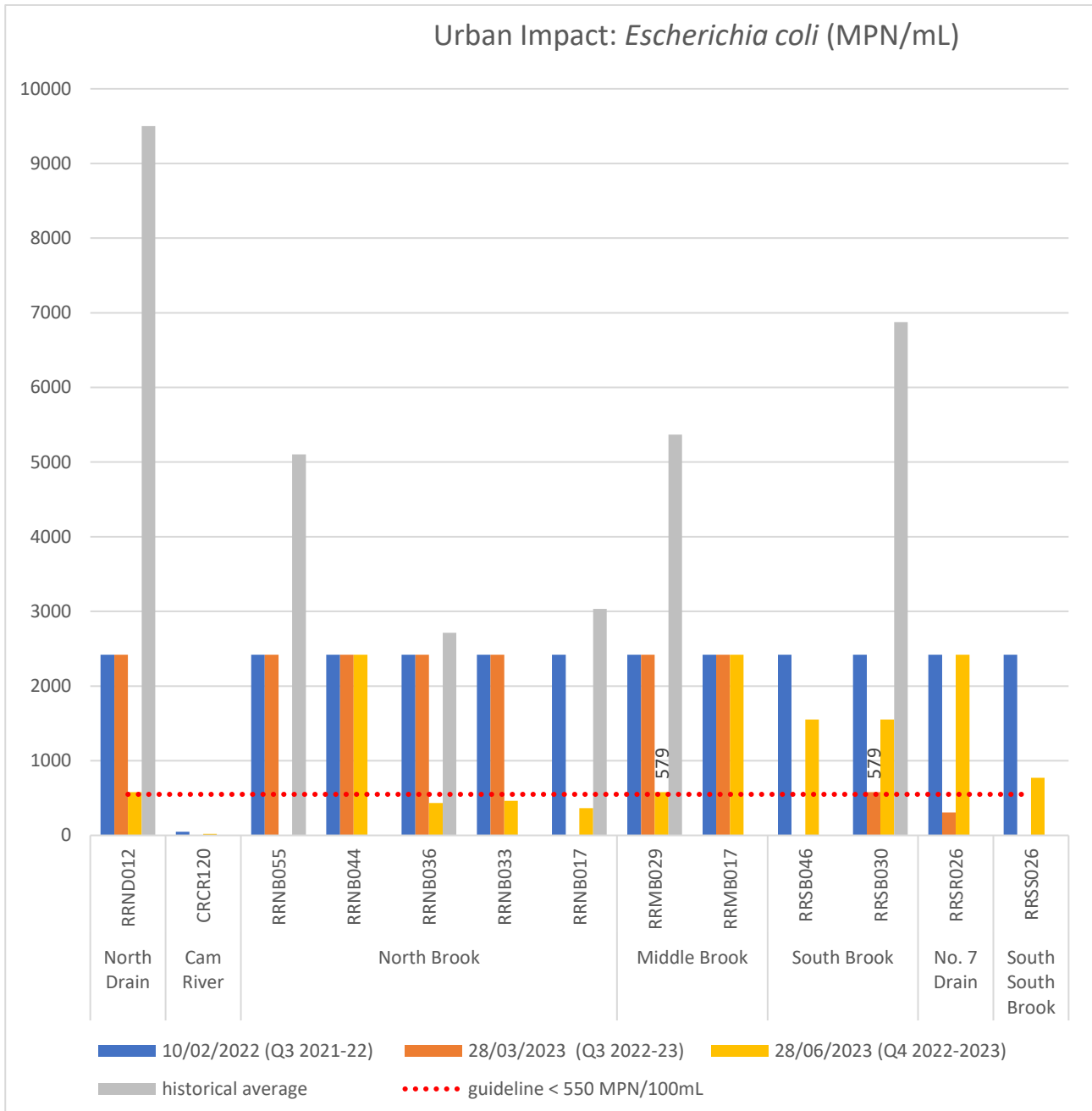
In the North Brook, no significant trends were identified from trend analysis. Sampling sites RRNB055, RRNB044, RRNB036 and RRNB033 showed high levels of *E. coli* during Quarter 3 of sampling. These values were not too different from 2021/22 or historical values. On the latest sampling in Quarter 4, sites RRNB036, RRNB033 and RRNB017, showed decreased levels of *E. coli* in comparison to previous sampling.

In the Middle Brook, trend analysis did not show significant differences. A reducing trend is indicated potentially from visual observation of data for site RRMB029 in the Middle Brook ( $n = 6$ ,  $R^2 = 0.11$ ). Inclusion of sampling results from the next financial year will further inform trends in the Middle Brook. Site RRMB017 remained around the same high values of *E. coli* through time, with no historical data available to compare it to.

In the South Brook, trend analyses did not show a significant decreasing trend for RRSB030 ( $n = 6$ ,  $R^2 = 0.17$ ). Despite the no significant results, the linear regression line is shown as decreasing. Further sampling is required to determine whether this trend prevails when data from 2023-2024 is included in the analysis.

Interestingly, for site RRSB048, which is not a current sampling site, *E. coli* data from 2014 ( $n = 3$ , three sampling rounds,  $R^2 = 0.74$ ) showed a significant increase. This could be pointing to a historical source of *E. coli* contamination close to this area, which is likely from a rural source. Site RRSB048 is upstream from RRSB046, RRSB030, RRSR026 (No. 7 Drain) and RRSS026 (South-South Brook). More investigations on sources of *E. coli* on the three brooks are required.

In the South Brook, it is likely *E. coli* sources are from direct run-off from rural farms. Other sources of *E. coli* could be avian contamination from ponds and wetlands, or urban sources including domestic animals. Further investigations for cross-contamination and remediation works are required.



**Figure 15. Urban Impact *E. coli* sample results for the 2022/2023 reporting year (orange and yellow). Data is presented compared to previous financial year (blue) and baseline monitoring data (grey). Note reporting method for *E. coli* has changed and samples beyond 2240 MPN/100mL are not reported. Results can't be compared with historical mean.**

#### 4.7.7. Dissolved Reactive Phosphorus

Figure 16 shows the Urban Impact Dissolved Reactive Phosphorus (DRP) sample results for the 2022-2023 reporting year.

The guideline value for DRP is 0.016 mg/L. Sources of DRP could be attributed to use of residential garden fertilisers, wastewater overflows, in groundwater inflows, and from airborne particulates settled onto impermeable surfaces during dry weather (e.g. from rural land west of Rangiora) and released as surface runoff during subsequent rainfall.

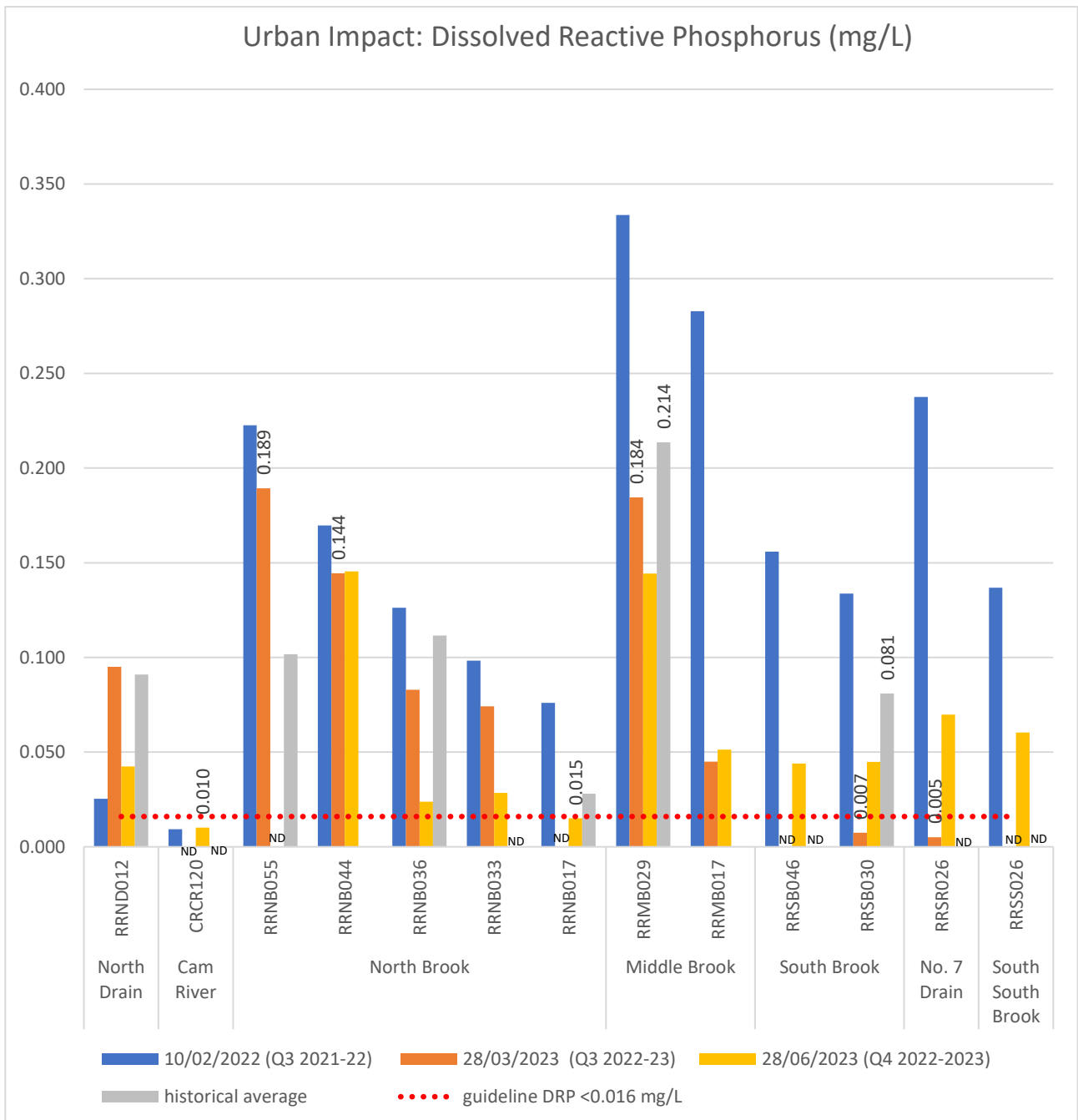


Figure 16. Urban Impact Dissolved Reactive Phosphorus sample results for the 2022/2023 reporting year, compared to the 2021/2022 and historical sampling results.

The Cam River sample site CRCR120 was under the guideline, with 0.010 mg/L. This result is followed closely by RRNB017, which was slightly under the guideline value with 0.015 mg/L. All other sites were above the guideline with at least one sampling round. The Cam River was not sampled during baseline sampling.

Actions to reduce DRP levels are required for the Middle Brook, North Brook and South Brook. Actions could focus on reducing any point sources identified (such as wastewater cross-connections), and reducing sediment inputs during wet weather, a key mechanism where phosphorus is transported into a waterway.

Sampling sites on the North Brook and Middle Brook had the highest concentrations, with site RRNB055 at 0.189 mg/L and site RRMB029 at 0.184 mg/L respectively. The first, showed significant trends in increasing DRP levels over time, while the later showed no significant trends. Details are outlined below.

In the North Brook, sites RRNB036, RRNB044 and RRNB055 showed high levels of DRP, with the highest value of DRP recorded at 0.189 mg/L during Quarter 3 at site RRNB055. This site also showed a potential trend for increasing levels of DRP over time ( $n=5$ ,  $R^2=0.4$ , sampling from 2014, 2022, 2023).

For site RRNB033, despite the values being above the guideline, trend analysis revealed a significant decrease of DRP levels over time, however the same size is small ( $n = 3$ ,  $R^2=0.75$ ). The level of confidence in the reliability of this result is undetermined. Further sampling rounds (at least 5), will further inform this. For this site analysis, data was from 2022 and 2023, with no historical data available. All other North Brook sites showed no significant trends.

In the Middle Brook, 2022-23 sampling showed a decrease in DRP levels for site RRMB017. Trend analysis with a small sampling size, showed this as a significant decrease in DRP levels compared to last financial year results ( $n = 3$ ,  $R^2=0.96$ ). Once again, the confidence levels for this result are questionable due to sampling size. More sampling and trend analysis is required to include more data. Further upstream, at site RRMB029 levels of 0.184 mg/L of DRP were recorded. This was the second highest value recorded for DRP in sampling between 2021 and 2023. No significant trends were found for this. It is noted, historically this site has recorded levels of 0.57 mg/L on 14/5/2014.

In the South Brook, DRP levels were generally lower than 2021-22. This could be a result of sampling in different-sized rain events. Historically, site RRSB030 also recorded high DRP levels of 0.21 mg/L on 14/5/2014. There were no significant trends identified in the South Brook for DRP levels. However, interestingly, site RRSB048 (further upstream from RRSR026) already shows a significant increase of DRP from 2014 baseline sampling ( $n = 3$ ,  $R^2=0.77$ ). This could provide a starting point to initiate DRP investigations in the area and could provide insight as to whether a source of phosphorus is present there and being recorded downstream. These values are only indicative, as they are based on a sample size of 3.

#### **4.7.8. Total Ammoniacal Nitrogen**

The guideline values for Total Ammoniacal Nitrogen (TAN) are pH dependant. The highest pH value from Urban Impact sampling was adopted to retrieve a guideline (pH = 7.2). From this value, the guideline equivalent adopted for TAN was 1.99 mg/L.

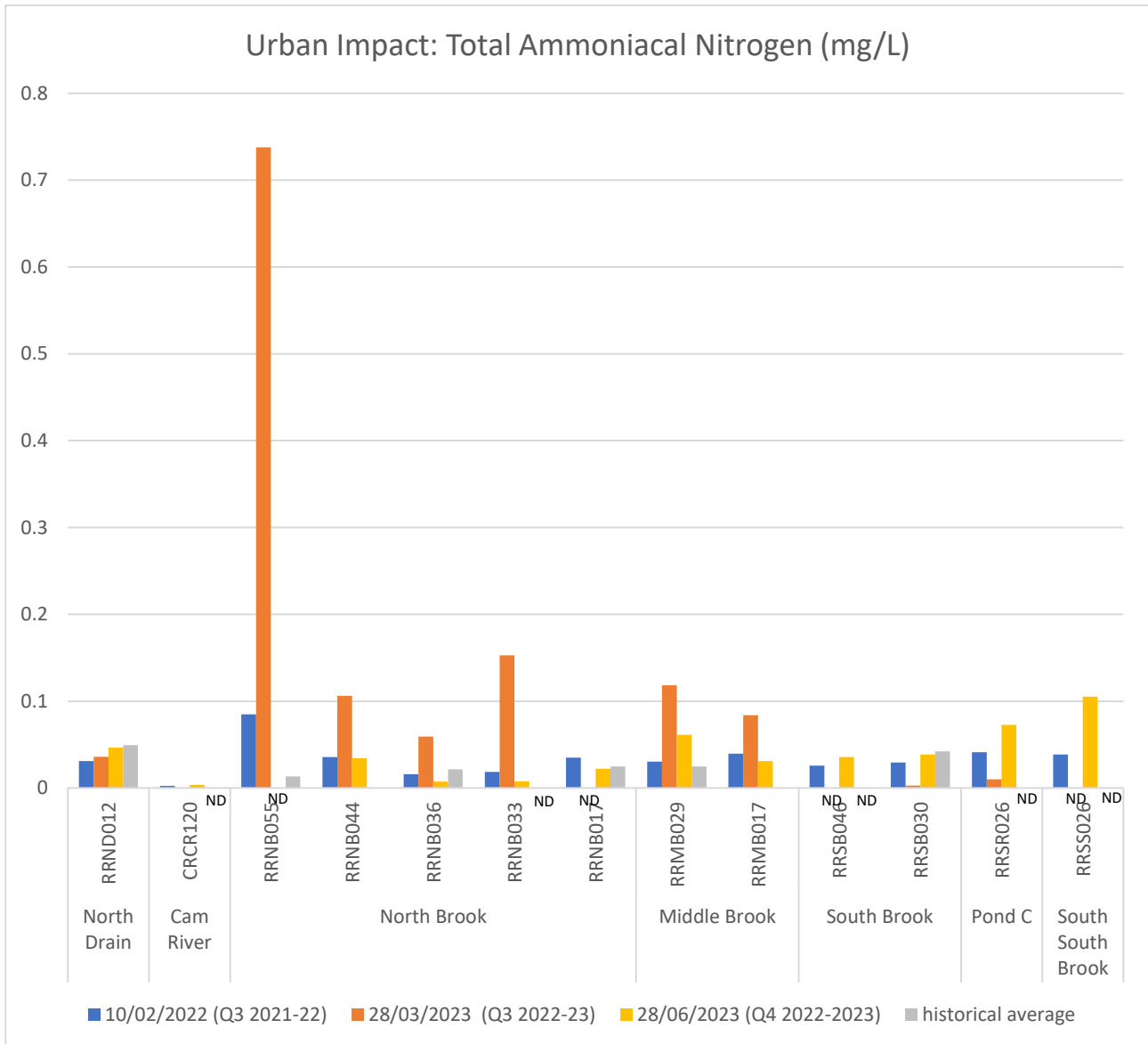
All sampling recorded for TAN in 2022-23 was below the guideline. See Figure 17. No actions are recommended.

The highest value for TAN was site RRNB055 (North Brook at Aspen St), with a value of 0.74 mg/L. This site also presented the highest TAN levels in 2021-22 sampling. Refer to Figure 17 for results. The guideline values have not been represented, as they are much higher than the actual levels of Total Ammoniacal Nitrogen found, allowing for a better visual representation of 2022-23 sampling results.

The results suggest that there are limited wastewater overflows during rain events or other similar sources of TAN.

From trend analysis, it is noted that at site RRNB055 in the North Brook at Aspen St, a significant increase in TAN levels has been found over time ( $n = 5$ ,  $R^2=0.56$ ), however it is of very low magnitude and well under the guideline. This analysis included data from 2014, 2022 and 2023.





**Figure 17. Urban Impact - Total Ammoniacal Nitrogen sample results for 2022-2023. Guideline value of 1.99 mg/L is not shown, to allow for better visualisation of the sampling results. ND = no data.**

Other sites in the North Brook, also presented relatively higher levels of TAN, in comparison to 2021-22 and historical baseline sampling data.

In the Middle Brook, the highest TAN levels were detected in the third quarter of 2022-23, with values of 0.12 mg/L and 0.08 mg/L for RRRMB029 and RRRMB017 respectively.

From trend analysis, site RRRMB029 in the Middle Brook showed a significant increase in TAN levels over time, with data from 2014, 2022 and 2023 ( $n = 6$ ,  $R^2=0.48$ ). Despite the  $R^2$  being below 0.5 as stated in methods, this trend is close to meeting the criterion to be significant. Still, the TAN values from this sampling are well below the guideline.

In the North Drain (RRND012), TAN levels were higher in 2022-23 than in 2021-22, but not higher than from baseline sampling and did not exceed the guideline. The Cam River had levels of TAN below the detection limit in Quarter 3 (0.003 mg/L).

In the South Brook, all TAN levels were low, ranging from 0.002 mg/L to 0.10 mg/L as the maximum value recorded.

## 4.8. Stream Health

Although Stream Health monitoring is to provide context only, with no compliance in relation to consent CRC184601, it is helpful to compare results to established guideline values for surface water in New Zealand (see Table 4).

**Table 8: Stream Health monitoring surface water guideline values**

Contaminant	Guideline	Guideline Source
Dissolved Oxygen	>70%	CLWRP, <i>Spring-fed-Plains (Urban)</i>
pH	Shall be between 6.5 - 8.5	CLWRP, <i>section 16, schedule 5</i>
Temperature	<20°C	<i>CLWRP, Table 1A, Spring-fed-Plains (Urban)</i>
Specific Conductance	< 175 $\mu\text{S cm}^{-1}$	Biggs (1988, 2000)
Dissolved Inorganic Nitrogen	< 1.5 mg/L	CLWRP, <i>section 16, schedule 5</i>
Total Ammoniacal Nitrogen	Depends on pH level	Refer CLWRP, Table S5C, Schedule 5
Dissolved reactive phosphorus	< 0.016 mg/L	CLWRP, Schedule 5
E. coli	< 550 MPN/100mL	CLWRP, Schedule 5
Total Suspended Solids	<50 gm <sup>3</sup>	CLWRP

### 4.8.1. Dissolved Oxygen

The Dissolved Oxygen (DO) sample results for 2021-2023 are presented in Figure 18. The guideline value for Dissolved Oxygen is >70%, from the CLWRP (for Spring-fed-Plains, Urban waterways).

During Quarter 4 (sampling undertaken on 23/5/2023, light blue columns in Figure 18), low levels of DO were recorded. This was identified as an instrumental error of the probe during sampling, which has been resolved.

Levels of DO were in general above the guideline for all sampling sites during more than one quarter. The exception to this was site RRNB036 in the North Brook at Lilybrook Park. This site recorded DO levels >60%. This was already reported on in the 2021-22 report. The explanation for these low levels of DO is that there is an identified inflow of spring water directly beside RRNB036. This groundwater likely has lower oxygen levels (as a natural phenomenon) and no further action is required.

The North Brook at Lilybrook (RRNB036) was also below the guideline value in the 2014 baseline sampling in dry weather but was above the guideline value during a moderate rain event.

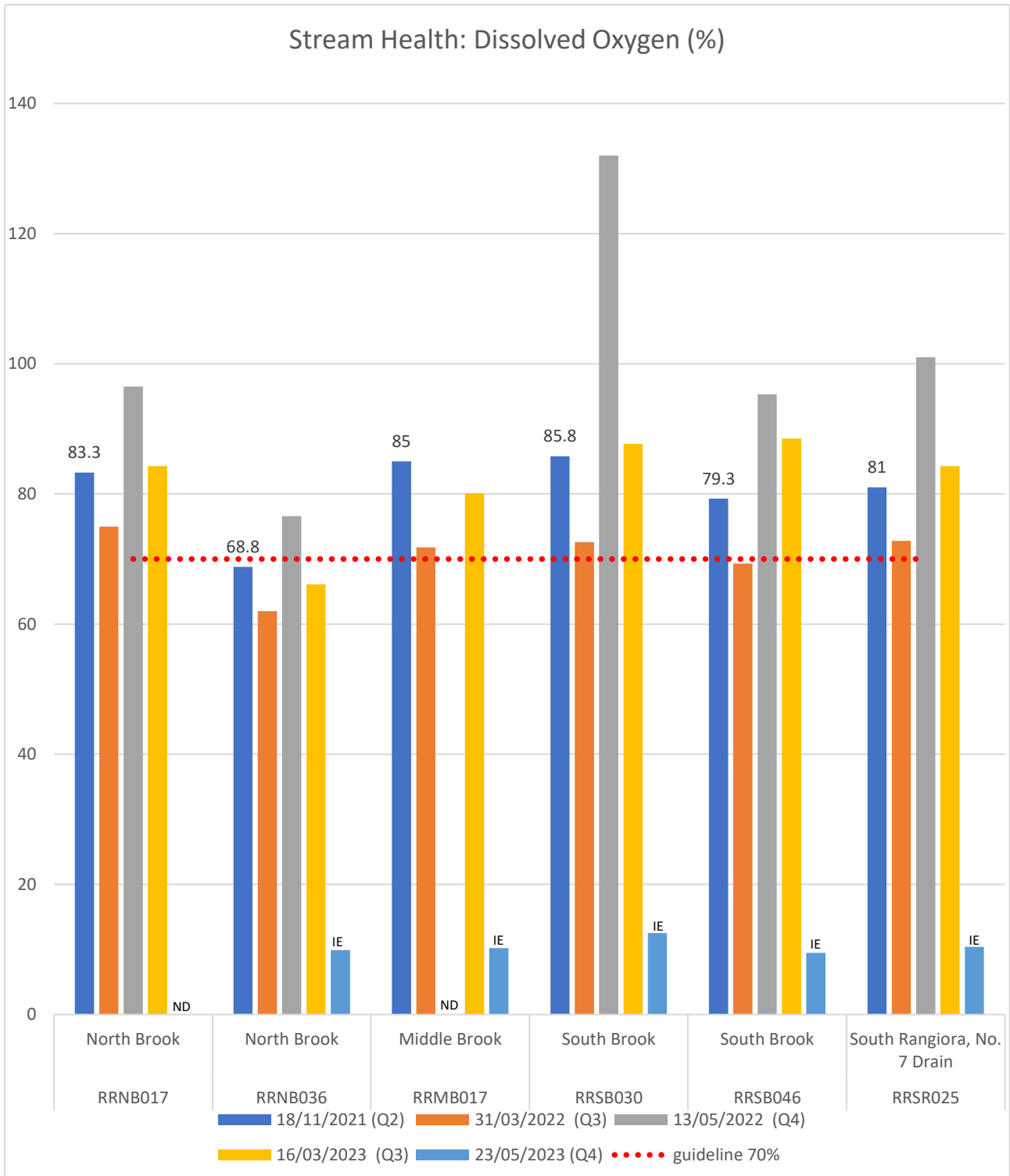


Figure 18. Stream Health - Dissolved Oxygen sample results for the 2022/2023 reporting year. Low DO levels are explained for instrumental error. IE = Instrumental Error. ND = No Data.

#### 4.8.2. Temperature

The temperature sample results are presented in Figure 19. All samples were below the CLWRP guideline limit of 20°C.

The highest temperature (15.3°C) recorded was at site RRMB017 (Middle Brook at Gefkins Road) during 2021-2022. The lowest temperature (9.1°C) was recorded at site RRSR025 (South Rangiora downstream of

the Fernside / Flaxton intersection) during 2022-23. There is no evidence of stormwater discharges affecting temperature, so therefore no actions are recommended to reduce temperature in the waterways sampled.

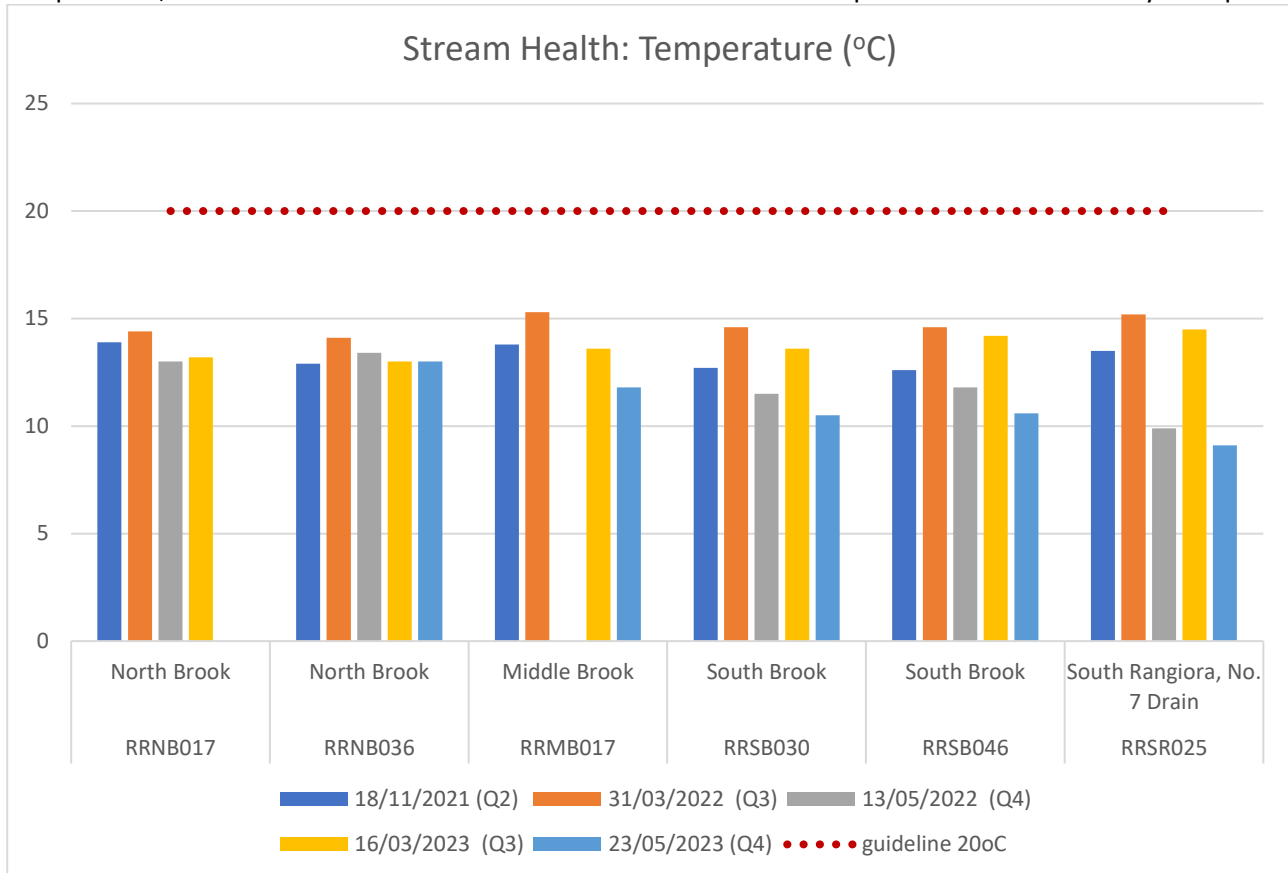
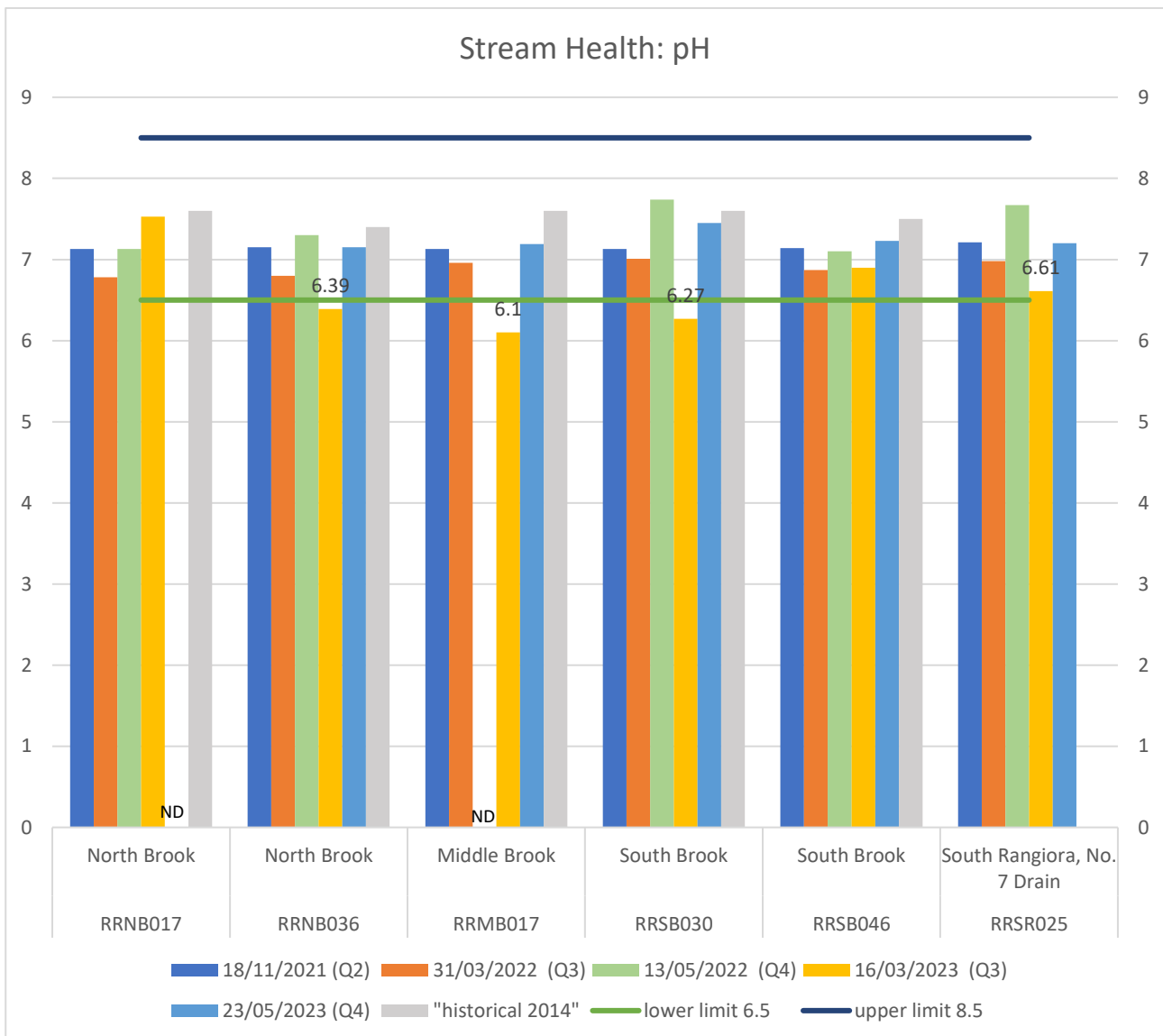


Figure 19. Stream Health - Temperature results for the 2022/2023 reporting year, with 2021-22 for comparison.

### 4.8.3. pH

Almost all pH results were within the guideline limits of between 6.5 – 8.5 (Figure 20), though tended to be slightly more acidic. This is in line with findings from the 2014 baseline sampling that also found all samples to meet pH guidelines. During Quarter 3 sampling (16/3/2023), pH values were lower than 6.5 in the Middle Brook (RRMB017), South Brook (RRSB030) and North Brook (RRNB036). The lowest value was recorded at RRMB017 (Middle Brook) at pH = 6.1. On the next round of sampling in Quarter 4 (23/5/2023), the pH values for all the sites mentioned before, were found to be well within the guideline again. Because of this, no actions are recommended. If lower pH persists in future sampling, it is recommended to double-check the calibration of the pH probe first, followed by an investigation of any land use nearby those sampling sites which may be causing it. Heavy metals in water with a low pH tend to be more toxic, as they become more soluble and bioavailable (Saalidong *et. al*, 2022). We know there are significant levels of dissolved Zinc in the North Brook, at Aspen Street Park site (RRNB055). Another explanation for low pH levels recorded could be instrumental error of the pH probe.

No further actions are recommended, as no direct evidence of negative effects of stormwater discharges on pH have been found. It is noted the pH can vary substantially diurnally, and that grab sampling may not have captured the fluctuations of pH values in the waterways.



**Figure 20. Stream Health - pH results for the 2022/2023 reporting year, with 2021-22 results for comparison. ND = No data.**

#### 4.8.4. Specific conductivity

Significant increases in conductivity may be an indicator that polluting discharges have entered the water.

According to the CRWLP, the conductivity guideline of  $<175 \mu\text{S}/\text{cm}$  was adopted as a limit. The following conductance results have been adjusted to  $25^\circ\text{C}$  (specific conductance).

The highest specific conductivities recorded were in Quarter 3 (sampling event 16/3/2023), with  $203 \mu\text{S}/\text{cm}$  at RRSB046 (South Brook at Townsend Road),  $188.4 \mu\text{S}/\text{cm}$  at RRSR025 (South Rangiora, No. 7 Drain) and  $180 \mu\text{S}/\text{cm}$  at RRMB017 (Middle Brook, at Gefkins Road, east of the Railway Line). The first two sites were also over the guideline in Quarter 4 of 2022-23. See Figure 21.

This matches with the low pH levels registered at the same sampling event for the same locations as described in the previous section (see 4.8.3 or Figure 20). There could have been a minor contamination event at these sites in March 2023, or the probe could have been faulty for this sampling round. All conductivity levels resume to normal levels in the next round of sampling (Quarter 4, 23/5/2024).

More investigation is required before any action can be recommended, as some waterways can naturally have higher conductivity due to geology of the catchment, and it is not necessarily a sign of a polluting discharge. An analysis of trends over time is more useful.

Due to time constraints, and Stream Health not being a consent requirement, Stream health trends over time have not been calculated or included in this report.

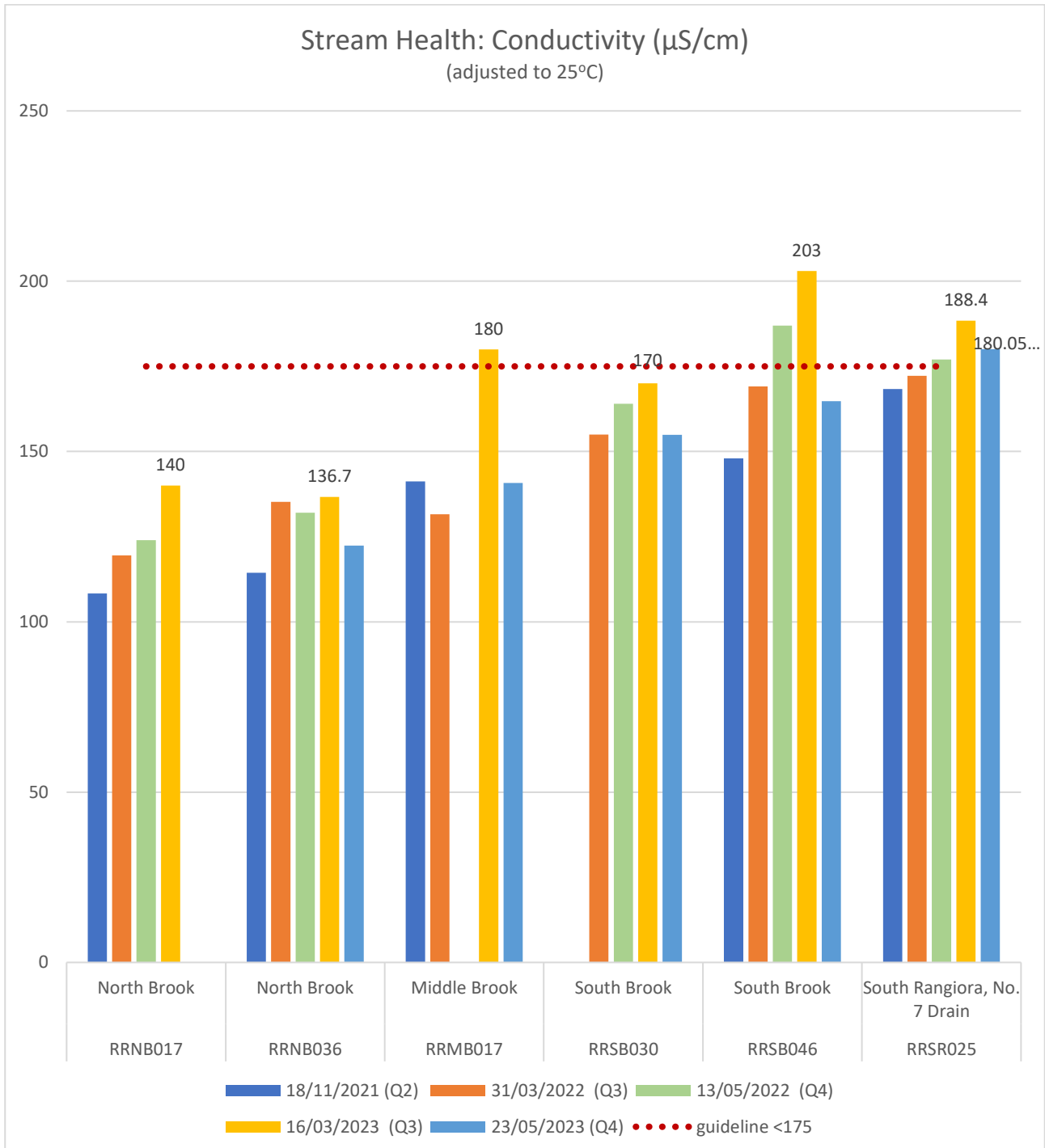


Figure 21. Stream Health - specific conductance sample results for the 2022/2023, with 2021-22 for comparison

#### 4.8.5. Dissolved Inorganic Nitrogen

All sites had exceedances of the guideline value of 1.5mg/L Dissolved Inorganic Nitrogen (DIN) for at least one quarter, see Figure 19. Action is required to reduce DIN levels, however it is likely that DIN sources are both rural (direct discharge and via groundwater inflows) and urban. It is recommended to further characterise sources of DIN to target treatment appropriately.

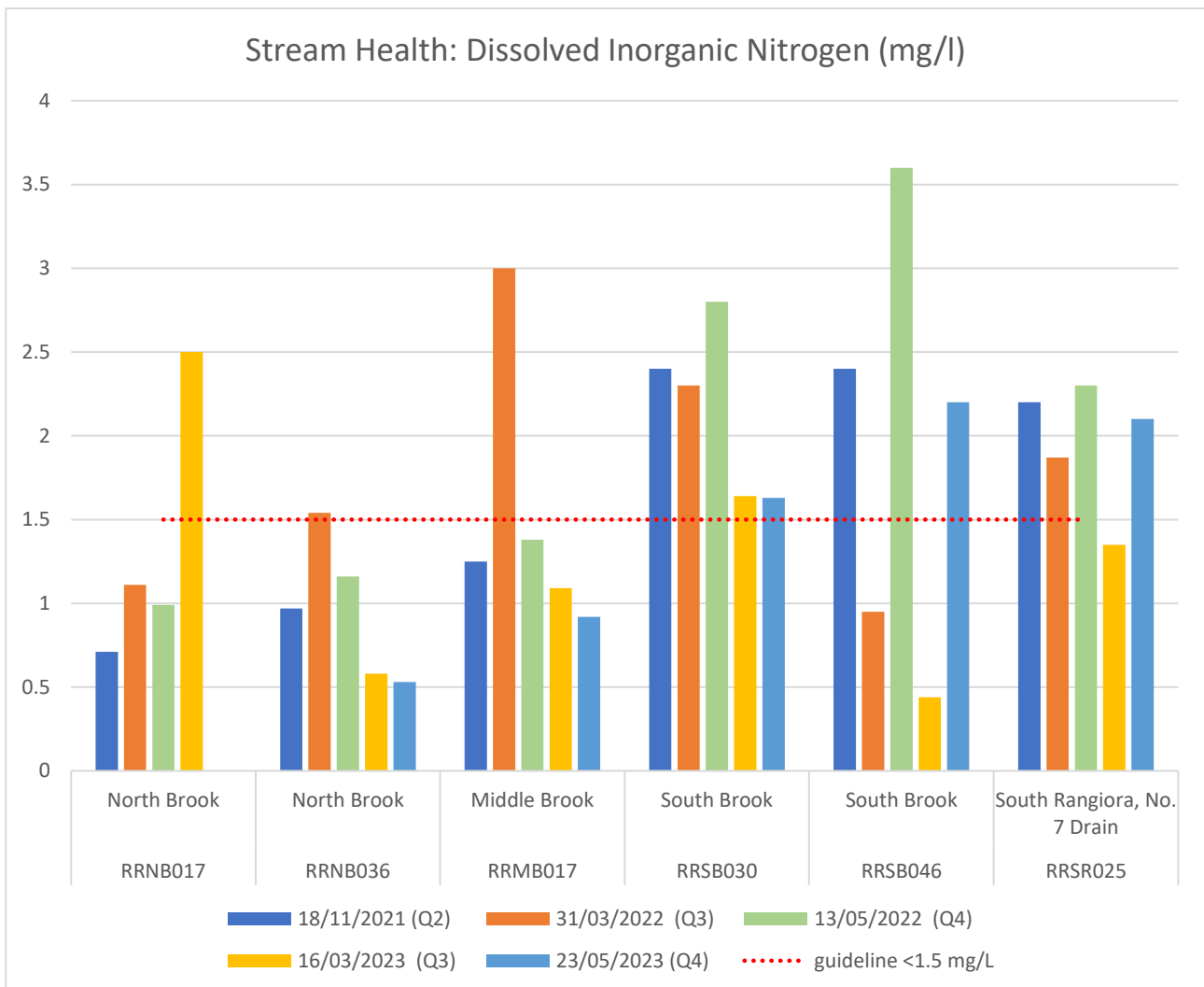
In 2021-22 only one site did not exceed DIN levels (RRNB017, North Brook at Boys Road). However for 2022-2023 sampling this site recorded 2.5mg/L of DIN in Quarter 3, which exceeds the guideline value. This site was not sampled in Quarter 4 of 2022-23.

For all other sites exceeding the guideline value, it is observed that the DIN levels dropped under the guideline in Quarters 3 and 4 of 2022-23. This is the case for sites RRNB036 (North Brook) and RRMB017 (Middle Brook, Gefkins Road east of railway Road). The latter site presented the second highest values of DIN at 3mg/L during Quarter 3 of 2021-2022.

The highest DIN level registered was in the South Brook RRSB046, (east-side of Townsend Road), which was registered in Quarter 4 of 2021-2022 at 3.6mg/L. DIN dropped down below the guideline in the following sampling round (Quarter 2022-23). However, DIN levels increased again for the last round of sampling in Quarter 4, suggesting cyclical discharges of nitrogen in this area, likely from higher nitrate leaching of soils during winter months with more rainfall.

An investigation between WDC and Environment Canterbury is recommended to locate soils that have high nitrate leaching due to land management, to locate practices that could be improved.

No baseline monitoring for DIN was carried out in 2014, so no comparative data is available.



**Figure 22. Stream Health - Dissolved Inorganic Nitrogen sample results for 2022/2023, with 2021/22 results for comparison**

#### 4.8.6. Total ammoniacal nitrogen

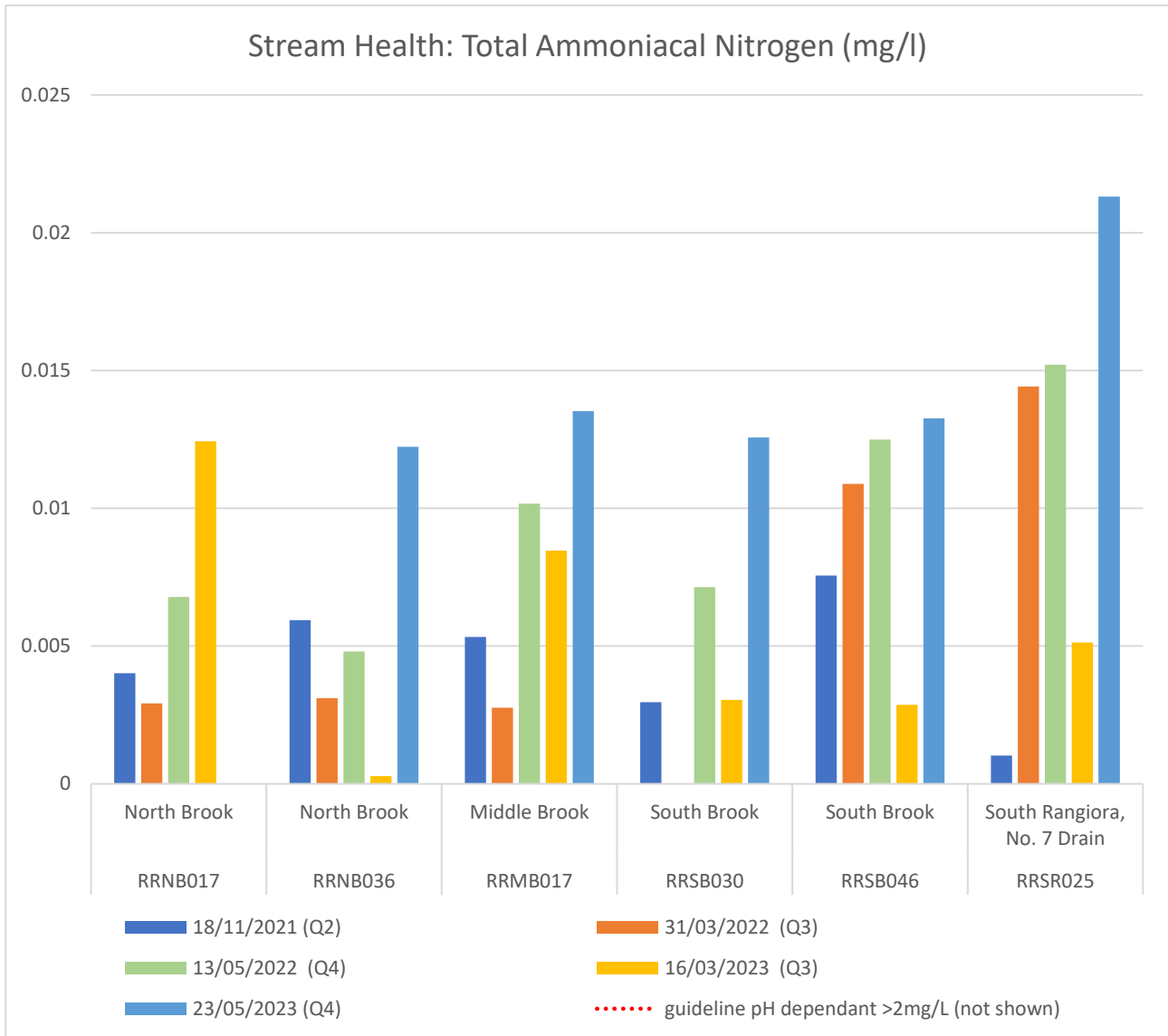
The Total Ammoniacal Nitrogen (TAN) value that provides 95% species protection is adjusted for pH. The pH values from section 4.7.3, were used to find the TAN guideline equivalent. As adjusted per schedule/table S5C of the CLWRP the guideline for TAN ranged from 2.09 mg/L to 2.33 mg/L.

All sampling recorded for Total Ammoniacal Nitrogen in 2022-23 during Stream Health sampling was below their respective guideline values. See Figure 21.

The highest TAN value found was 0.021 mg/L at RRSR025 (South Rangiora, downstream of Fernside/Flaxton Intersection SMA outlet).

Due to the low levels of TAN found, no actions are recommended. Baseline monitoring in 2014 also found low levels of TAN.





**Figure 23. Stream Health Total Ammoniacal Nitrogen sample results for 2022/2023, with 2021-22 for comparison**

#### 4.8.7. Total Suspended Solids

All Stream Health sites were well below the guideline value of 50 g/m<sup>3</sup> (Figure 22). In 2022-23 all sites were found to be below the default detection limit of 3 g/m<sup>3</sup>, except for the following:

- RRNB017, Quarter 3, North Brook, northern side of Boys Road, TSS = 4 mg/l
- RRSB030, Quarter 4, South Brook West side of Railway Road, TSS = 3.09 mg/L
- RRSB046, Quarter 3 and 4, South Brook, East side of Townsend Road, TSS = 3.2 mg/L and 3.29 mg/L
- RRSR025, Quarter 4, South Rangiora, Fernside / Flaxton intersection, TSS = 3.09 mg/L

Baseline sampling in 2014 did not identify any sites over the guideline value, even during rain events. 2021-23 sampling shows that it is likely that no action is required for TSS, except for a recommendation to investigate the discharge from Pond C on Flaxton Road, as reported in the Urban Impact section.

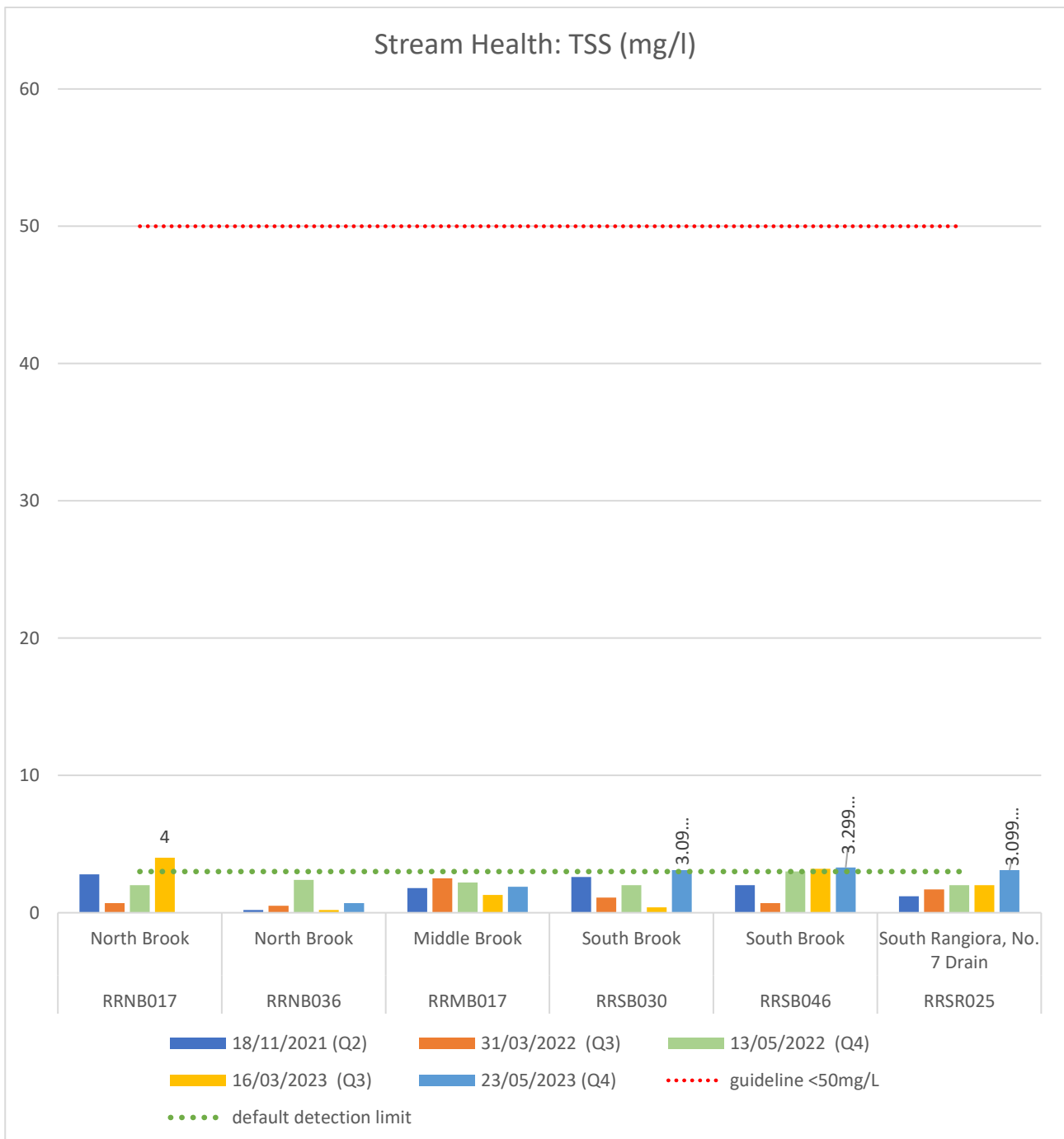


Figure 24. Stream Health - Total Suspended Solids sample results for 2022/2023, with 2021/22 for comparison

#### 4.8.8. Dissolved Reactive Phosphorus

All sites were below the guideline value for Dissolved Reactive Phosphorus (Figure 23). Baseline sampling in 2014 also found all samples to be below the guideline value during dry weather. Although no sites were above the guideline value during dry weather, DRP guidelines were exceeded during wet weather sampling, therefore actions are still recommended to be undertaken to reduce DRP.

It is recommended to monitor closely in future sampling sites RRSR025 (Fernside Road / Flaxton Road), RRSB046 (South Brook, Townsend Road), RRMB017 (Middle Brook, Gefkins Road) and RRNB017 (North Brook, Boys Road). These values are below the guideline value, but close to exceeding it.

In Quarter 2 of 2021-22, RRSB030 was found to be below the default detection limit of 0.004 g/m<sup>3</sup>. No other values were below the default detection limit in 2022-23.

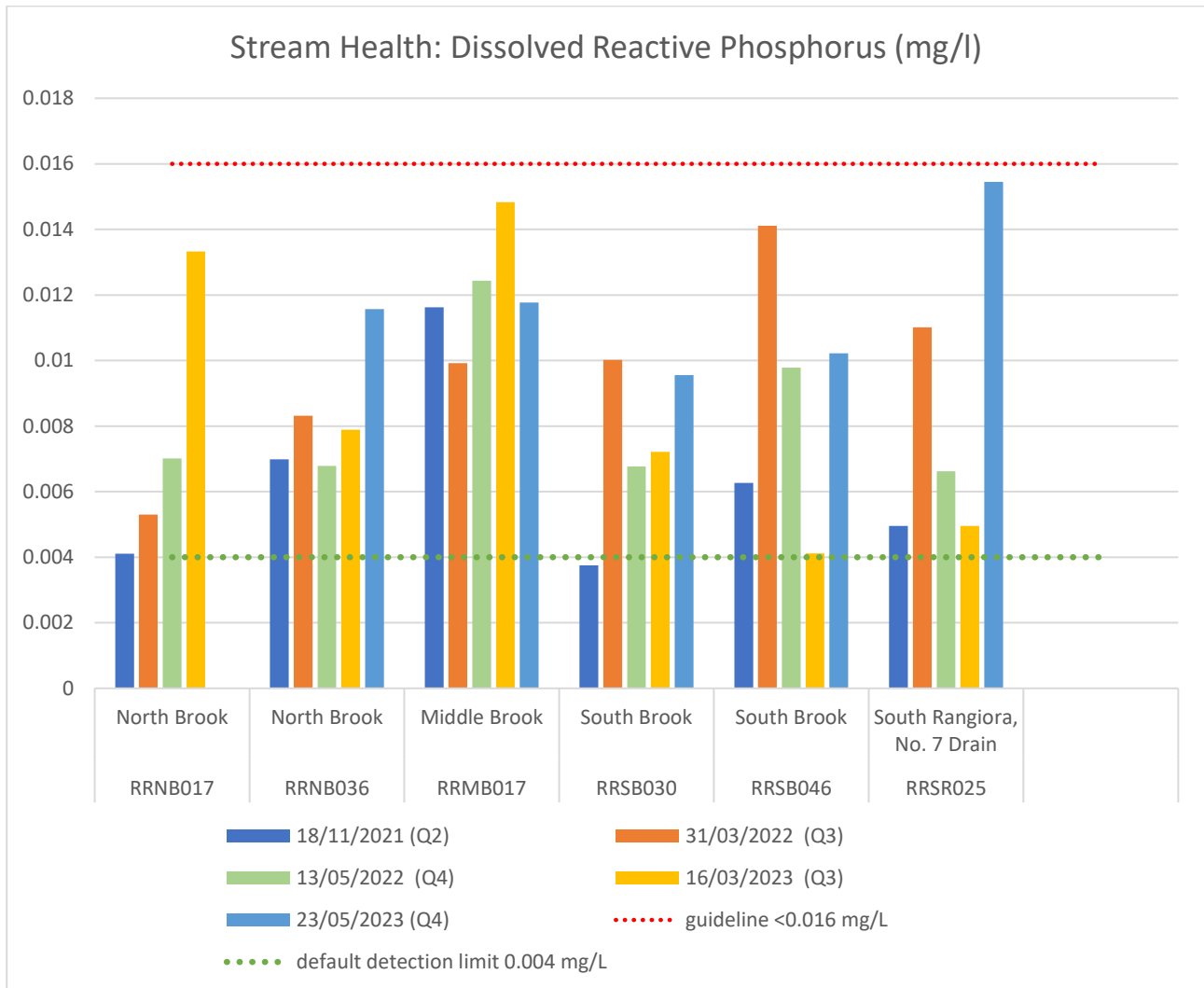


Figure 25. Stream Health - Dissolved Reactive Phosphorus sample results for 2022/2023, with 2021/22 for comparison

#### 4.8.9. *E. coli*

*E. coli* is used as an indicator of possible sewage contamination as *E. coli* is commonly found in human and animal faeces.

Results from 2021-22 are represented in Figure 24 for comparison (2021-2022, Quarter 2 and Quarter 3 respectively; blue and orange bars).

In 2022-2023, only one site exceeded the guideline value of *E. coli* 550 MPN/100 mL. This was site RRMB017 (Middle Brook, Gefkins Road, east of Railway Line) with 686 MPN/100 mL during Quarter 3 (2023). The Middle Brook is spring fed with urban headwaters, which suggests urban sources of *E. coli*. This site also presented high levels of *E. coli* during 2021-22 dry weather sampling. Given these results were from dry weather, sources of *E. coli* could be from farmland areas or urban sources. Urban sources of faecal bacteria could be dogs, cats and birds (i.e. waterfowl), or human.

Actions are recommended to reduce faecal contamination in the Middle Brook.

It has been brought to WDC's attention that occasionally cattle trucks driving cross over the junction of Fernside Road / Flaxton Road, which is sampling site RRSR025 (No. 7 Drain). If this is correct, this raises the question of whether cattle trucks lost any effluent. It is noted how *E. coli* levels were high for this sampling site for Quarter 3 of the previous financial year. It is thought that waterfowl is a much more likely source of *E. coli* contamination in Pond C (RRSS025). More investigation is required to confirm source of contamination from *E. coli*. Investigations and actions are recommended.

While the North Brook did not exceed guideline levels for *E. coli* during 2022-23, site RRNB017 has exceeded the guideline value in the past, and *E. coli* levels for Quarter 4 of 2022-23 were just below the guideline value.

In the 2014 baseline sampling, rural inputs of *E. coli* were hypothesised for catchments with rural areas, which is supported by 2021-23 results. In general, there were *E. coli* levels below the guideline value during dry weather, but exceedances during rain events.

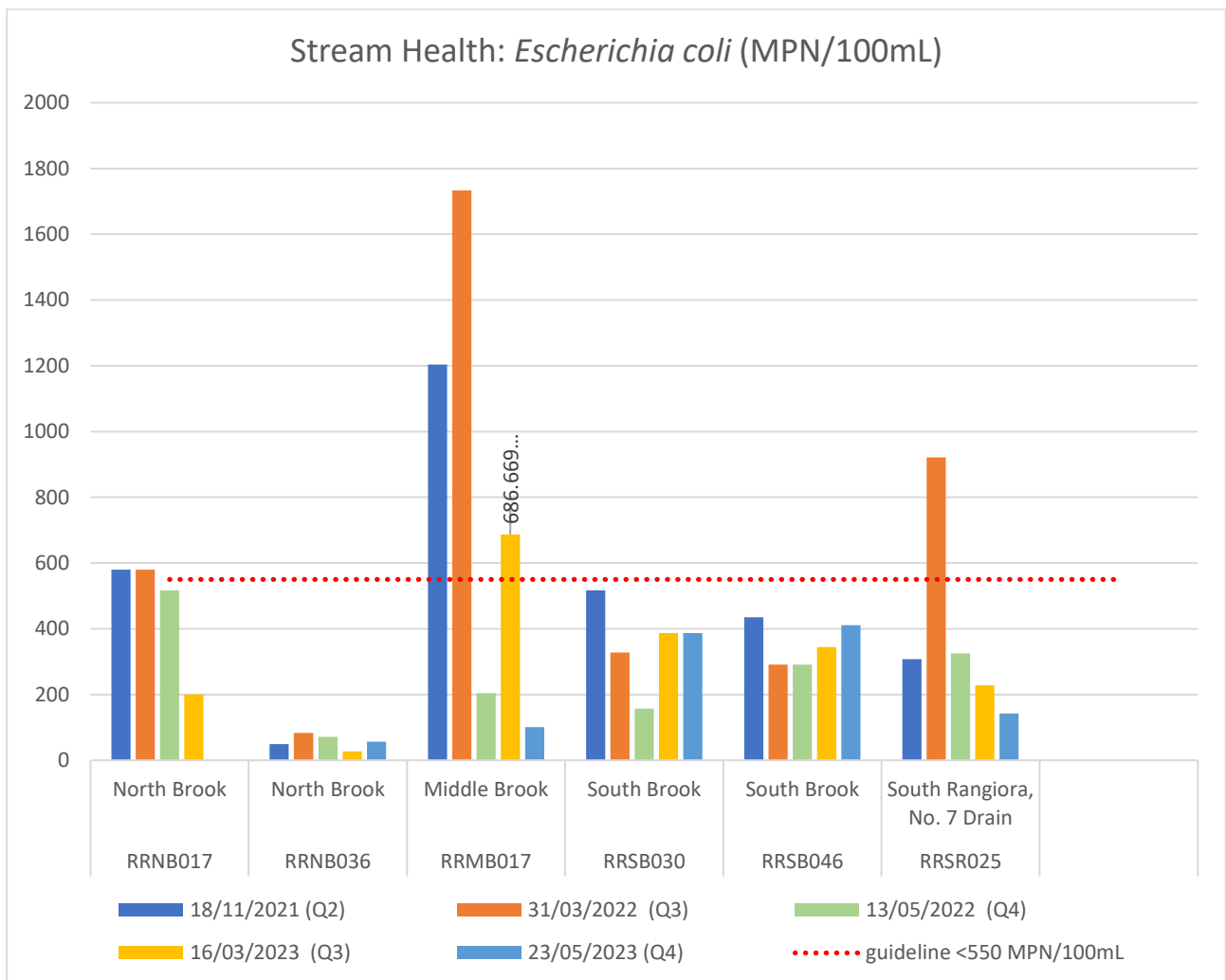


Figure 26. Stream Health - *E. coli* sample results for 2022/2023, with 2021-22 for comparison

#### 4.9. Stream sediment depth and cover results

All stream reaches monitored were composed primarily of run habitat, with limited pools and riffles. In the Middle Brook at 44 South Belt, approximately 10% of the bed was covered with <2mm sediment, which was predominantly (95%) sand. Sediment depth was general nil, with a few patches of 10mm and 50mm in the transects. In the Middle Brook by Gefkins Road, at the edge of the urban boundary, the amount of sediment cover <2mm had increased to an estimated 30% cover that was predominantly silts and clays (80%). The sediment depth was generally nil in the higher flow areas with sides of lower flow with sediment of 20-150mm (and one outlier of 350mm).

In the North Brook at Ward Park there was an estimated 50% <2mm sediment cover (of which 50% was silt and clay, 50% sand). There are large boulders that have been added to the bed in this reach, so sediment depth can vary from nil on top of the boulders up to 300mm in the pockets between the boulders. Downstream below North Brook Ponds the <2mm sediment cover was approximately covering 30% of the bed, however Cape Pond Weed obscured large portions of the bed which made assessment difficult. Approximately 80% of this sediment was silt and clay. The depth of sediment was usually nil in the flow, except for where pockets of the Cape Pond Weed have trapped sediment in their roots to a depth of 150mm. The North Brook at Dudley Park was dry at the time of the visit, and therefore not suitable for measurement of sediment depth or cover measurements.

The South-South Brook at Lineside Road (below the Pond A outlet) was 100% <2mm sediment, of which 100% was silt and clay. This waterway has had flows diverted away from it historically which has likely been a significant cause of the sediment build-up. The sediment depths measured ranged from 100mm-400mm.

The No.7 Drain had only 5% cover of sediment <2mm, of which 95% was sand, however the waterway had been mechanically cleaned of sediment within a few weeks prior sampling, with sediment removed and placed onto the banks. The bed sediment depth was generally nil, with patches along the wetted edge that were 50mm deep.

#### 4.10. Spills reported

There was one spill of 5L into the Rangiora stormwater network reported to WDC staff in 2022-23. A vehicle was vandalised on 47 White St, with diesel siphoned off and some of this spilt onto the road. Rain washed this into the stormwater network, and into the North Brook. WDC deployed sawdust and absorbent mats from the spill kit around the spill and mats in the receiving environment. The stormwater sump was blocked off.

Another investigation on Kowhai Avenue in 2022-23 concluded that a reddish and oily discharge into the stormwater network was likely to be from naturally occurring iron-rich sediment and oils from peaty swamp deposits in the area, not due to pollution.

More information is available in the Annual Report 2021-2023 (Tables 4 and 5, section 9, TRIM 240325047404).

## 5. Discussion

**Table 8: Summary of compliance with CRC184601 guideline values in 2022-23**

Contaminant			Notes
Total Suspended Solids	Compliant		All sites were compliant for TSS in 2022-23 sampling. Note only one sampling round was carried due to weather and resource limitations.  Only one major discharge outlet during a moderate rain event was non-compliant in 2021 financial year.  Compliance also met for all stream health sites (dry weather sampling).
Dissolved copper	Non-compliant		7 sites exceeded the guideline value during wet weather sampling
Dissolved zinc	Non-compliant		7 sites exceeded the guideline value during wet weather sampling
Dissolved Reactive Phosphorus	Non-compliant		Not met for all sites except Cam River. Actions recommended.
<i>E. coli</i>	Non-compliant		Not met for all sites except Cam River, and some sites in North Brook on the latest sampling. Actions recommended.
Total Ammoniacal Nitrogen	Compliant		
Dissolved oxygen	Guideline met*		Not used for compliance. All following results are from Stream Health (dry weather sampling).  <i>* if one low oxygen value is confirmed to be due to large groundwater inflows at the site - North Brook at Lilybrook Park (RRNB036)</i>
Temperature	Guideline met		
pH	Guideline met		
Conductivity	Guideline value not met		Not met for 3 sites, all other sites were met (Middle Brook, South Brook, No. 7 Drain)
Dissolved Inorganic Nitrogen	Guideline value not met		Guideline value exceeded for 6 sites (North Brook, Middle Brook, South Brook, No. 7 Drain)
Total Ammoniacal Nitrogen	Guideline met		
Total Suspended Solids	Guideline met		
Dissolved Reactive Phosphorus	Guideline met		
<i>E. coli</i>	Guideline not met		3 sites exceeded guideline values of <i>E. coli</i> (North Brook, Middle Brook, No. 7 Drain)

**From Trend Analysis of Urban Impact sampling results**, it is identified the following:

- **Site RRNB055: North Brook, Aspen Street Park**
  - **Levels of Dissolved Zinc have increased significantly over time.**
    - It is recommended to initiate a project targeting remediation of Dissolved Zinc levels in the North Brook at this site.
    - Investigation of Zinc sources is recommended around this area, so that it can be treated at source by physically covering materials that are causing Zinc contamination.
  - Levels of Dissolved Copper show a tendency to increase, however no significant differences were found over time.
    - More sampling will further inform any trends with Copper levels.
  - Levels of Dissolved Reactive Phosphorus show a tendency to increase over time, however no statistical significance was found yet, but statistically was very close to a significant change.
    - It is recommended to monitor these levels closely, as it is likely that the changes would be significant over time once results from 2023-24 sampling are included with better trend analysis – and provided that DRP levels stay at similar or higher levels than this financial year over the next year. This is yet to be determined with further sampling. Next financial year will further inform actions recommended for DRP levels if any.
  
- **Site RRMB029: Middle Brook, western side of Bush Street**
  - Levels of Total Ammoniacal Nitrogen show a clear increase of levels over time, not statistically significant at this stage but very close to statistical significance. The guideline values were not exceeded.
    - Due to a clear trend coming from a small sample that is close to statistical significance, it is recommended to monitor closely TAN levels and to add more information as it becomes available.
    - It is recommended to prepare and investigate nitrogen absorption projects in the Middle Brook, before nitrogen levels exceed guidelines and become an eutrophication problem.
  - There were not enough sample rounds on some contaminants such as Cu and Zn, to provide a statistically significant analysis.
    - It is recommended to increase the sample size and to expand WDC's projects list once more results are included.

**From Major Network Outlets Sampling in Pond C:**

- Levels of Dissolved Reactive Phosphorus (DRP) were very close to exceed the guideline.
  - Dissolved Reactive Phosphorus is a plant nutrient, which can contribute excessive plant and algae growth, damaging the ecological health of streams if it enters surface water.
  - Excess of phosphorus can originate on land from fertilizer or animal manure, where it can also leach onto groundwater.
  - Actions to start fixating phosphorus levels before they become a higher problem are recommended.
  - The design of a wetland with associated riparian planting to improve the water quality of No. 7 Drain and the discharge of stormwater from Pond C is recommended.
- *E. coli* levels were above the guideline, for at least 1.5 orders of magnitude.
  - The use of filtration solutions or biochar (BC) enhanced sand filtration systems, targeted at enhancing *E. coli* removal are recommended as a low-cost project to reduce *E. coli* levels in Pond C.

- Studies such as Zeng & Kand (2023) have found using activated BC-sand filtration systems increases the removal of *E. coli* because of the hydrophobic attraction between BC surface and *E. coli*.
- Using filtration systems to remove *E. coli* it is recommended to target these levels at Pond C

#### **From Urban Impact Sampling Results:**

- Dissolved Copper exceeded the guideline values in the North Drain, North Brook, Middle Brook and South Rangiora / No. 7 Drain
- Dissolved Zinc exceeded guideline values in the North Drain, North Brook and Middle Brook
  - A diligent sweeping of the roadside channels is recommended to WDC, working with contractors to improve water quality and minimize heavy metals in Stormwater run-off.
  - It is recommended to focus on the frequency of sweeping during dry periods (i.e. between storms), which is key to improve water quality in stormwater as found in a study undertaken by NIWA in 2011. There is also evidence available from CCC.
  - It is recommended that WDC researches previous work by CCC with contractors and road sweeping frequencies, to establish a road sweeping frequency that balances costs and diminishes the contaminant load, ultimately improving water quality outcomes.
  - The following are recommended to be included within the next Roding Contract between WDC – Corde (or any future contractor):
    - Focus where there is a high contaminant load:
      - Increase road sweeping frequency in industrial area above Pond C
      - Increase Sump cleaning in industrial areas, particularly those with businesses in the automotive field (see the Industrial Area above from Pond C).
    - Roadside channel sweeping:
      - Recommend hand sweeping of the roadside channel where vehicles are parked, or issue a parking notice the day before when sweeping is scheduled. This is recommended to increase efficiency.
      - It is recommended to adjust the frequency of road sweeping by WDC in the contract every 6 months, to meet changing activity needs.
      - The frequency recommended is:
        - For streets with high traffic volumes: weekly and a fortnight
        - Commercial streets: between fortnightly and monthly
        - Residential areas: between monthly and quarterly
    - Sump cleaning frequency:
      - Inspect and empty sumps as required every 6 months.
      - It is recommended to record the frequency that sumps need emptying, to build up a good picture of where the demands are needed most.
    - Resources:
      - WDC estimates that at a minimum, at least 2 sweepers are needed to maintain the entire network in Rangiora. It is recommended that WDC outsources a contractor that has at least 2 sweepers ready and available, to provide for the maintenance of the entire network in Rangiora Urban Area. This point is critical when new global stormwater consents get approved for new towns within the District.
- *E. coli* levels exceeded the guideline in the North Drain, North Brook, Middle Brook and South Brook during rain events
  - Investigations are required to isolate the source and to confirm the urban and/or rural origin of *E. coli* contamination.



- Filtration systems and/or devices required as recommended above. The same recommendations issued to address high levels of *E. coli* in Pond C apply here for these waterways.

There were data gaps in 2022-23. The current results and recommendations are issued based on best data available. It is anticipated that more information will become available when data from 2023-2024 is added to the data analysis. Therefore, results and priorities of required actions could change quickly.

The challenges encountered for this round of stormwater sampling were related to staff shortages and weather limitations. These issues have now been addressed with the employment of a new 3 Waters Compliance Officer role. Funding has also been allocated for a new Waterways Engineer role. This sets WDC in a better position to continue monitoring, reporting and remediating environmental results as they are encountered throughout the financial years.

As identified in the 2014 baseline monitoring report for Rangiora, contaminants such as DIN, DRP and *E.coli* have likely rural, as well as urban sources. The proportion of each source can be difficult to establish because of the upstream rural catchments present in some waterways, and the groundwater inflows into all catchments sourced from primarily rural recharge zones. Therefore, any actions to reduce these contaminants requires further investigations to identify urban sources first. *E. coli* and other faecal bacterial levels diminish after time underground, but nitrogen and phosphorus compounds can be carried long distances from where they have been leached from soils, depending on levels of denitrification for example.

Likely rural inputs for *E. coli* include from stock (sheep and cattle) and birds. Urban inputs could be from dogs, birds, and human sources. No wastewater overflows were reported to have occurred during the sampling events. Cross-connections of wastewater to stormwater discharge outlets is a possibility but has a low occurrence.

Options for stormwater treatment will be examined in the Rangiora Stormwater Management Plan, to be drafted before 1 January 2025.

## 6. Recommendations

A summary of recommendations based on the discussion above:

1. Prioritise actions to reduce Dissolved Zinc levels in the North Brook due to high level of exceedances found in sampling sites. Actions are also recommended for the Middle Brook.
2. Investigate sources of Zinc in North Brook and Middle Brook, as recommended in 2021-2022.
3. Investigate sources of *E. coli* in Rangiora waterways, particularly investigate whether the source is rural run off.
4. Undertake actions to treat *E. coli* levels in Rangiora waterways, in particular for the Middle Brook and South Brook, due to high exceedances found during dry weather.
5. Undertake actions to reduce Dissolved Copper for the North Brook, Middle Brook and No. 7 Drain catchments (also recommended in 2021-2022).
6. Investigate sources of DRP in the North Brook, and initiate engagement with landowners and the community to tackle the problem at source, where possible.
7. Actions required to treat and identify sources of DIN in South Brook, as recommended in 2021-2022.
8. Actions required to improve the functioning of Pond C, including treatment of DRP levels and *E. coli*. This was also recommended in 2021-2022.
9. Expand data analysis of trends with more targeted analysis which include exploratory analyses to understand the distribution of data, and the use of Time Trends software to include rainfall adjustments and a more accurate analysis.

## 7. References

Clapcott, J.E., Young, R.G., Harding, J.S., Matthaei, C.D., Quinn, J.M. and Death, R.G. (2011). Sediment Assessment Methods: Protocols and guidelines for assessing the effects of deposited fine sediment on in-stream values. Cawthron Institute, Nelson, New Zealand. <https://www.envirolink.govt.nz/assets/R4-1-Sediment-Assessment-Methods-Protocol-and-guidelines.pdf>

Depree, C. (2011). Street sweeping: an effective non-structural Best Management Practice (BMP) for improving stormwater quality in Nelson? Report No. HAM2011-043. NIWA. <https://envirolink.govt.nz/assets/Envirolink/934-NLCC51-Street-sweeping-an-effective-non-structural-best-practice-for-improving-stormwater-quality.pdf>

Pinner, M. J. (2018). Summary of Evidence of Mark James Pinner for Christchurch City Council. LEX14926. <https://api.ecan.govt.nz/TrimPublicAPI/documents/download/3509418>

Saalidong, B. M., Aram, S. A., Otu, S., & Lartey, P. O. (2022). Examining the dynamics of the relationship between water pH and other water quality parameters in ground and surface water systems. PloS one, 17(1), e0262117. <https://doi.org/10.1371/journal.pone.0262117>

Zeng, S., & Kan, E. (2023). Enhanced Escherichia coli removal from stormwater with bermudagrass-derived activated biochar filtration systems. Journal of Environmental Management, 344, 118403. <https://doi.org/10.1016/j.jenvman.2023.118403>

**WAIMAKARIRI DISTRICT COUNCIL**

**REPORT FOR DECISION**

**FILE NO and TRIM NO:** WAT-10-14 / 240508073256

**REPORT TO:** UTILITIES AND ROADING COMMITTEE

**DATE OF MEETING:** 28 May 2024

**AUTHOR(S):** Sophie Allen – Water Environment Advisor

**SUBJECT:** Zone Implementation Programme Addendum (ZIPA) Capital Works Programme – 2024-25

**ENDORSED BY:**

(for Reports to Council,  
Committees or Boards)

\_\_\_\_\_  
Department Manager

\_\_\_\_\_  
Chief Executive

**1. SUMMARY**

1.1 This report seeks approval for the proposed Waimakariri District Council (WDC) capital works programme for 2024-25 as developed from the Zone Implementation Programme Addendum (ZIPA), including;

- i. biodiversity and amenity improvements for the South Brook at Townsend Fields, Rangiora (\$10,000);
- ii. terrestrial planting along the Kaiapoi River (\$10,000);
- iii. willow removal at an inanga (whitebait) spawning areas located on land owned by Waimakariri District Council, Environment Canterbury and a private landowner (Cam River Ruataniwha, Courtenay Stream true left bank and McIntosh Drain) \$15,000;
- iv. native planting and interpretation panels for the Waikuku Beach pond on the corner of Bridge Street and Park Terrace that is in the Taranaki Stream Catchment \$5,000;
- v. allocation of \$30,000 to four Waimakariri Water Zone Committee Action Fund recipients as top-up funding (Bittern Inanga Rushland \$11,700, Hunters Stream \$5,000, O’Kair Lagoon \$10,000 and Pohio Wetland \$3,300).

1.2 ZIPA Capex projects from 2023-24 that have been completed on budget are:

- i. Fish passage improvements on the North Brook tributary at Cotter Lane in Rangiora;
- ii. Biodiversity 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 New Zealand Transport Authority Waka Kōtahi along the Benzies Creek (a tributary of Saltwater Creek) with willow and blackberry removal, McIntosh Drain (WDC land) with

native spawning plants planted, and Courtenay Stream true right bank (private landowner) with willow removal.

- 1.3 Outstanding 2023-24 projects are:
- i. Installation of walkway culverts for a riparian access along the North Brook, Rangiora for the North Brook Trail project. Due to a right of way easement for public access not in place yet, this budget is requested again in 2024-25 when this easement should be in place. No 2023-2024 carry-over budget is requested.
  - ii. Re-grading of the McIntosh Drain bank for improvements to the inanga (whitebait) spawning area. The bank regrading proposal of this project is on hold pending a re-alignment of the works in line with another proposal to rebatter a large section of this waterway. Therefore this budget has not been requested for 2024-25.
  - iii. Taranaki Stream Reserve additional planting budget. This native plant budget of \$5,000 was not required in 2023-24, with sufficient Greenspace budget for planting works within this reserve.
- 1.4 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.
- 1.5 Capital expenditure ZIPA projects are scoped and presented annually to the Utilities and Rooding Committee for approval.

Attachments:

- i. Selected funding applications for the Waimakariri Water Zone Committee Action Fund (TRIM 240515077713)

## 2. **RECOMMENDATION**

**THAT** the Utilities and Rooding Committee:

- (a) **Receives** report No. 240508073256.
- (b) **Approves** the proposed 2024-25 Waimakariri District Council capital expenditure work programme, based on the Zone Implementation Programme Addendum (ZIPA) recommendations.
  - i. Biodiversity and amenity improvements in Waimakariri River tributaries – South Brook Townsend Fields project (\$10,000)
  - ii. Terrestrial riparian plantings along the Kaiapoi River (\$10,000)
  - iii. Inanga (whitebait) spawning habitat improvements – willow and gorse control (\$15,000)
  - iv. Northbrook Trail - installation of three culverts (\$30,000)
  - v. Waikuku Beach pond – native planting and interpretation signage (\$5,000)
  - vi. Waimakariri Water Zone Committee Action Fund top-up -Bittern Inanga Rushland, O’Kairs Lagoon, Pohio Wetland and Hunters Stream projects (\$30,000)
- (c) **Notes** the works carried out in 2023-24 under the ZIPA capital expenditure programme.

- i. Fish passage improvements on the North Brook tributary at Cotter Lane in Rangiora;
  - ii. Biodiversity 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 New Zealand Transport Authority Waka Kōtahi along the Benzies Creek (a tributary of Saltwater Creek) with willow and blackberry removal, McIntosh Drain (WDC land) with native spawning plants planted, and Courtenay Stream true right bank (private landowner) with willow removal.
- (d) **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.
- 3.4 A total of \$305,000 per annum was approved by Council for 2019-21 on 28 May 2019 (refer to TRIM 190501061992), of which \$100,000 was capital expenditure. Due to COVID-19 pandemic budget revisions, the capital expenditure was reduced to \$50,000 from 2020-21 until 2022-23, with a return to \$100,000 from 2023-24.

### 4. **ISSUES AND OPTIONS**

- 4.1. \$100,000 is allocated to capital expenditure (CAPEX) projects in the 2024-25 Financial Year (see Table 1),

Table 1: Summary of capital expenditure proposed for 2024-25 for WDC ZIPA works

<b>CAPEX project</b>	<b>ZIPA recommendation</b>	<b>Budgeted amount</b>
Biodiversity and amenity improvements in Waimakariri River tributaries – South Brook Townsend Fields project	1.26	\$10,000
Terrestrial riparian plantings along the Kaiapoi River	1.27	\$10,000
McIntosh Drain inanga spawning habitat improvements – willow (and gorse) control	2.11	\$15,000

Cam River (Ruataniwha) inanga spawning habitat improvements – juvenile willow removal		
Courtney Stream inanga spawning habitat – juvenile willow removal		
Northbrook Trail - installation of three culverts	1.26	\$30,000
Waikuku Beach Pond – native planting and interpretation signage	1.21	\$5,000
Waimakariri Water Zone Committee Action Fund top-up (Bittern Inanga Rushland, O’Kairs Lagoon, Pohio Wetland and Hunters Stream projects – see Attachment i)	1.26	\$30,000
<b>TOTAL</b>		<b>\$100,000</b>

#### ***Biodiversity and amenity – South Brook Townsend Fields***

- 4.2. WDC staff have been working since 2019 on improving a WDC-owned esplanade reserve on the South Brook beside the Townsend Fields Stormwater Management Area. Native planting has resulted in an eco-sourced riparian margin along the large areas on the south side, and some of the north side. This work will continue to be led by the WDC Greenspace Team and rangers in 2024-25. Public access signage has not been installed yet, with some health and safety issues to resolve first, such as large crack willows which need on-going arborist attention after wind events.
- 4.3. 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 some of the crack willows in August 2019, however there are still large crack willows that require gradual removal as native plants grow to provide riparian habitat.
- 4.4. Budget for plant maintenance, such as weeding around plants and weed control (e.g. blackberry) is available under the ZIPA operational budget for 2024-25.

#### ***Terrestrial plantings on the Kaiapoi River***

- 4.5. 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.
- 4.6. 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 successful establishment over time.
- 4.7. \$10,000 is proposed be allocated in the 2024-25 year to continue the Kaiapoi River terrestrial riparian planting.

### ***Cam River Ruataniwha, Courtenay Stream and McIntosh Drain - Inanga spawning habitat improvements***

- 4.8. 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.
- 4.9. There are significant Inanga spawning sites in the District, such as in the Saltwater Creek, Cam River (Ruataniwha), Taranaki Stream, Courtenay Stream and McIntosh Drain.

#### *Cam River Ruataniwha*

- 4.10. The Cam River Ruataniwha has not received ZIPA budget before for inanga spawning area improvement works. Juvenile crack willow removal has been recommended by AEL below the Cam River Floodgate to prevent future shading of suitable spawning habitat (Figure 1). Permission has been granted from the River Engineering team at Environment Canterbury for this willow removal to be carried out. WDC has often carried out works such as native planting within the stopbanks of the Kaiapoi and Cam River Ruataniwha, working with the landowner Environment Canterbury due to the importance of these waterways to the community and mana whenua.



Figure 1: Inanga spawning habitat at the confluence of the Cam River with the Kaiapoi River. The willows for removal are on a section of part of the true left (yellow section with suitable habitat for inanga spawning if willow shading is removed).

#### *Courtenay Stream*

- 4.11. Juvenile crack willow regrowth on the true left upstream of the floodgate has been observed by WDC staff. This area has previously had willow removal for inanga spawning habitat improvements in 2019 – 20, however there is sufficient regrowth to revisit this area. The land is WDC owned and managed by Greenspace as NCF Reserve.



*McIntosh Drain*

- 4.12. Willow growth was removed in 2019-20 or 2020-21 and a gorse hedge was sprayed. Willow regrowth and juvenile willows that have spread need to be targeted again. Gorse will also be targeted if there is adjoining private landowner approval.

**Northbrook Trail culvert installation and planting**

- 4.13. 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 culverts over drains that feed into the North Brook. Legal access for the general public has not yet been finalised as a right of way easement, however would be required by WDC staff as a condition for release of the \$30,000 budget for culvert installation. Due to this easement not in place during 2023-24, this budget is requested again for 2024-25. WDC staff have proposed to design and install the culverts under consent CRC195065 for Maintenance and Minor Works in Waterways.
- 4.14. 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.

**Waikuku Beach Pond**

- 4.15. On the corner of Bridge Street and Park Terrace there is a pond on WDC-owned land (figure 2) that is part of the Taranaki Stream catchment. The pond is beside a playground with frequent use by the community. A budget of \$3,000 for weed removal and native planting has been approved by the Woodend Sefton Community Board for biodiversity works in 2023-24 (TRIM 240430067679). Additional Greenspace and ZIPA Capex budgets have been proposed to meet the total project cost of \$15,500 for weed removal and native planting (see restoration plan TRIM 240412058320). \$5,000 is proposed from the ZIPA Capex budget in 2024-25 towards native planting costs and interpretation panels.

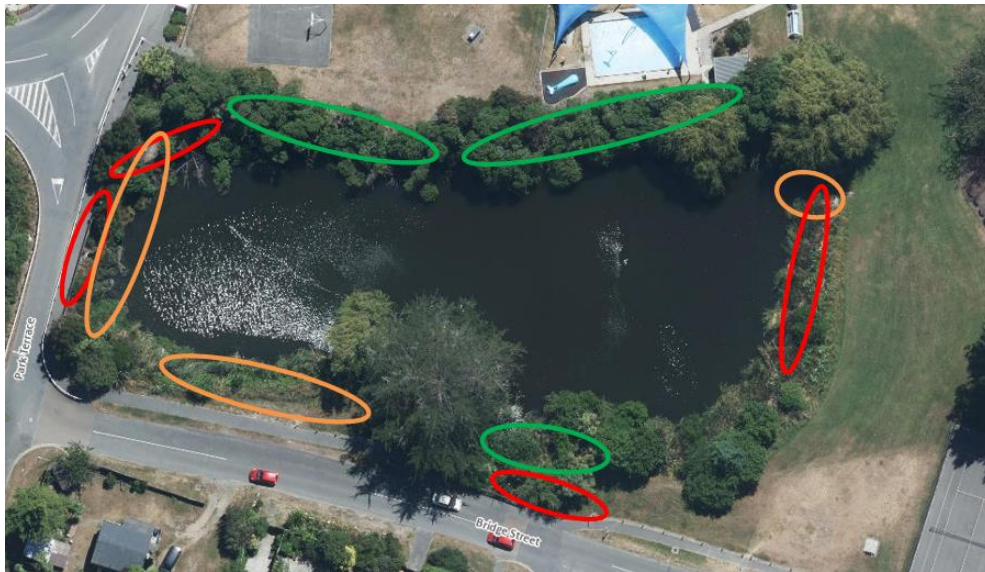


Figure 2. Waikuku Beach Pond showing viewing areas of the pond from footpaths (red), dense encroachment by grey willow (green) and areas of other problematic weeds (orange).

**WWZC Action Fund top-up**

- 4.16. The Waimakariri Water Zone Committee Action Fund was oversubscribed in the May 2024 funding allocation round. Successful projects were not able to be fully funded. WDC staff propose to top-up selected successful projects to enable these projects to be completed as scoped. WDC has proposed to Environment Canterbury that it will oversee the funding agreements with recipients and follow-up reporting and monitoring of the projects, however this approach of how funding could be distributed has not been confirmed yet. WDC will provide Environment Canterbury with the funds to distribute to recipients. WDC has proposed that funding agreements will acknowledge WDC as a partial funder. Progress reports would be provided to WDC by Environment Canterbury for information.
- 4.17. Attachment i includes the funding applications and project details for the projects that the proposed to receive top-up funding and a summary is provided in Table 2.

Table 2: Action Fund Projects proposed for WDC ZIPA top-up funding

Project name	Catchment	Action Fund funding requested by applicant	WWZC Action Fund allocation (funded by Environment Canterbury)	Proposed ZIPA budget top-up (WDC funding)	Total funding proposed
Bittern Inanga Rushland – fencing and woody weed control	upper McIntosh Drain catchment, Kaiapoi	\$35,000	\$15,000	\$2,461 top-up for fencing costs  \$9,239 for woody weed control  (\$11,700 total)	\$26,700
Hunters Stream – stream restoration and native planting	A tributary of the Cust River	\$13,775	\$5,285	\$5,000 for native planting costs	\$10,285
O’Kairs Lagoon	upper McIntosh Drain catchment, Kaiapoi	\$15,000 – but additional costs were included in the application	\$15,000	\$10,000 for woody weed control	\$25,000
Pohio Wetland	upper McIntosh Drain catchment, Kaiapoi	\$15,000	\$11,700	\$3,300 for woody weed control	\$15,000

### **2023-24 Works Completed**

- 4.18. 2023-24 works that have been successfully completed were either achieved on budget or under budget.

### **2023-24 Works Completed: Fish Passage**

- 4.19. A rock ramp of cobbles and boulders has been created on a tributary of the North Brook (corner of Cotter Lane and Northbrook Road) which created a pooled area below the concrete apron, reducing a fast-flowing drop (see Figure 2). This concrete apron was 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. Survey work to confirm if there is now inanga migration above the rock ramp will be carried out this winter.



Figure 2: The likely fish passage barrier on a North Brook tributary – Corner of Cotter Lane and Northbrook Road before (left) and after (right) works were carried out

### **2023-24 Works Completed: Inanga Spawning Area Improvements**

- 4.20. Courtenay Stream had willow re-growth on the true right bank above the floodgate. Aquatic Ecology Ltd recommended that this was removed to prevent shading of inanga spawning habitat before the willows become large. WDC Greenspace rangers completed this work in summer 2023-24, with successful poisoning to prevent regrowth.
- 4.21. Benzies Stream (a tributary of Saltwater Creek) had willows along the inanga spawning reach. Aquatic Ecology Ltd recommended that these were removed to prevent shading of inanga spawning habitat. This land is owned by NZTA Waka Kōtahi who provided approval for the works to take place. WDC Greenspace rangers completed this work by drilling holes into the trunks for herbicide application in summer 2023-24, with the willows left *in situ* as there is no public access to the area. There was also some blackberry removed and/or poisoned with herbicide.
- 4.22. At McIntosh Drain, additional native planting works with inanga spawning suitable species were carried out directly upstream in the inlet of a recently-commissioned pump station, in addition to native planting required by resource consents. This created a denser spawning habitat of higher quality for inanga spawning. There is a proposal under discussion to widen the length of McIntosh Drain from Beach Road downstream to the pump station, therefore re-grading works above the Pump Station inlet structure area were not carried out.

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

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

### **Implications for Community Wellbeing**

- 4.24. 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.
- 4.25. 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. No carry-over budget is requested for the 2024-25 budget from 2023-24 projects that have not been completed. This report is for more detailed specifics of the proposed projects for 2024-25.

### 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.

<b>AGENDA ITEM NO: 6</b>	<b>SUBJECT MATTER:</b> Zone Committee schedule and priorities – review discussion	
<b>REPORT TO:</b> Waimakariri Water Zone Committee		<b>MEETING DATE:</b> 1 July 2024
<b>REPORT BY:</b> Murray Griffin, CWMS Facilitator, ECan		

## PURPOSE

This agenda item provides the Water Zone Committee with an opportunity to review and discuss its schedule and priorities for 2024.

## RECOMMENDATION

### That the Zone Committee

**Review** – its schedule and confirm priorities for the remainder of 2024.

## BY WHO

This update will be led by:

- **Murray Griffin, Facilitator – ECan**

## BACKGROUND

The committee's schedule for the remainder of 2024 is:

### **1 July – Meeting**

5 August – Workshop/Field visit (TBC)

### **2 September – Meeting**

7 October – Workshop/Field visit (TBC)

### **11 November – Meeting**

2 December – Workshop/Field visit (TBC)

**MINUTES OF A MEETING OF THE CANTERBURY WATER MANAGEMENT STRATEGY  
WAIMAKARIRI ZONE COMMITTEE HELD IN THE COUNCIL CHAMBER, 215 HIGH STREET,  
RANGIORA ON MONDAY 6 MAY 2024 WHICH COMMENCED AT 4.00PM.**

**PRESENT**

C Latham (Chairperson), J Cooke (Te Ngāi Tūāhuriri Rūnanga representative), E Harvie, Councillor T Fulton (WDC Councillor) and Councillor C McKay (ECan Councillor), C. Aldhamland, M. Jolly, R. Gill-Clifford.

**IN ATTENDANCE**

S Allen (WDC Water Environment Advisor), N Theinhardt (ECan Zone Delivery Lead Waimakariri), Andrew Arps (Northern Zone Manager, ECan), L Barltrop (Waimakariri Biodiversity Trust), M Griffin (ECan CWMS Facilitator) and K Rabe (WDC Governance Advisor).

**KARAKIA**

C Aldhamland provided a karakia to open the meeting.

**1. BUSINESS**

**1.1 Apologies**

Moved: C Latham      Seconded: Councillor C McKay

**THAT** an apology for absence be received and sustained from Arapata Reuben.

**CARRIED**

**1.2 Welcome and Introductions**

An opportunity was provided for introductions for all present.

**1.3 Register of Interests**

The following updates to the Register of Interest were advised by members:

Although not to be included in the Register of Interests, Councillor Tim Fulton wished to declare that he had been contracted to write a book on the Central Plains Water Scheme. Although this was out of the Waimakariri District, he wanted to advise his involvement with this.

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

**2.1 Lucy Barltrop, Waimakariri Biodiversity Trust**

L Barltrop provided the Committee with an overview of the Waimakariri Biodiversity Trust's (The Trust) background. The Trust was formed following Waimakariri Water Zone Committee discussions regarding the lack of assistance there was for members of the community to protect and enhance indigenous biodiversity on a voluntary basis. The Trust had gained charitable status in mid-2022 and had eight Trustees with J Lindsay-Roper as chairperson. The Trust received establishment funding from the Council's Land and Water Committee of \$20,000 and \$5,000 from Environment Canterbury's Zone Committee. It had also received an additional \$20,000 from the

Council's Utilities and Roading Committee for operational costs and Zone Committee project funding. The Trust had a vision and purpose to see vibrant, healthy, connected, indigenous ecosystems valued across the Waimakariri District and 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. The Trust had worked with Compass FM and the media and were building relationships with existing groups such as the Ashley Rakahuri Rivercare Group, the Hurunui Biodiversity Trust, Waimakariri Irrigation Limited, Waimakariri District Council and Environment Canterbury.

L Bartrop provided the Committee with an overview of the current projects the Trust was working on which included working with Rangiora High and Daiken on a wetland area, running the Winter Series 2, assisted with the Fernside Wetland and Hunter Stream initiatives, working with EnviroSchools, Waimakariri Irrigation Limited, Kaiapoi East Residents Association and the Trust had also submitted an application to the Waitaha Action to Impact Fund to hopefully restore a pond in Waikuku Beach.

### 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 Cooke

**THAT** the CWMS Waimakariri Zone Committee

- (a) **Agrees** that Section 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**

#### 3.1 CWMS Action Plan Budget 2023/24 – M Griffin (CWMS Facilitator-Waimakariri)

C Latham presented this report which requested approval for applications to the Zone Committee's Canterbury Water Management Strategy Action Plan budget for the 2023/24 financial year. Over the last six months, Committee members had visited most of these projects, where possible, to understand how these would align with the Committee's vision and action plan.

In total the Committee received 12 applications however three projects were declined as they did not align as well with the Committee's 2021-24 Action Plan priorities.

C Latham requested clarification regarding the Hunters Stream application and was assured that though the project was now to be staged the catchment component of the project would be completed.

Councillor Fulton queried whether the Lees Road projects were interlinked and was told that the projects were all self-contained and did not rely on the other surrounding projects to achieve their aims.

Moved: R Gill-Clifford

Seconded: M Jolly

**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: J Cooke

Seconded: Councillor Fulton

**THAT** the CWMS Waimakariri Zone Committee:

(b) **Approves** its support for the project initiatives based on the remaining \$66,000 available of the \$75,000 CWMS Action Plan Budget allocated for each CWMS Water Zone for the 2023/24 financial year.

1. Bittern Inanga Rushland – Air Charter Queenstown \$15,000.
2. Hunters Stream – J & G Freeman \$5,285.
3. Ketchum Cottage – A Wilson \$7,210.
4. O’kair Lagoon – J Wakeman & M Stewart \$15,000.
5. Pohio Wetland – N Auld \$11,700.
6. Riparian enhancement project – Whiterock Mains \$6,000.
7. Sefton Saltwater Creek Catchment Group Yr3 monitoring \$2,805.
8. Waimakariri Biodiversity Working Group – Environmental Awards \$3,000.

**CARRIED**

### 3.2 Wai Connection – Update – M Griffin (CWMS Facilitator, ECan)

J Halsey, Engagement Services Manager / Wai Connection Waitaha Regional Manager for EOS Ecology, was in attendance to update the Committee via a PowerPoint presentation (Trim Ref: 240507072176) on the Wai Connection programme underway across Canterbury and in the Waimakariri specifically.

J Halsey gave a brief background on how Wai Connection was set up to support local catchment groups by providing project support which included planning and network support, training, project reporting and guidance to provider organisations. They could also offer support on technical or scientific matters such as science-focused catchment information, project website and resources, community-based monitoring and data website and developing additional community-based monitoring programmes.

Canterbury had been divided into three areas namely North, Mid and South project regions with their own EOS Ecology 'Wai Connection Catchment Co-ordinator'. A successful Canterbury regional hui was held on Monday 18 September 2023 at Dunsandel Community Centre.

C Latham queried if the Waimakariri catchment map series work undertaken included the Ashley River and was told that the Ashley may be included at a later stage, however the current focus was the Waimakariri River and Waimakariri plains. C Latham also asked what the catchment mapping resource included and was informed that it was a high level document which did not focus on details however was a useful tool for catchment groups as a starting point.

Councillor McKay queried when funding for Wai Connection ran out and was informed that EOS Ecology had funding until June 2025. The focus was currently on community days, education and for the catchment groups to take ownership of the project. The project was also aligned with Environment Canterbury's (\*ECan) priorities and the team worked with ECan scientists to ensure there were no conflicts.

Councillor Fulton noted the comment regarding working collaboratively with ECan's scientists querying how community data would be accepted by ECan. J Halsey noted

that community groups had been collecting data for many years and she and ECan were working on how to include this valuable resource with ECan's official data. New Zealand Landcare Trust were assisting with this part of the project.

C Latham noted that she had been involved in the Saltwater Creek Catchment Group for some time and asked what assistance this group could expect. J Halsey noted that currently they had funding for 15 groups which were already identified but encouraged other groups not included in the project to attend community days and education sessions. She noted that the Saltwater Creek Catchment Group was included on their list for Canterbury and the group would be receiving further information at a later stage.

The Chairperson thanked J Halsey for her presentation.

Moved: Councillor McKay

Seconded: C Aldhamland

**THAT** the CWMS Waimakariri Zone Committee:

- (a) **Receives** the update for information and with consideration to the committee's CWMS Action Plan priorities.

**CARRIED**

### 3.3 Te Tiriti Training – Presentation – M Griffin (CWMS Facilitator, ECan)

R Gill-Clifford gave a presentation (Trim Ref: 240507072181) on her attendance to the Te Tiriti training she undertook in October 2023, noting that Te Tiriti o Waitangi was Contra Proferentum and a founding document of the country. By being 'Contra Proferentum' indicated that when dealing with the Treaty the indigenous language took precedence over English.

R Gill-Clifford stated that the training had a profound effect on her and her understanding of the history of the country, noting that there were big and small actions that pākehā could take to honour the treaty that could be done on a daily basis. It was important to apply Te Tiriti, pay careful attention to relationships above all else. R Gill-Clifford requested Committee members to comment on what this presentation had meant.

M Jolly agreed with R Gill-Clifford that she felt conflicted and guilty for the damage done however the feelings themselves were unhelpful. She believed that to be hopeful of a better relationship between all who lived in New Zealand would be a better reaction.

Councillor Fulton stated that the presentation was very thought provoking and to understand the cultural differences and understanding of phraseology which had led to misunderstanding throughout the years.

M Griffin noted that the next training course was scheduled for 11<sup>th</sup> and 12<sup>th</sup> June and queried if any of the Committee would like to attend. C Aldhamland asked if she could attend.

The Chair thanked R Gill-Clifford for her presentation.

Moved: M Jolly

Seconded: E Harvie

**THAT** the CWMS Waimakariri Zone Committee:

- (a) **Receives** this update for information.

**CARRIED**

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

##### 4.1 **Zone Committee Working Groups.**

- *Biodiversity Working Group – M Jolly*  
Evolved this year since we have successfully applied for Action Plan funding once again to host the Zone Committee Environmental Awards in 2024, Thank you. As with the inaugural awards in 2023 we aim as a committee to celebrate environmental champions within the Zone. Applications for the awards will go live early June, with judging proceeding from August onwards. We intend to combine the awards with the Mayoral Community Awards in October (date TBC). The Working Group is also supporting the Monitoring Group an upcoming soil and Water Health Workshop to be held on 9<sup>th</sup> July with providing free nitrate testing during the evening.

Many thanks to Lincoln Agritech for providing us with a GW50 nitrate sensor at no charge for use on the night.

- *Lifestyle Working Group – C Latham*  
Top Ten leaflets had been distributed through rural real estate brokers and were well received, however the pamphlet required wider distribution than currently it was getting. The Waimakariri Biodiversity Group held a Workshop on Unlocking Nature on Your Land which included the top ten tips among other topics. Feedback on the tips was positive.

There was a query if any of the other districts had something similar to the top ten tips and M Griffin noted that Selwyn District Council had shown interest and there was discussion regarding the possibility of adapting the pamphlet to be regional.

- *Monitoring Working Group – E Harvie*  
Acknowledged the presentation by Wai Connect and gave a brief update on the monitoring and collation of the information which will be released in the next few months.

Nitrate testing - There was a query regarding the hiring of a nitrate testing device in the near future and E Harvie agreed that there was budget for this however there were ongoing discussions on how best to manage the drop-in session with a suggestion that Wai Connect give a presentation so residents samples could be tested during the presentation to ensure that there was less waiting around for results. M Griffin suggested that there should be clarity on whether here was a demand for further testing of the community's water supplies and that consideration be given to including a scientist to attend the session to give information to residents on the test results. This had proved very popular at the Mandeville drop-in session. It was also suggested that the session be very explicit in that the testing was for nitrates and not E.coli or other contaminants.

Councillor McKay urged the Committee to keep discussions with WDC current in relation to any testing of water.

##### 4.2 **Waimakariri CWMS 2021-2024 Action Plan Review.**

M Griffin noted that the 2021-2024 Action Plan had been reviewed last year and noted that the current version was due to expire in June 2024 and he believed that there was not much that had changed, however this was an opportunity for the Committee to decide if there should be any changes made to this action plan. A new plan would be developed for the new long term plan term.

The Committee agreed to let the current version stand with an option to review later in the year via a workshop, once the outcome of the Zone Committee review was known.

#### 4.3 **Environment Canterbury Updates.**

Councillor McKay noted the Memo from A Parrish on the Regional Policy Statement which was likely to be released in June or July of this year.

She also gave a brief update on the LTP hearings and process. The Council agenda for the Council meeting included ECan submissions on central government reforms.

#### 4.4 **Waimakariri District Council Updates.**

1. Eastern Districts Sewer Scheme 2022-23 compliance report (forwarded to the WWZC from Utility and Roading (U&R) Committee – see attached report supplied by Kalley Simpson)
2. Avian Botulism report 2022-23 (forwarded to the Waimakariri Water Zone Committee from U&R Committee – see attached report).  
The only thing to add to this report is a comment from Sophie Allen that a 2023-24 report would be written sometime in the coming months by Sophie, with a review of science and how the 2023-24 season went. She said “there was only a minor outbreak this year that was at the Kaiapoi Wastewater Treatment Plant, but only low bird deaths at other WDC Waste Water Treatment Plants that might have been avian botulism or other causes”.
3. Cam River Enhancement Report. A comment to add to the progress of the projects in the report was that they had been delayed for implementation. WDC carried out consultation with Ngai Tuahuriri following a request from Mahaanui Kurataiao Ltd earlier in the year. Some projects would happen in the next few months, a few would now be in 2024-25, and one fencing and planting project on private land had the landowner pull out.
4. Natural Environment Strategy - There had been some good support for the NES from the LTP consultation in terms of the majority of people supported the preferred option (all actions funded) but there had also been submissions which discussed the need to halt work in the biodiversity space. This had been related to the government’s instruction to stop work on the SNAs. We are yet to see which option the Council would adopt.
5. The Stormwater Network Discharge Consents for Oxford, Woodend and Kaiapoi should be granted shortly, as a commencement date of 1 May 2024 was agreed by WDC and ECan. An annual report for the Rangiora stormwater network discharge consent CRC184601 and annual water quality report for 2022-23 had been sent to ECan and would be presented to U&R Committee in June, with circulation shortly afterwards to the WWZC.
6. There was collaboration between Greenspace, Waimakariri Biodiversity Trust, Canterbury Museum, Lincoln University and Wildlands in delivering a successful series of iNaturalist events across the District at the end of April. There were three mini BioBlitz, a nighttime critter event and a bird event at the Ashley/Rakahuri.
7. Arohatia te Awa (Cherish the River) – This programme of work has had a restart following a period of inactivity. An increased scope of projects now included beyond the Cam Ruataniwha River to the Lineside Road wetland area, and scoping of projects in the Ohoka Stream, Courtenay Stream and elsewhere.
8. Nitrates – A Greenpeace event in Rangiora on the 21 April netted about 250 attendees who wished to test the nitrate levels in their drinking water. Some samples were brought in from WDC community drinking water supplies, which showed slightly different results than what is published by WDC – this was likely due to testing methods, and natural variation in nitrate levels over time (e.g. annual cycles). Greenpeace had questioned the Maximum Allowable Value in the drinking water standards from research that it could lead to a slightly lower birth weights in infants if it is over 5 mg/L Nitrate-Nitrogen. Greenpeace sent a letter to Te Whatu Ora, naming the Oxford supply (incorrectly named as the Oxford town supply, when it is the Oxford No.1 Rural supply) as over 5 mg/L Nitrate-Nitrogen. Regular WDC testing through an IANZ accredited lab shows that the Oxford No. 1 Rural supply average is under 5 mg/L (except for one sample that was just over 5mg/L). A report would likely come to WWZC in July regarding the private well study results from the spring 2023 sampling round which will also examine new research regarding nitrate effects on health.

Here are links for the nitrate item:

<https://www.greenpeace.org/aotearoa/press-release/elevated-levels-of-nitrate-contamination-found-in-canterbury-drinking-water/>

<https://www.greenpeace.org/aotearoa/press-release/letter-to-te-whatu-ora-ecan-calls-for-response-to-high-nitrate-in-canterbury-drinking-water/>

1. Coffman VR, Jensen AS, Trabjerg BB, Pedersen CB, Hansen B, Sigsgaard T *et al.* Prenatal exposure to nitrate from drinking water and markers of fetal growth restriction: A population-based study of nearly one million Danish-born children. *Environmental Health Perspectives*. 2021;129(2):027002. <https://doi.org/10.1289/EHP7331>
2. Sherris Allison R, Baiocchi M, Fendorf S, Luby Stephen P, Yang W, Shaw Gary M. Nitrate in Drinking Water during Pregnancy and Spontaneous Preterm Birth: A Retrospective Within-Mother Analysis in California. *Environmental Health Perspectives*. 2021;129(5):057001. <https://doi.org/10.1289/EHP8205>
3. From <https://www.phcc.org.nz/briefing/nitrate-contamination-drinking-water-and-adverse-birth-outcomes-emerging-evidence>

The reports for information in item 6 of the agenda were taken as read.

#### 4.5 **Action points from the previous Zone Committee meetings.**

M Griffin noted the following had been received in response to E Harvie's query on an update from the planning &/or consents section in relation to meeting the timeframe for policy 8.4.36 of the Canterbury Land and Water Regional Plan.

To clarify: *Policy 8.4.36 – Assist with achieving the freshwater outcomes by: (a) reviewing, by 31 December 2024, all surface water and stream depleting groundwater permits within the Ashley River/Rakahuri Freshwater Management Unit that have a direct or high stream depletion effect, and by implementing the environmental flow and allocation regimes in Table 8c on all reviewed permits and any new permits granted.*

*“The Canterbury Regional Council is currently undergoing its long-term planning process, in which it will set its budget and work programme priorities for the next ten years. Funding for consent reviews will be a consideration within that budgeting. Until we know the outcome of that process, we are not planning on beginning a consent review in the Rakahuri catchment.”*

Councillor McKay noted that she was still awaiting a response from the ECan Rivers Team regarding the spraying of Willows as raised by M Bates.

Moved: E Harvie

Seconded: Councillor Fulton

**THAT** the CWMS Waimakariri Zone Committee:

**CARRIED**

(a) **Receives** these updates for information.

Moved: Councillor McKay

Seconded: M Jolly

**THAT** the CWMS Waimakariri Zone Committee:

- (b) **Agrees** that the current CWMS Action Plan stand with the option to review later in the year.

**CARRIED**

**5. CONFIRMATION OF MINUTES**

**5.1 Minutes of the Canterbury Water Management Strategy Waimakariri Zone Committee Meeting – 4 March 2024**

Moved: J Cooke

Seconded: C Aldhamland

**THAT** the CWMS Waimakariri Zone Committee:

- (a) **Confirms** the Minutes of the Canterbury Water Management Strategy Waimakariri Zone Committee meeting, held on 4 March 2024, as a true and accurate record.

**CARRIED**

**6. GENERAL BUSINESS**

**KARAKIA**

C Aldhamland provided a karakia to close the meeting.

**NEXT MEETING**

The next meeting of the CWMS Waimakariri Water Zone Committee is scheduled for Monday 1 July 2024 at 4pm.

There being no further business, the meeting closed at 6.10pm.

CONFIRMED

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Chairperson  
Carolyne Latham

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Date

**WAIMAKARIRI DISTRICT COUNCIL**

**REPORT FOR INFORMATION**

**FILE NO and TRIM NO:** SEW-12 / 231003156382

**REPORT TO:** UTILITIES AND ROADING COMMITTEE

**DATE OF MEETING:** 17 October 2023

**AUTHOR(S):** Caroline Fahey, Water & Wastewater Asset Manager

**SUBJECT:** Eastern Districts Sewer Scheme and Oxford Wastewater Treatment Plant  
Annual Compliance Monitoring Reports 2022 – 2023

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

	_____	_____
	General Manager	Chief Executive

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**1. SUMMARY**

- 1.1. The purpose of this report is to update the Utilities and Roading Committee on the consent compliance performance of the Eastern District Sewer Scheme (EDSS) and Oxford Sewer Scheme for the 2022-2023 reporting year (1 July 2022 to 30 June 2023).
- 1.2. The Eastern District Sewer Scheme (EDSS) Ocean Outfall operates under resource consent CRC041162.2, in conjunction with various other consents that enable the wastewater schemes operation. Consent compliance for monitoring data of this nature is determined on two levels:
  - Has the frequency of monitoring met the consent requirements
  - Does the monitoring data comply with any numerical limits specified in the consent conditions
- 1.3. Full compliance was achieved for all EDSS consent conditions during the 2022-2023 monitoring period.
- 1.4. The Oxford Sewer Scheme is operated under three Canterbury Regional Council (CRC) resource consents being CRC961013, CRC144561 and CRC184787. These consents do not require an annual compliance report however a report has been prepared as good practice.
- 1.5. Full compliance was not achieved for the Oxford Sewer Scheme consent conditions during the 2022-2023 monitoring period. The main reasons for non-compliance relate to the lack of monitoring data to clearly demonstrate that the depth limit for effluent application at the irrigation field had been achieved, and exceedance of consent limit for faecal coliform level for 2 effluent samples taken.
- 1.6. In order to resolve these issues, staff are working to get the western irrigator (Irrigator 2) connected to SCADA and to install additional flow monitoring equipment at the Oxford Irrigator site which will improve monitoring data collection to demonstrate compliance with the depth limit for effluent application at the irrigation field. Additionally, the UV equipment at the treatment plant has been replaced and operational procedures improved to address the faecal coliform limit exceedance.

- 1.7. Environment Canterbury (ECan) are currently reviewing the Annual Compliance Monitoring Reports for the 2022-2023 period. A compliance report will be issued by ECan following the completion of their review.

Attachments:

- i. Eastern Districts Sewer Scheme – Annual Compliance Monitoring Report 2022-2023 (TRIM 230718108139)
- ii. Oxford Sewer Scheme – Annual Compliance Monitoring Report 2022-2023 (TRIM 230913142543)

## 2. **RECOMMENDATION**

**THAT** the Utilities and Roothing Committee:

- (a) **Receives** Report No.
- (b) **Notes** that full compliance was achieved for all of the Eastern District Sewer Scheme (EDSS) Ocean Outfall consent conditions during the 2022-2023 monitoring period.
- (c) **Notes** that the Eastern Districts Sewer Scheme – Annual Compliance Monitoring Report 2022-2023 is currently being reviewed by Environment Canterbury.
- (d) **Notes** that although not required, the Oxford Sewer Scheme - Annual Monitoring Report 2022-2023 was provided to Environment Canterbury as good practice.
- (e) **Notes** that the Oxford Sewer Scheme did not achieve full compliance for the 2022-23 monitoring period. There were two reasons why the scheme did not achieve full compliance, one was due to lack of monitoring data to clearly demonstrate that the depth limit for effluent application at the irrigation field had been achieved, and the other was due to the exceedance of consent limit for faecal coliform level for 2 effluent samples taken.
- (f) **Notes** that staff are working on getting Irrigator 2 (western irrigator) connected to SCADA and installing additional flow monitoring equipment at the Oxford Irrigator site which will improve monitoring data collection to demonstrate compliance with the depth limit for effluent application at the irrigation field. Once this work is complete, the scheme is expected to be fully compliant.
- (g) **Notes** that UV equipment at the treatment plant has been replaced and operational procedures are being improved to address the faecal coliform limit exceedance.
- (h) **Circulates** this report to all Community Boards for their information.
- (i) **Circulates** a copy of this report to Te Ngāi Tūāhuriri Rūnanga, Te Kōhaka o Tūhaitara Trust and Waimakariri Water Zone Committee for their information.

## 3. **BACKGROUND**

- 3.1. The purpose of this report is to update the Utilities and Roothing Committee on the consent compliance performance of the Eastern District Sewer Scheme and Oxford Sewer Scheme for the 2022-2023 reporting year.

### **Eastern District Sewer Scheme**

- 3.2. The treatment facilities at the Rangiora, Kaiapoi, Woodend and Waikuku Beach Wastewater Treatment Plants (WWTP's) discharge into a pipeline (the Ocean Outfall), that discharges into Pegasus Bay between Pines/Kairaki Beach and Woodend Beach. These treatment plants and the Ocean Outfall comprise the Eastern Districts Sewer Scheme (EDSS). Figure 1 below geographically describes the scheme. The EDSS operates under a number of resource consents from the Canterbury Regional



Council. The focus of this report is CRC041162.2, the consent that authorises the discharge of treated effluent into the coastal marine environment from the Ocean Outfall.

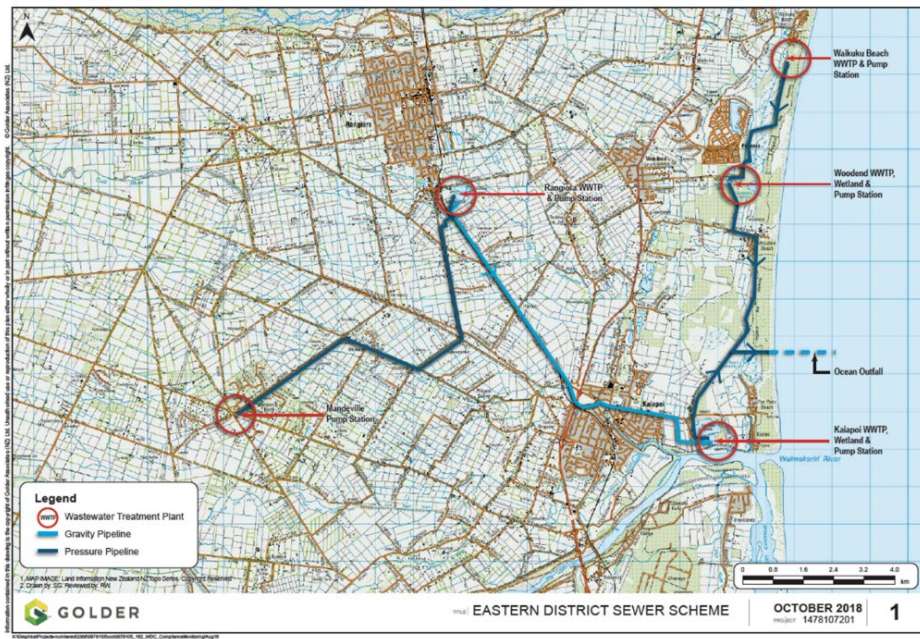


Figure 1: Eastern District Sewer Scheme Map

**Oxford Sewer Scheme**

3.3. The Oxford Sewer Scheme operates a wastewater treatment plant (WWTP) at Oxford, which serves approximately 900 properties. The WWTP is located on the north side of the Eyre River on High Street with an irrigation disposal field location on the south side of the Eyre River on Woodstock Road. Figure 2 below describes these locations geographically.

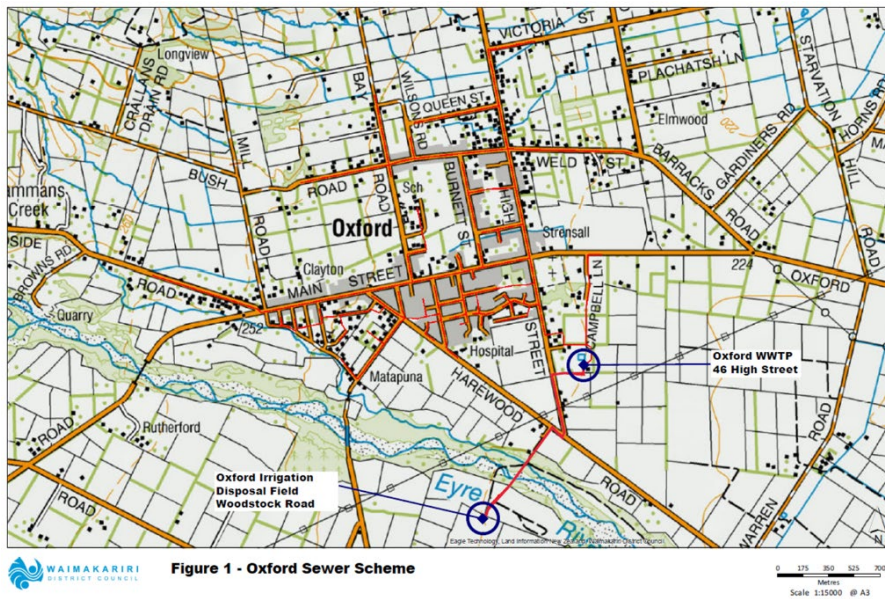


Figure 2: Oxford Sewer Scheme Map

**4. ISSUES AND OPTIONS**

**4.1. Eastern District Ocean Outfall**

4.1.1. Table 1 provides a summary of compliance for each consent utilised to operate the Eastern Districts Ocean Outfall. Full compliance was achieved for all the consents for the 2022/23 monitoring period.

*Table 1: Summary of Eastern District Ocean Outfall Consent Compliance 2022/23*

Consent	Activity	Compliance
<b>CRC041162.2</b>	To discharge treated sewerage effluent into coastal marine area from sub-aqueous ocean outfall	Full compliance
<b>CRC041049</b>	To discharge treated sewage effluent to the infiltration wetland and to ground water via seepage at the Kaiapoi WWTP	Full compliance
<b>CRC168391</b>	To discharge treated sewage effluent via seepage onto land (Woodend)	Full compliance
<b>CRC145027</b>	To discharge dewatered sludge removed from a wastewater pond to land (Rangiora)	Full compliance
<b>CRC031724</b>	To discharge groundwater from subsoil drains into the marine area of Jockey Baker Creek	Full Compliance (no discharge)
<b>CRC168388</b>	To discharge contaminants to air (Woodend)	Full Compliance
<b>CRC950610</b>	To discharge contaminants to air (Kaiapoi)	Full Compliance
<b>CRC962560</b>	To discharge contaminants to air (Waikuku)	Full Compliance
<b>CRC030917</b>	To discharge contaminants, via seepage, from Rangiora STP to land	Full Compliance
<b>CRC041163</b>	For the erection, placement and maintenance of an ocean outfall pipeline and temporary structures, including a trestle structure and sheet piling for the purpose of constructing an ocean outfall, within the coastal marine area	Full Compliance
<b>CRC154176</b>	To discharge contaminants to land (Kaiapoi)	Full Compliance
<b>CRC168390</b>	To use land for storing, treating and discharging human effluent (Woodend)	Full Compliance
<b>CRC173124</b>	To discharge contaminants (odour) to air (Rangiora)	Full Compliance

#### 4.1. Oxford Sewer Scheme

4.1.1. Table 2 provides a summary of compliance for each consent utilised to operate the Oxford Sewer Scheme.

*Table 2: Summary of Oxford Sewer Scheme Consent Compliance 2022/23*

Consent	Activity	Compliance
<b>CRC961013</b>	To discharge contaminants to air	Fully compliant
<b>CRC144561</b>	Land use consent for the establishment of a sewage storage basin	Fully compliant
<b>CRC184787</b>	To discharge contaminant into land to water	Non-compliant, lack of SCADA data for Irrigator 2 overstates the effluent to land application depth

through Irrigator 1; high faecal coliform spikes in July and January during the 2022/23 year likely due to issues with the UV disinfection unit (one faulty unit was however replaced on 8/9/22).

#### 4.1. **Oxford Sewer Scheme non-compliances**

##### 4.1.1. **Irrigator Issues**

- 4.1.2. Condition 13 – Unable to demonstrate that the depth of effluent application was not exceeded due to lack of monitoring data from Irrigator 2 (western irrigator) overstating of the depth of effluent application by Irrigator 1 (eastern irrigator).
- 4.1.3. Irrigator 2 was damaged in early 2021 due to a strong wind event and was only replaced in September 2022. Between the period of June 2022 and September 2022, a temporary irrigation system using k-lines was deployed to apply effluent to the western irrigation field. There was only monitoring data available for Irrigation 1 to calculate the depth of effluent application during this monitoring period. Staff had difficulty getting support from the irrigator supplier to assist with getting Irrigator 2 connected to SCADA which led to monitoring data being unavailable.
- 4.1.4. Staff are working on getting the western irrigator (Irrigator 2) connected to SCADA and to install additional flow monitoring equipment at the Oxford Irrigator site which will improve monitoring data collection to demonstrate compliance with the depth limit for effluent application at the irrigation field. Once this work is complete, the scheme is expected to be fully compliant.

##### 4.1.5. **Faecal Coliform Limit Exceedance**

- 4.1.6. Condition 4 – Faecal Coliform Bacterial concentration exceeded the 500cfu/100ml limit for 2 samples taken in July 2022 and January 2023.
- 4.1.7. For the July sample this was due to operational issues with the UV units and the plant operators observed a poor quality of effluent at this time. One known faulty UV unit was replaced and recommissioned on 8/9/2022, therefore it is expected that higher compliance should be achieved from that date onwards. There were no clear operational issues causing the high January 2023 sample however results following the exceedance on that date were compliant. Operational improvement are being made to sample data collection by using the Infrastructure Data app which will provide better operational records going forward.

#### **Implications for Community Wellbeing**

- 4.2. Despite non-compliances there are no known implications on community wellbeing by the issues and options that are the subject matter of this report.
- 4.3. The Management Team has reviewed this report and support the recommendations.

## 5. **COMMUNITY VIEWS**

### 5.1. **Mana whenua**

- 5.2. Te Ngāi Tūāhuriri hapū may be interested in the findings of the Ocean Outfall Compliance Report 2022/23, due to their relationship with the coastal area used for kai moana/mahinga kai gathering. At the recent WDC-Runanga joint meeting it was mentioned that a cultural monitoring plan would be developed in conjunction with Mahaanui Kurataio Limited for our

wastewater operations. The recommendations of this report include circulation of this report and the attachments to Te Ngāi Tūāhuriri Rūnanga for their information.

5.3. **Groups and Organisations**

5.4. Council staff meet regularly with residents adjacent to the Woodend WWTP, who are interested in operations and performance of this plant. A copy of the Annual Compliance Monitoring Report can be made available to them for information purposes.

5.5. There have also been a number of members of the public who have been interested in the performance of the Kaiapoi WWTP and have raised concerns in the past with the Waimakariri Zone Committee. A copy of the Annual Compliance Monitoring Report will be made provided to Waimakariri Zone Committee for information purposes.

5.6. Te Kōhaka o Tūhaitara Trust manages the Tūhaitara Coastal Park where the ocean outfall is located.

5.7. There are no other groups and organisations likely to be affected by, or to have a direct interest in the subject matter of this report. There has been no discussions or consultation with any group as part of this compliance monitoring report.

5.8. **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**

6.2. There are not financial implications of the decisions sought by this report. However it should be noted that on-going non-compliances can result in increased monitoring costs and action being taken against the Council (i.e. abatement notice). Such instances can result in loss of confidence from the public as well as adverse effect to Council's reputation. Approximately \$100,000 is being allowed for in the budgets for monitoring of the Ocean Outfall.

6.3. Once the work to connect Irrigator 2 (western irrigator) to SCADA and additional flow monitoring equipment have been installed at the Oxford Irrigator site, the scheme is expected to be fully compliant. There is existing budget to complete this work.

6.4. **Sustainability and Climate Change Impacts**

6.5. The recommendations in this report do not have sustainability and/or climate change impacts.

6.6. **Risk Management**

6.7. There are not risks arising from the adoption/implementation of the recommendations in this report.

6.8. **Health and Safety**

6.9. There are not health and safety risks arising from the adoption/implementation of the recommendations in this report.

**7. CONTEXT**

7.1. **Consistency with Policy**

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

7.3. **Authorising Legislation**

7.4. Not applicable.

7.5. **Consistency with Community Outcomes**

7.6. The Council's community outcomes are relevant to the actions arising from recommendations in this report. Managing the Council's Eastern Districts Sewer Scheme and Oxford Wastewater Scheme in a manner that is compliant with our Canterbury Regional Consents ensures;

- There is a safe environment for all, and
- Core utility services are provided in a timely, sustainable, and affordable manner

7.7. **Authorising Delegations**

7.8. This report is for information only as the compliance reports have already been submitted to Environment Canterbury for review, therefore no actions requiring delegated authority are recommended.



**REPORT**

**Eastern Districts Sewer Scheme – Annual Compliance  
Monitoring Report 2022 - 2023**

**Waimakariri District Council**

3 October 2023

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## LIST OF ABBREVIATIONS AND UNITS

ammoniacal-N	ammoniacal nitrogen
BODs	five-day biochemical oxygen demand
°C	degrees Celsius
cfu/100 mL	colony forming units per 100 millilitres
CRC	Canterbury Regional Council
DIN	dissolved inorganic nitrogen
DO	dissolved oxygen
DRP	dissolved reactive phosphorus
EDSS	Eastern Districts Sewer Scheme
EDS	Eastern Districts Sewer
<i>E. coli</i>	<i>Escherichia coli</i>
ESR	Institute of Environmental Science and Research
g/m <sup>3</sup>	grams per cubic metre
iu	infectious units
km	kilometre
LOESS	local polynomial regression fitting
L/s	litres per second
MDL	method detection limit
m	metres
mL	millilitres
m <sup>3</sup>	cubic metres
m <sup>3</sup> /day	cubic metres per day
N	number of samples
nitrate-N	nitrate nitrogen
NIWA	National Institute of Water and Atmospheric Research
PCB	polychlorinated biphenyls
PAH	polycyclic aromatic hydrocarbons
pfu	plaque forming units
SCADA	supervisory control and data acquisition

TN	total nitrogen
TP	total phosphorus
TSS	total suspended solids
UV	ultraviolet
WDC	Waimakariri District Council
WWTP	wastewater treatment plant

## 1. INTRODUCTION

### 1.1. Background

Waimakariri District Council (WDC) operates wastewater treatment plants (WWTPs) at Rangiora, Kaiapoi, Woodend and Waikuku Beach, located in the eastern part of the district. In 2006, the treatment facilities at each WWTP were upgraded, with the flows from these four locations combined for discharge to the coastal marine environment via an ocean outfall located in Pegasus Bay. The upgraded system and ocean outfall, shown in Figure 1, is known as the Eastern District Sewer Scheme (EDSS).

The EDSS operates under a number of resource consents from Canterbury Regional Council (CRC) also known as Environment Canterbury (ECan), which are listed in Table 1 along with their respective reporting requirements and level of compliance for the 2022/23 monitoring year.

**Table 1: Eastern District Sewer Scheme Resource Consents**

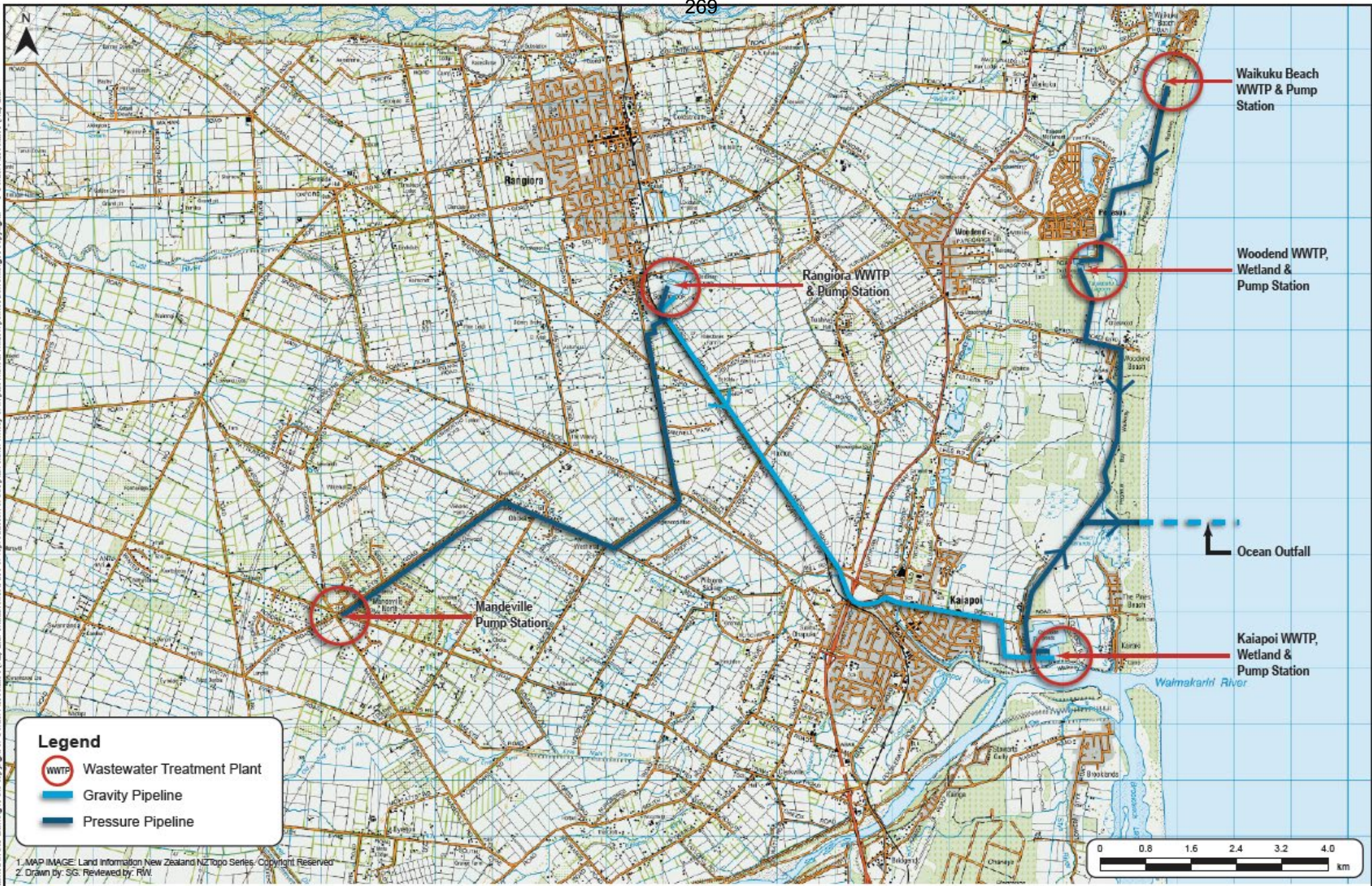
Consent	Activity	Reporting	Compliance
<b>CRC041162.2</b>	To discharge treated sewerage effluent into coastal marine area from sub-aqueous ocean outfall	Refer to Section 2.0 of this report	<b>Full compliance</b>
<b>CRC041049</b>	To discharge treated sewage effluent to the infiltration wetland and to ground water via seepage at the Kaiapoi WWTP	Refer to Section 3.0 of this report	<b>Full compliance</b>
<b>CRC168391</b>	To discharge treated sewage effluent via seepage onto land (Woodend)	Refer to Section 4.0 of this report	<b>Full compliance</b>
<b>CRC145027</b>	To discharge dewatered sludge removed from a wastewater pond to land (Rangiora)	Refer to Section 6.0 of this report	<b>Full compliance</b>
<b>CRC031724</b>	To discharge groundwater from subsoil drains into the marine area of Jockey Baker Creek	Refer to Section 5.0	<b>Full Compliance (no discharge)</b>
<b>CRC168388</b>	To discharge contaminants to air (Woodend)	No reporting required No events to report	<b>Full Compliance</b>
<b>CRC950610</b>	To discharge contaminants to air (Kaiapoi)	No reporting required No Events to Report	<b>Full Compliance</b>
<b>CRC962560</b>	To discharge contaminants to air (Waikuku)	No reporting required No events to Report	<b>Full Compliance</b>
<b>CRC030917</b>	To discharge contaminants, via seepage, from Rangiora STP to land	No reporting required	<b>Full Compliance</b>
<b>CRC041163</b>	For the erection, placement and maintenance of an ocean outfall pipeline and temporary structures, including a trestle structure and sheet piling for the purpose of constructing an ocean	No reporting required	<b>Full Compliance</b>

	outfall, within the coastal marine area		
<b>CRC154176</b>	To discharge contaminants to land (Kaiapoi)	No reporting required	<b>Full Compliance</b>
<b>CRC168390</b>	To use land for storing, treating and discharging human effluent (Woodend)	No reporting required	<b>Full Compliance</b>
<b>CRC173124</b>	To discharge contaminants (odour) to air (Rangiora)	Section 7.0	<b>Full Compliance</b>




## 1.2. Report Scope

The scope of this report fulfils the reporting requirements of consents issued to WDC by ECan for the purpose of managing and administering the EDSS, these include; CRC041162.2, CRC041049, CRC168391, CRC173124 and CRC145027. These consents require an annual monitoring report be submitted to Environment Canterbury. The reports are required to be submitted variously between 31 July and 31 August each year. However, a combined report for all five resource consents with a due date of 31 August has been agreed between WDC and ECan. Figure 1 below shows the location of the District Ocean Outfall pipeline and individual WWTP sites.

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**Legend**

-  Wastewater Treatment Plant
-  Gravity Pipeline
-  Pressure Pipeline

1. MAP IMAGE: Land Information New Zealand NZ Topo Series. Copyright Reserved  
2. Drawn by: SG. Reviewed by: RW



## 2. CRC041162.2 – DISCHARGE FROM OCEAN OUTFALL

### 2.1. Overview

Consent compliance for the period 1 July 2022 through to 30 June 2023 ('the monitoring period'), has been assessed by WDC. This report includes comparison with data reported in previous monitoring periods, where applicable, reported under the EDSS resource consents.

### 2.2. Condition 2 – Discharge Volume and Rate

Condition 2 states:

“The discharge shall not exceed a rate of 660 litres per second or 57,000 cubic metres per day.”

Discharge volumes to the ocean outfall were recorded by a supervisory control and data acquisition (SCADA) system, which transmits via a broadband connection to an InTouch data visualisation system. This system is more reliable than the radio link previously used to download outflow data. The meter is still read manually on at least a monthly basis to provide a backup data record in the event the SCADA system fails.

Daily discharge volumes for the 2022/23 period are plotted in Figure 2. Total discharge volumes did not exceed 32,000 m<sup>3</sup>/day and remained well below the consent limit. Data gathered since July 2022 is graphed in Figure 2. The maximum daily instantaneous discharge rates for the 2022/23 monitoring period are illustrated in Figure 3 below. The Ocean Outfall raw flow data is attached in APPENDIX D “Ocean Outfall Flow Analysis Figures” TRIM 230719109053.

The spike in outfall volumes during July 2022 shown in Figure 2 is a result of the heavy rainfall that Waimakariri experienced from 12 July until 3 August 2022.

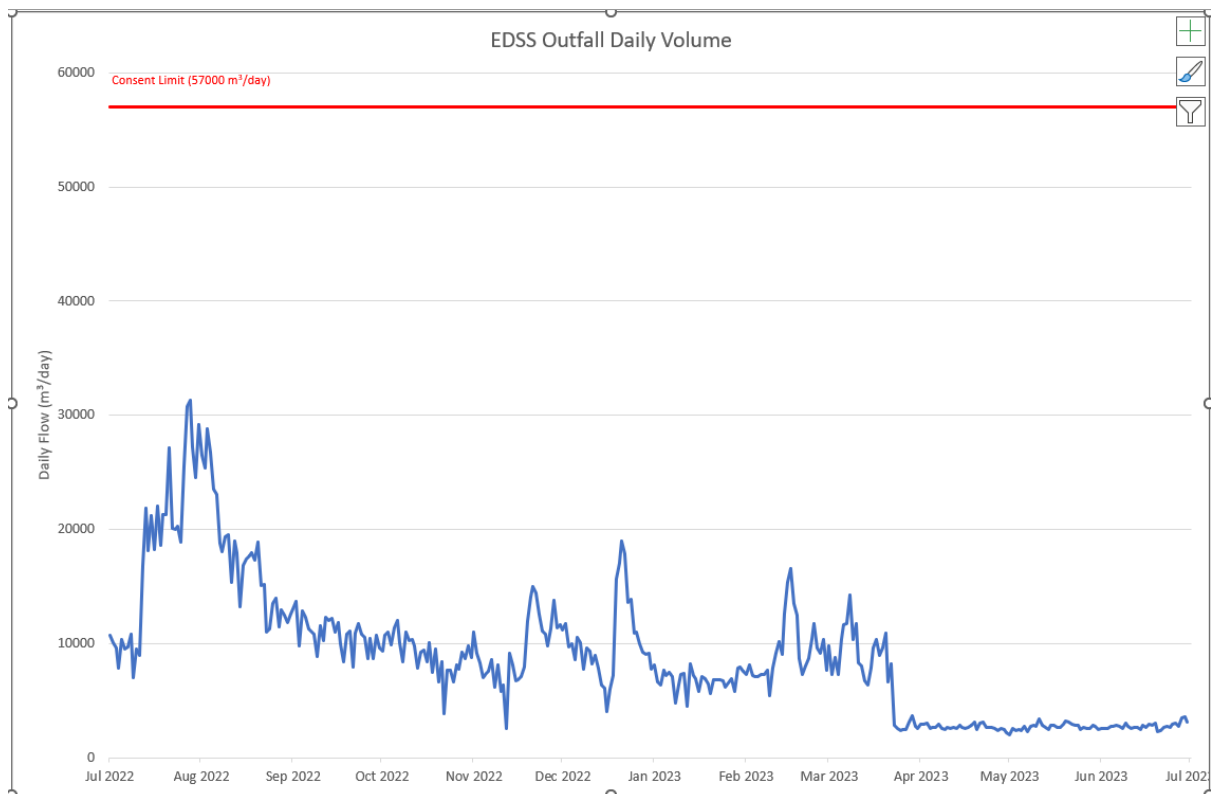


Figure 2. Daily discharge volumes to ocean outfall between July 2022 to June 2023

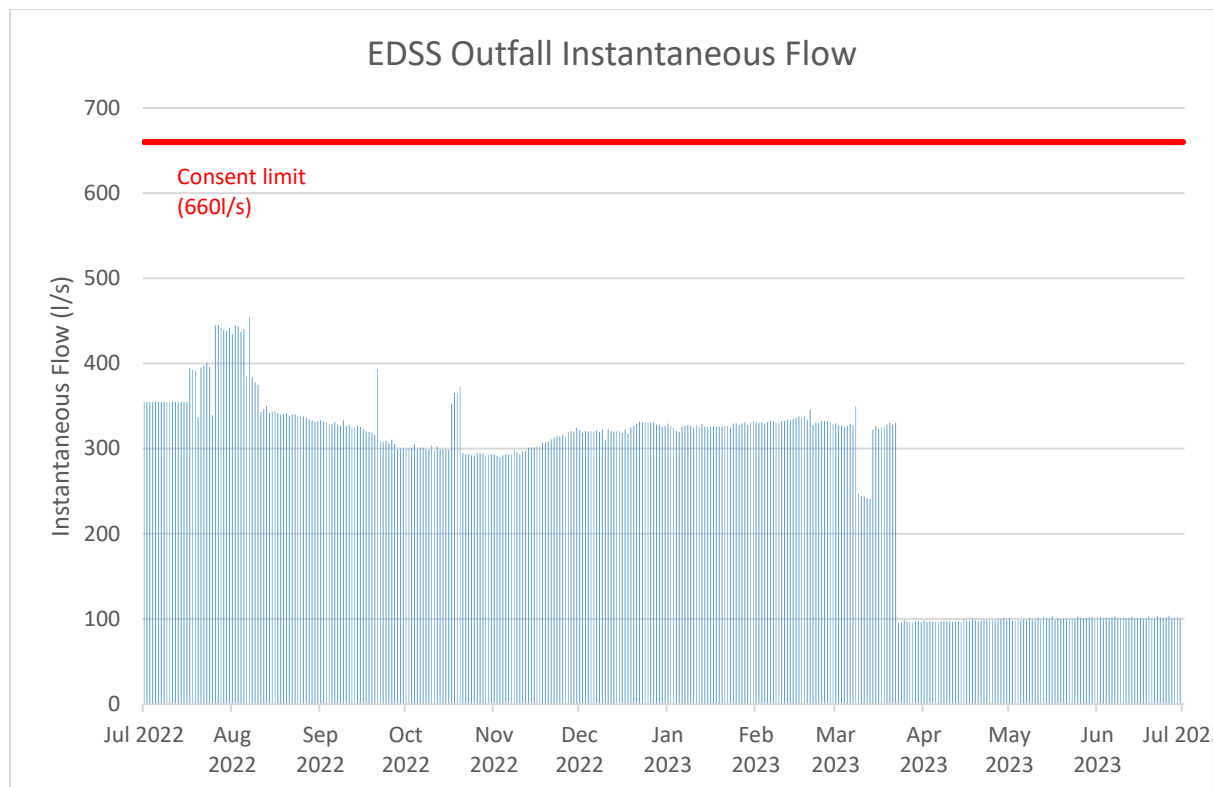


Figure 3: Maximum instantaneous daily discharge rate to ocean outfall between July 2022 and June 2023

Figures 2 and 3 show the ocean outfall daily discharge volume and instantaneous flow rates remained consistently below the consent limits of 57,000 m<sup>3</sup>/day and 660 L/s, respectively. As a result compliance with Condition 2 was met in full.

The above graphs show flow records reduced suddenly then remained relatively flat from 23 March 2023 onwards. This is the result of a flow meter recording issue at the Kaiapoi WWTP outflow meter which was fixed on 6 July 2023. From 23 March 2023 until 30 June 2023 data is only shown in the above graphs from the Woodend WWTP outflow with no outflow data included from Kaiapoi in the results shown in the graphs. Compliance with consent limits through this period is inferred, based on the preceding data.

The attached raw data sheets show several meter error data corrections in yellow highlight with notes explaining these corrections, where applicable (TRIM 230719109053 – Ocean Outfall Flow Analysis). Further explanation is provided within the attached email (Appendix E - email explanation of data corrections and meter errors TRIM 230720109120).

## 2.3. Conditions 9 – 12: Ocean Outfall Pipeline Discharge Quality

### 2.3.1. Overview of monitoring and compliance requirements

#### Condition 9

Condition 9 states the following:

*“A single grab sample shall be taken from the ocean outfall pipeline at the frequencies noted in this condition and the same shall be analysed for the identified contaminants at the frequencies noted for each contaminant. Report schedules shall be prepared recording the results of such analyses. Grab sample locations and the times at which the grab samples are taken shall be recorded and included in the reporting schedules. The consent holder shall retain the reporting schedules.*”

a) *Weekly*

- i. *pH -reported as pHunits*
- ii. *Dissolved oxygen - reported as % saturation*
- iii. *Temperature - reported as °C*
- iv. *Five-day biochemical oxygen demand - reported as g O/m<sup>3</sup>*
- v. *Filtered five-day biochemical oxygen demand - reported as g O/ m<sup>3</sup>*
- vi. *Total suspended solids - reported as g/ m<sup>3</sup>*
- vii. *Dissolved inorganic nitrogen - reported as g N/ m<sup>3</sup>*
- viii. *Ammoniacal nitrogen - reported as g N/ m<sup>3</sup>*
- ix. *Dissolved reactive phosphorus - reported as g P/ m<sup>3</sup>*
- x. *Faecal coliforms - reported as no./100ml*
- xi. *Enterococci - reported as no./100ml*
- xii. *Escherichia coli - reported as no./100ml.*

b) *Monthly*

- i. *Total phosphorus – reported as g P/ m<sup>3</sup>*
- ii. *Total nitrogen – reported as g N/ m<sup>3</sup>*

c) *Three monthly for the first two years and then six monthly thereafter*

- i. *Arsenic - reported as g/ m<sup>3</sup>*
- ii. *Cadmium - reported as g/ m<sup>3</sup>*
- iii. *Chromium - reported as g/ m<sup>3</sup>*
- iv. *Copper - reported as g/ m<sup>3</sup>*
- v. *Lead - reported as g/ m<sup>3</sup>*
- vi. *Nickel - reported as g/ m<sup>3</sup>*
- vii. *Zinc - reported as g/ m<sup>3</sup>*
- viii. *Mercury - reported as g/ m<sup>3</sup>*

*All metal analysis shall be for total metals only.*

d) *Three Monthly for the first two years and then annually thereafter*

- i. *Human Enterovirus. (no./10l)*
- ii. *Human Adenovirus. (no./10l).*

e) *Annually*

- i. *Thermophilic campylobacter spp (cfu/l)*
- ii. *Salmonella spp (no./l)*
- iii. *Organo chlorine pesticides – reported as g/ m<sup>3</sup>*
- iv. *Polychlorinated biphenyls – report as g/ m<sup>3</sup>*
- v. *Polycyclic aromatic hydrocarbons – reported as g/ m<sup>3</sup>*

The initial two year monitoring period began in May 2006 and concluded in April 2008. Since then, metals have been analysed at six monthly intervals, with viral and bacterial monitoring completed annually, in line with Condition 9 above.

*Condition 11*

Condition 11 requires that monitoring results for five-day biochemical oxygen demand (BODs), total suspended solids (TSS) and ammoniacal nitrogen (ammoniacal-N) are compared with the following limits:

*“Based on the weekly sampling required by Condition (9) of this consent, and taken over each 26 week period commencing on the 1st of May, and the 1st of November of each year during*



*the term of this consent, no more than 16 values in each 26 week period shall exceed the following standards for each of the named contaminants [Table 3]:”*

Table 3: Condition 11 limit of resource consent CRC041162.2.

Contaminant	Unit	Standard
<b>BOD5 (filtered)</b>	g/m <sup>3</sup>	25
<b>Total suspended solids</b>	g/m <sup>3</sup>	200
<b>Ammoniacal nitrogen</b>	g/m <sup>3</sup>	27

#### Condition 12

Condition 12 requires that faecal indicator bacteria monitoring results are compared with prescribed limits:

*“Based on the weekly sampling required by Condition (9) of this consent, over each Summer period (November - February inclusive) and over each Winter period (March - October inclusive), no more than six values from eight consecutive samples, shall exceed the following standard values and no more than two values from eight consecutive samples, shall exceed the higher value for enterococci and faecal coliforms /Table 4/.”*

Table 4: Condition 12 limits of resource consent CRC041162.2.

Contaminant	Unit	Standard value		Higher value	
		Summer	Winter	Summer	Winter
<b>Enterococci</b>	No./100mL	500	500	1,500	1,500
<b>Faecal coliforms</b>	No./100mL	1,000	9,000	5,000	20,000

#### 2.3.2. Physicochemical

The results of weekly physicochemical monitoring at the outfall structure between July 2022 and June 2023 are summarised in Table 5, alongside results from the previous monitoring period (July 2021 – June 2022). These results are discussed by parameter below. Physicochemical monitoring requirements were met during the 2022/23 period.

Table 5: Physicochemical water quality in the ocean outfall discharge.

Parameter	July 2022 to June 2023			July 2021 to June 2022		Consent Limit
	Samples	Median	Range	Median	Range	
<b>Laboratory pH (unit less)</b>	52	7.9	7.6 – 9.7	7.9	7.6-9.4	
<b>Field pH (unit less)</b>	53	7.63	6.0 – 16.05	7.1	6.4 – 8.45	
<b>DO (g/m<sup>3</sup>)</b>	53	1.3	0.0– 14.7	7.83	0.0-14.03	
<b>Temperature (°C)</b>	53	14.3	4.3 – 22.1	14.15	3.1 – 25.6	
<b>TSS (g/m<sup>3</sup>)</b>	52	34	12 - 139	40	8-91	200

pH

Laboratory measured pH in 2022/23 and field measured pH which is compared with earlier years are graphed below. There is no consent limit for pH. The field results show a spike of high pH in August 2022 (several results show a pH of around 16, see the red circle within the below graph, which is likely to be a meter reading error or data entry error). The error has been subsequently corrected as seen in subsequent data. However most lab and field results were between 6.5 and 8.5.

Junction Ocean Outfall

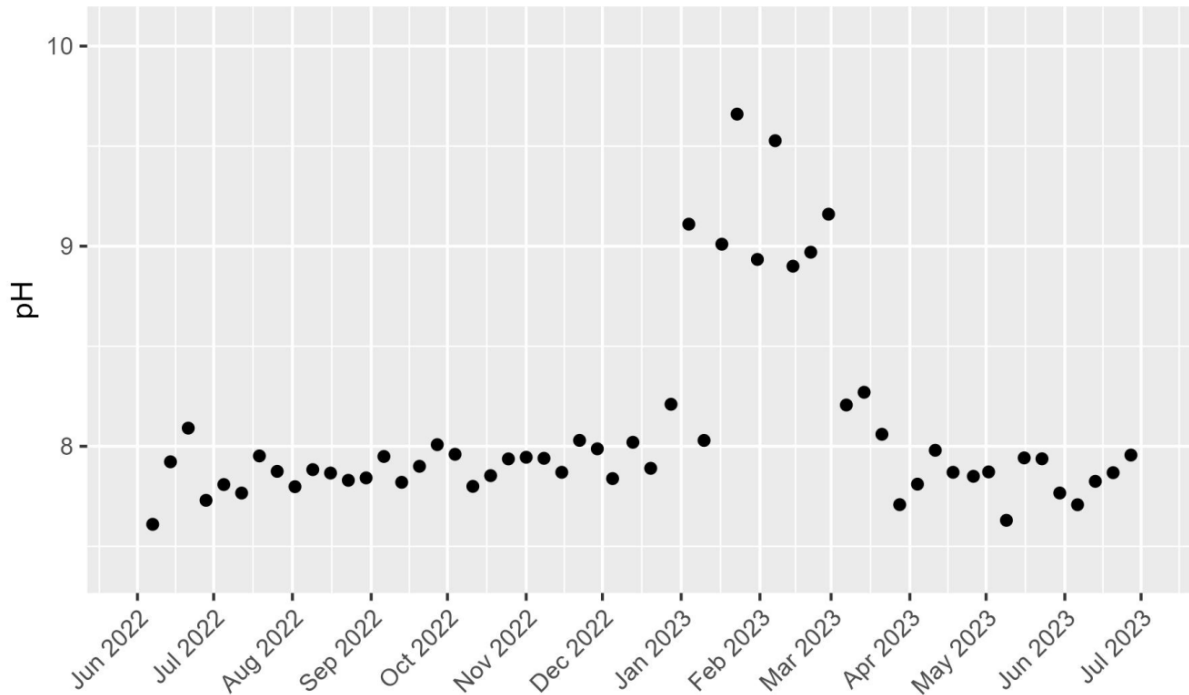


Figure 4: pH (laboratory sample) of the ocean outfall discharge between July 2022 to June 2023

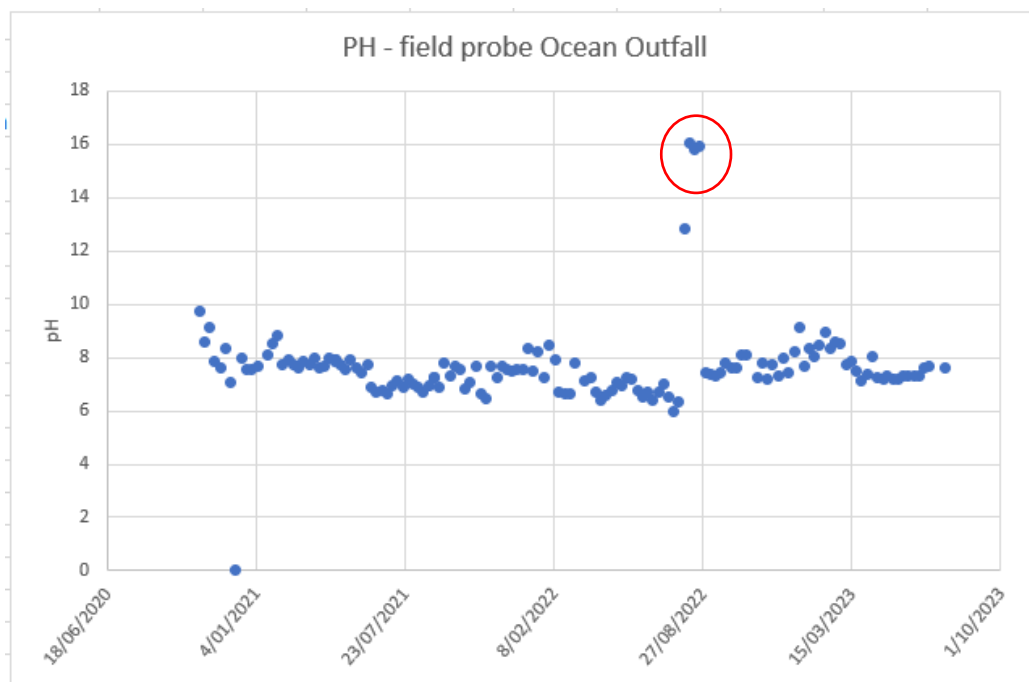


Figure 5: pH (field probe) of the ocean outfall discharge between October 2020 to June 2023

### Dissolved oxygen

Dissolved oxygen (DO) concentrations in the Ocean Outfall discharge were trending downwards in the 2022/23 year in comparison with previous years, as shown in the below graph. The DO measurements are taken with handheld meters that are calibrated monthly. The DO was sampled weekly at the outfall structure as required under Condition 9 (see Appendix H for raw data records). There is no consent limit for DO.

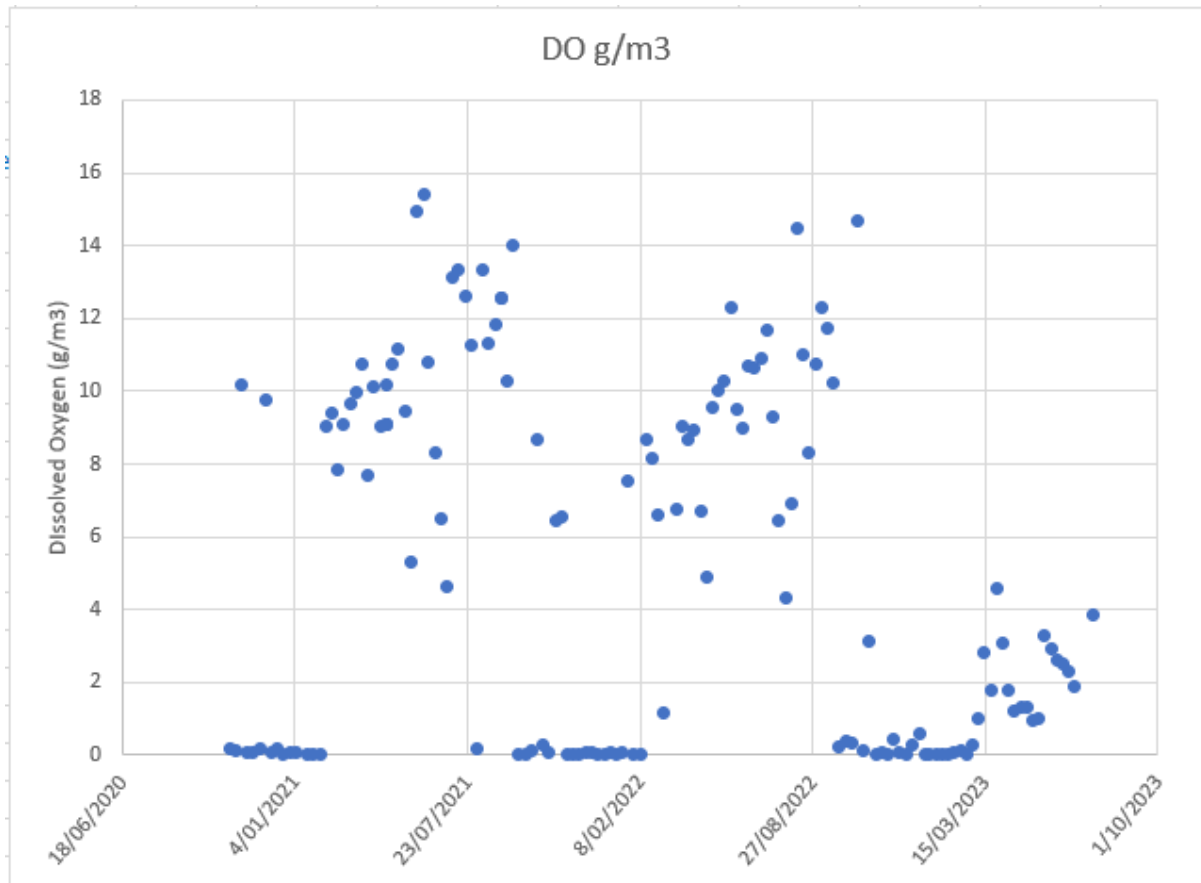


Figure 6. Dissolved oxygen concentrations in the ocean outfall discharge between October 2020 and June 2023.

Temperature

Temperature data showed typical seasonal variation (Figure 7). The annual temperature range in 2022/23 is consistent with previous years. The temperature was sampled weekly at the Outfall structure as required under Condition 9 (see Appendix H for raw data records). There is no consent limit for temperature.

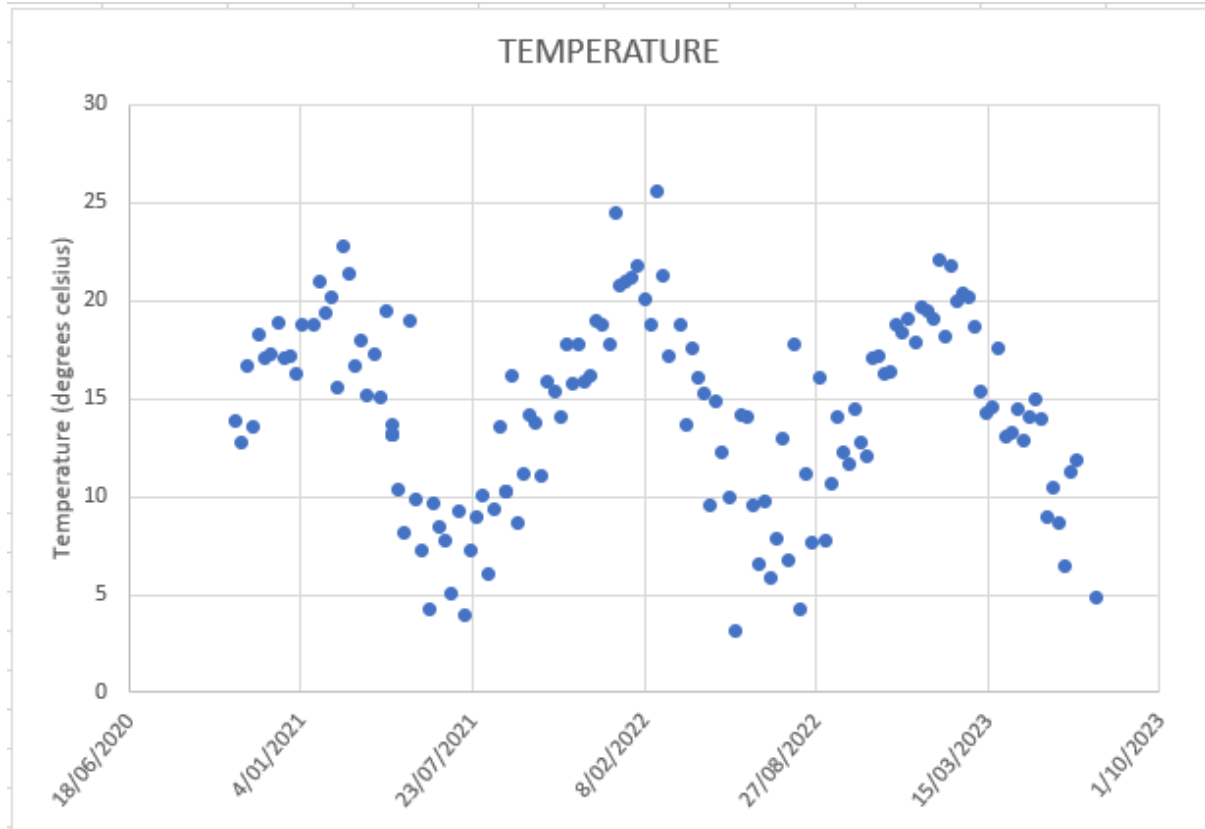


Figure 7. Temperature of the ocean outfall discharge between October 2020 and June 2023

Total suspended solids

There was no exceedance of the consent limit for TSS (200 g/m<sup>3</sup>) over the 2022/23 monitoring period of 52 samples (Figure 8), with the maximum reading being 139 g/m<sup>3</sup> which is well below this allowance. Therefore, full compliance was achieved for Condition 11 of the resource consent, which allows up to 16 exceedances in each 26-week period of the current monitoring period. On average the results were very similar with the previous monitoring period (median in 2022/23 of 34 g/m<sup>3</sup> compared with a median of 40 g/m<sup>3</sup> in the previous year). In general, the TSS concentrations displayed consistent quality. The higher TSS results recorded are related to times of high algal numbers in the treatment ponds.

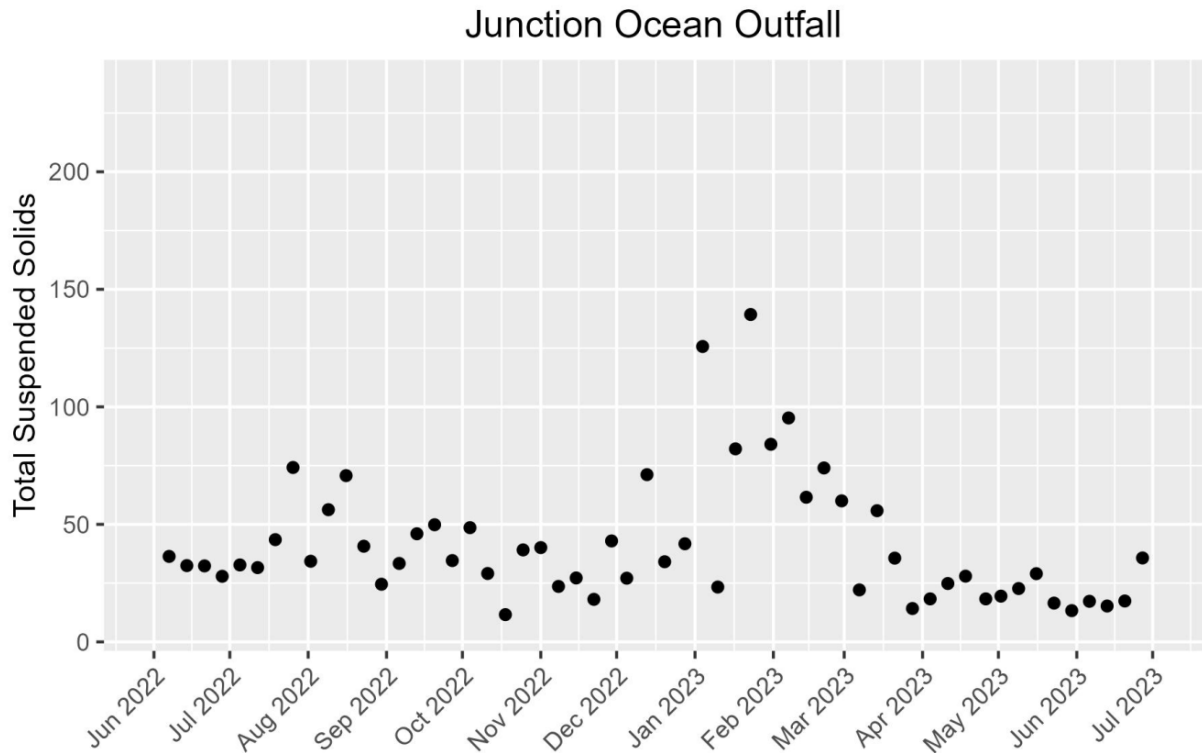


Figure 8. Total suspended solids in the ocean outfall discharge between July 2022 and June 2023.

2.3.3. Biochemical oxygen demand

Biochemical oxygen demand (BOD) results for the 2022/23 monitoring period were similar to those recorded during 2021/22 (Table 6), ranging in the current year from 9 g O<sup>2</sup>/m<sup>3</sup> to 43 g O<sup>2</sup>/m<sup>3</sup>, compared with 10 g O<sup>2</sup>/m<sup>3</sup> to 39 g O<sup>2</sup>/m<sup>3</sup> in the previous year.

The soluble BOD results were similar in the 2022/23 monitoring period compared to the previous period and remain well within the consent limit. A summary of BOD results from the ocean outfall discharge is provided in Table 6.

Table 6: Biochemical oxygen demand (g O<sub>2</sub>/m<sup>3</sup>) in the ocean outfall discharge.

Species	July 2022 to June 2023			July 2021 to June 2022		Consent Limit
	Samples	Median	Range	Median	Range	
<b>BOD<sub>5</sub> (g O<sub>2</sub>/m<sup>3</sup>)</b>	52	20	9- 43	21	10-39	
<b>Soluble BOD<sub>5</sub> (g O<sub>2</sub>/m<sup>3</sup>)</b>	52	4	2 - 6	3	2 - 18	25

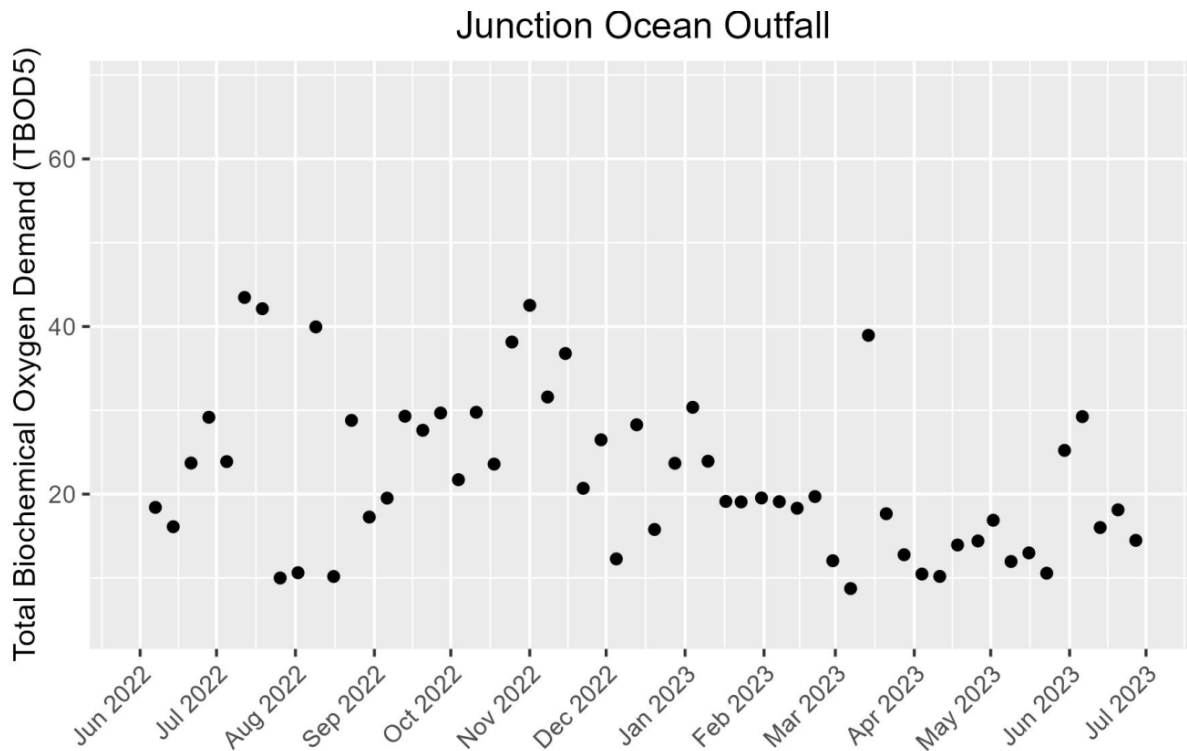


Figure 9: Five-day biochemical oxygen demand of the ocean outfall discharge July 2022 - June 2023.

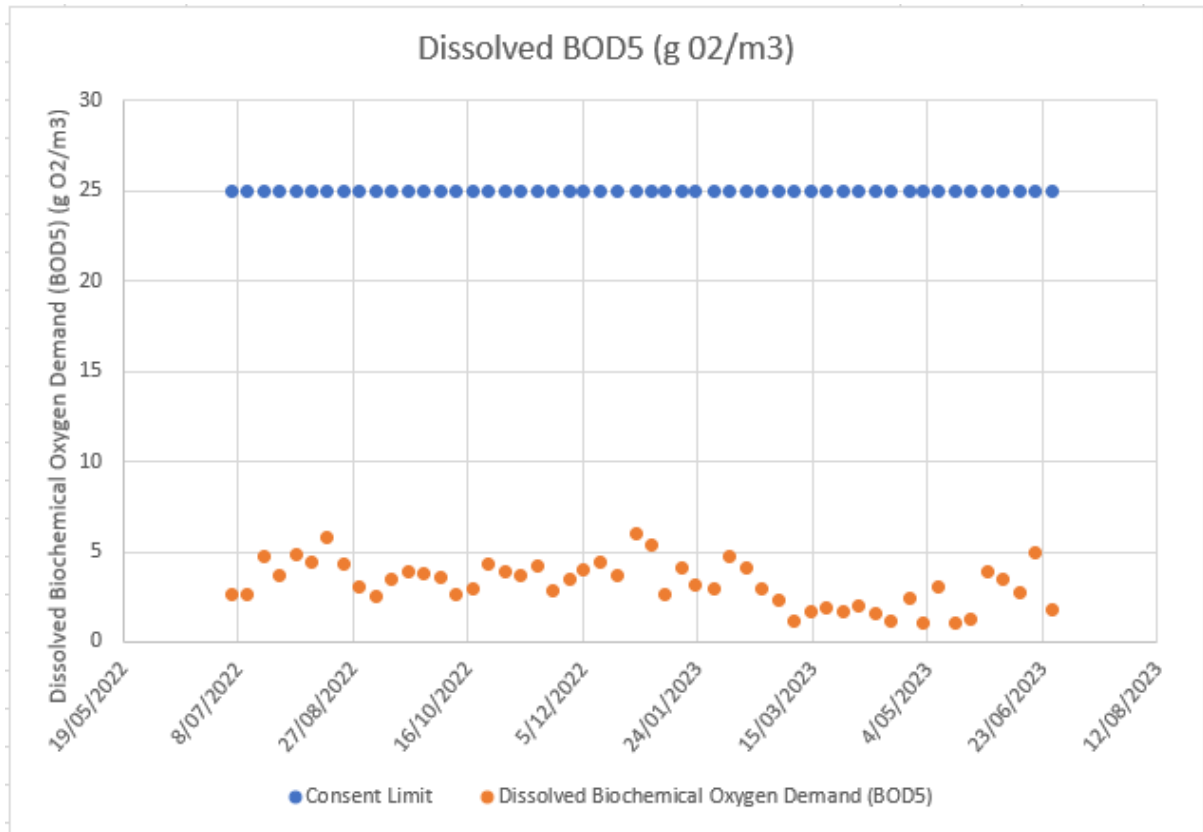


Figure 10. Soluble five-day biochemical oxygen demand of the ocean outfall discharge from July 2022-June 2023

2.3.4. Nutrients

Condition 9 requires dissolved inorganic nitrogen (DIN), ammoniacal-N and dissolved reactive phosphorus (DRP) to be measured weekly. Total nitrogen (TN) and total phosphorus (TP) are required to be measured monthly. The frequency of monitoring prescribed by Condition 9 was met for all parameters other than one missed sample of Total Nitrogen and Total Phosphorous during July 2022, which was due to an error in a bottle set distribution to the laboratory. This was offset by collection of additional samples in December 2022 and January 2023.

Table 7: Nutrient concentrations (g/m<sup>3</sup>) in the ocean outfall discharge.

Parameters	July 2022 to June 2023			July 2021 to June 2022		Consent Limit
	N	Median	Range	Median	Range	
Dissolved inorganic nitrogen	51	14.9	0.035-23	12.8	1.07-30	
Ammoniacal-N	52	12.4	0.024-23	11.6	0.082 - 30	27
Total nitrogen	13	13.2	8.9-20	17	6.1- 30	
Dissolved reactive phosphorus	52	4	0.7-9.2	4	1.37 – 9.2	
Total phosphorus	13	5.2	2.7 – 8.3	5	3.2– 9.7	

Note: \* No more than 16 values to exceed limit in the 26-week period beginning 1 May and 1 November. N: number of samples.

The dissolved inorganic nitrogen results shown in Figure 11 below, indicate a decrease throughout the summer months. There is no consent limit for DIN.

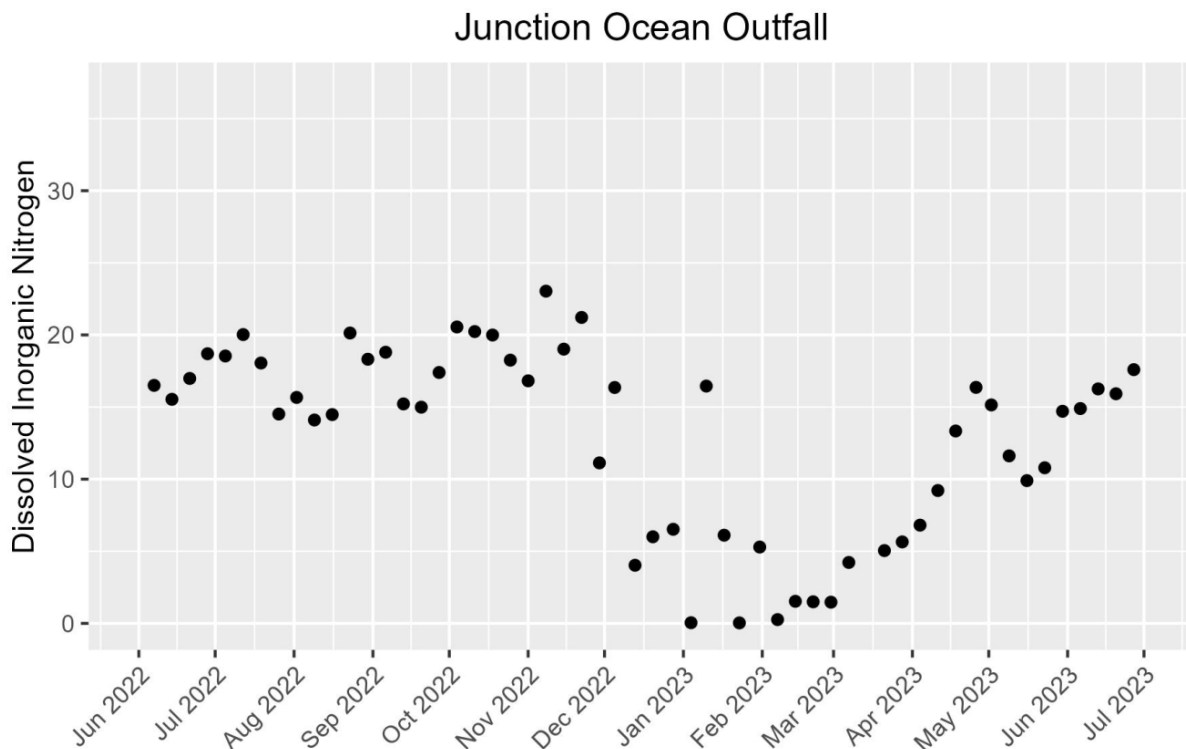


Figure 11. Dissolved inorganic nitrogen concentrations in ocean outfall discharge June 2022-July 2023



In general the Ammoniacal-N ( $\text{NH}_4$ ) levels are similar to the 2021/22 monitoring period. During the 2022/23 year there were no exceedances of the consent limit of 27g/m<sup>3</sup> of Total Ammoniacal-N. TAN levels are also lower over the summer months.

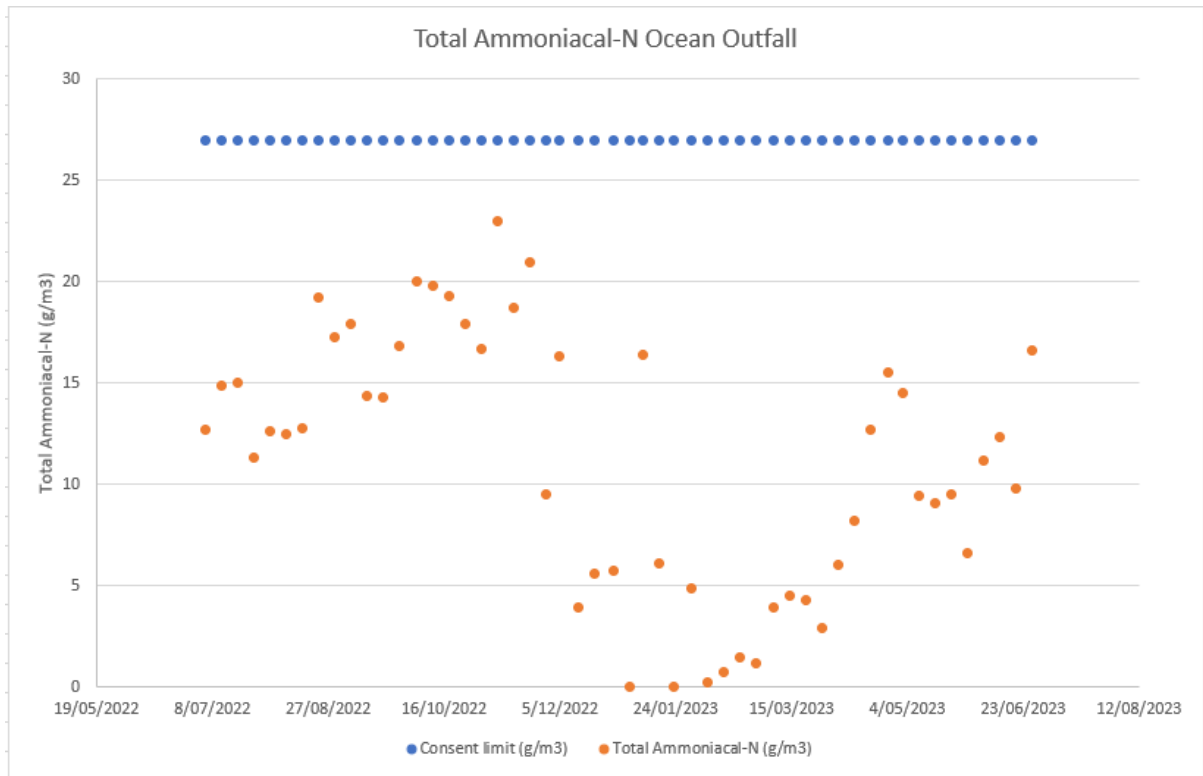


Figure 12. Ammoniacal-N concentrations in the ocean outfall discharge between July 2022 and June 2023

Total nitrogen (TN) concentrations over the 2022/23 monitoring period show a slight downward trend through the year (Figure 13 below). There is no consent limit for TN. No sample result is available for July 2022.

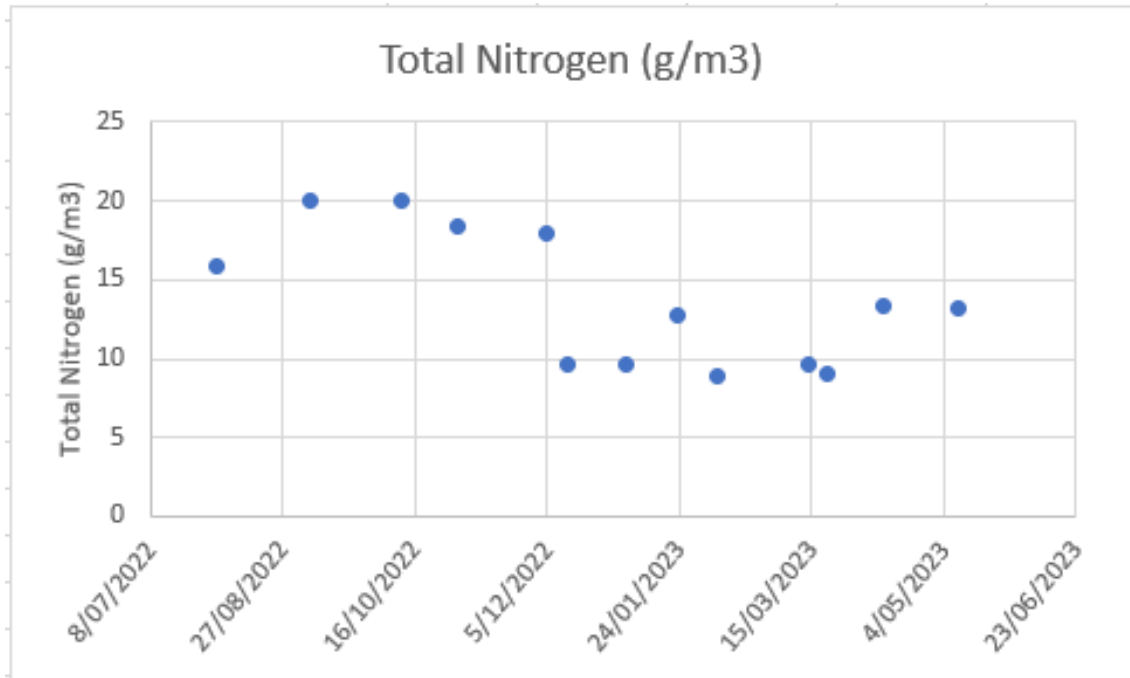


Figure 13. Total nitrogen concentrations in ocean outfall discharge between July 2022 and June 2023

The monitoring results for dissolved reactive phosphorous (DRP) and total phosphorus (TP) are shown in Figures 14 and 15. The pond performance and algae species and numbers remained stable during the 2022-23 period. Most of the phosphorus was present in the dissolved form (DRP). There are no consent limits for DRP or TP. The median DRP was unchanged between 2022/23 and 2021/22 periods (4g/m<sup>3</sup>).

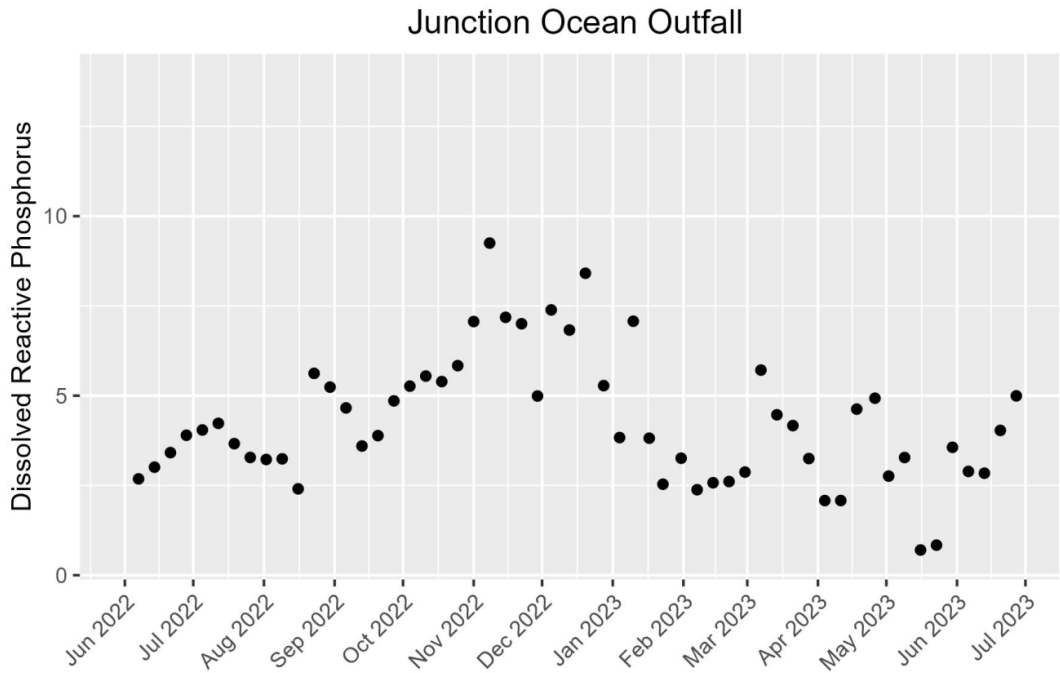


Figure 14. Dissolved reactive phosphorus concentrations in the ocean outfall discharge from June 2022 to July 2023.

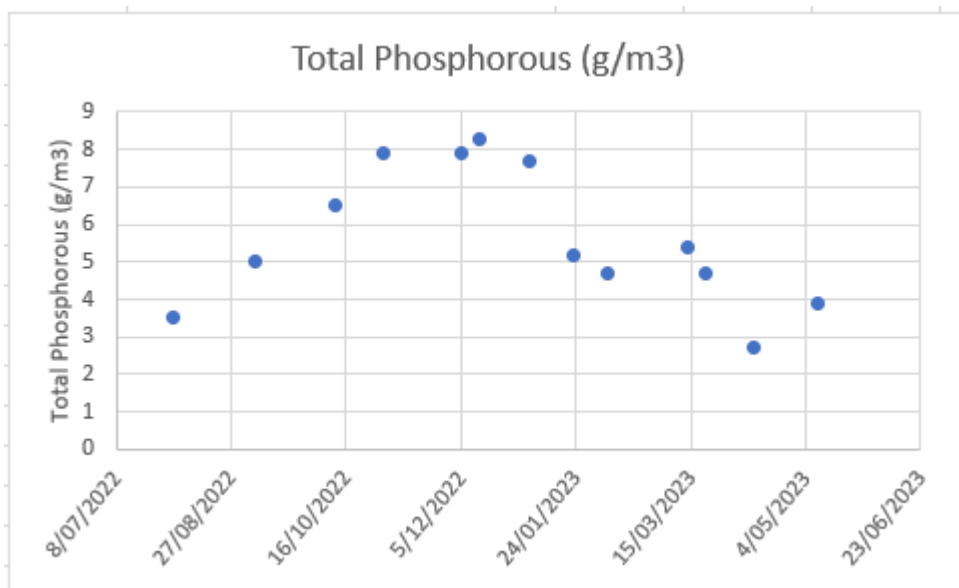
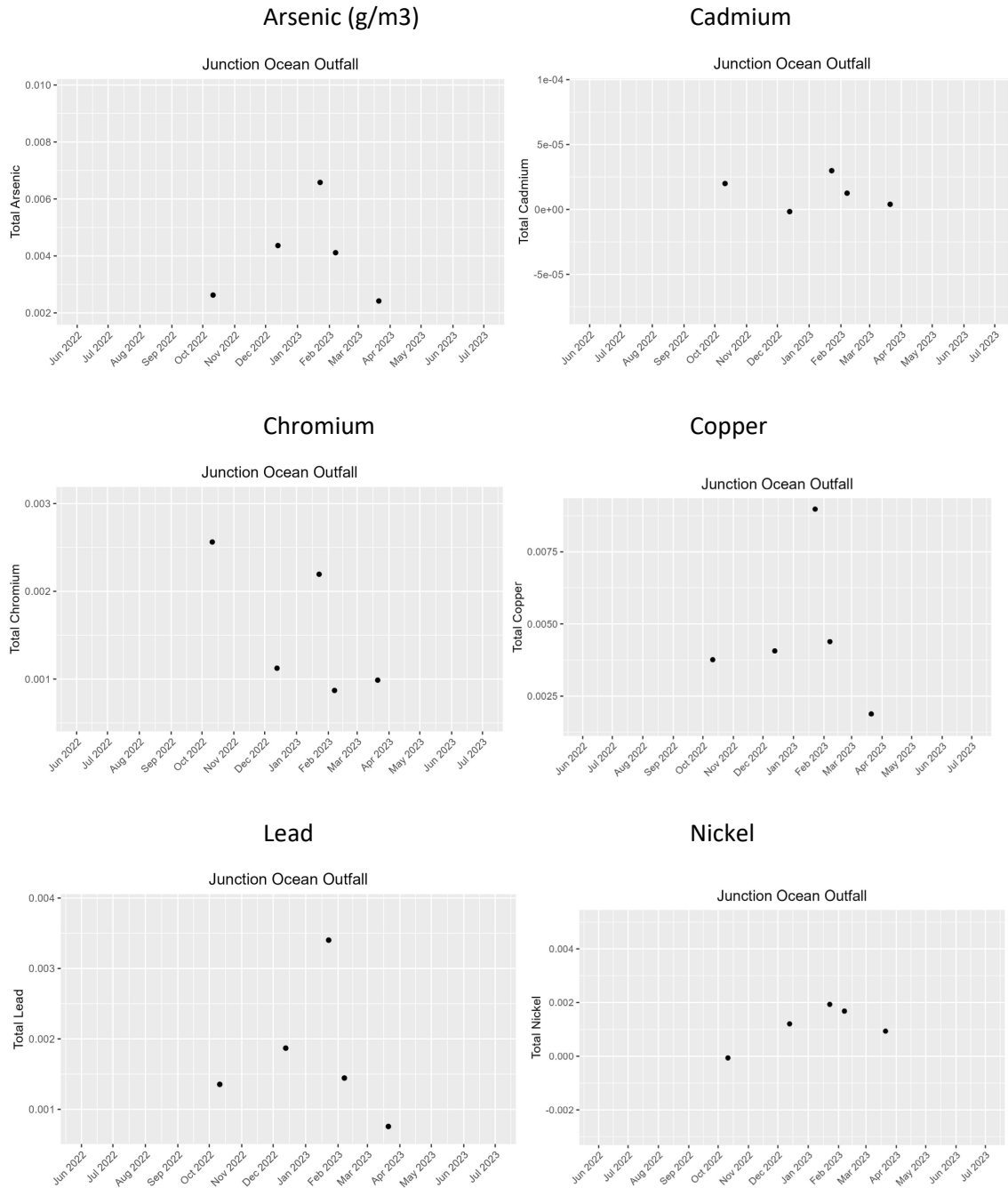


Figure 15. Total phosphorus concentrations in ocean outfall discharge between July 2022 and June 2023

### 2.3.5. Metals and metalloids

Total metal and metalloid concentrations from July 2022 until June 2023 are shown in Figure 16 below. These metals are required to be sampled twice a year however 5 samples of each parameter were taken during the 2022/23 year. Review of the results show the results for the metals were generally comparable to previous monitoring periods. It is noted however there was an individual spike in copper, lead and zinc in the January 2023 sample, which appears to be an isolated event (see Figure 16 below). Results for mercury and cadmium in the 2022/23 samples in Figure 17 appear flat or partly flat in their result ranges because these metals were not detected by the laboratory in these samples during that period. There are no consent limits for any trace metals and metalloids.



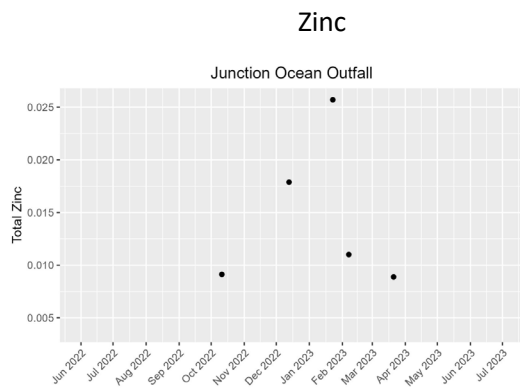
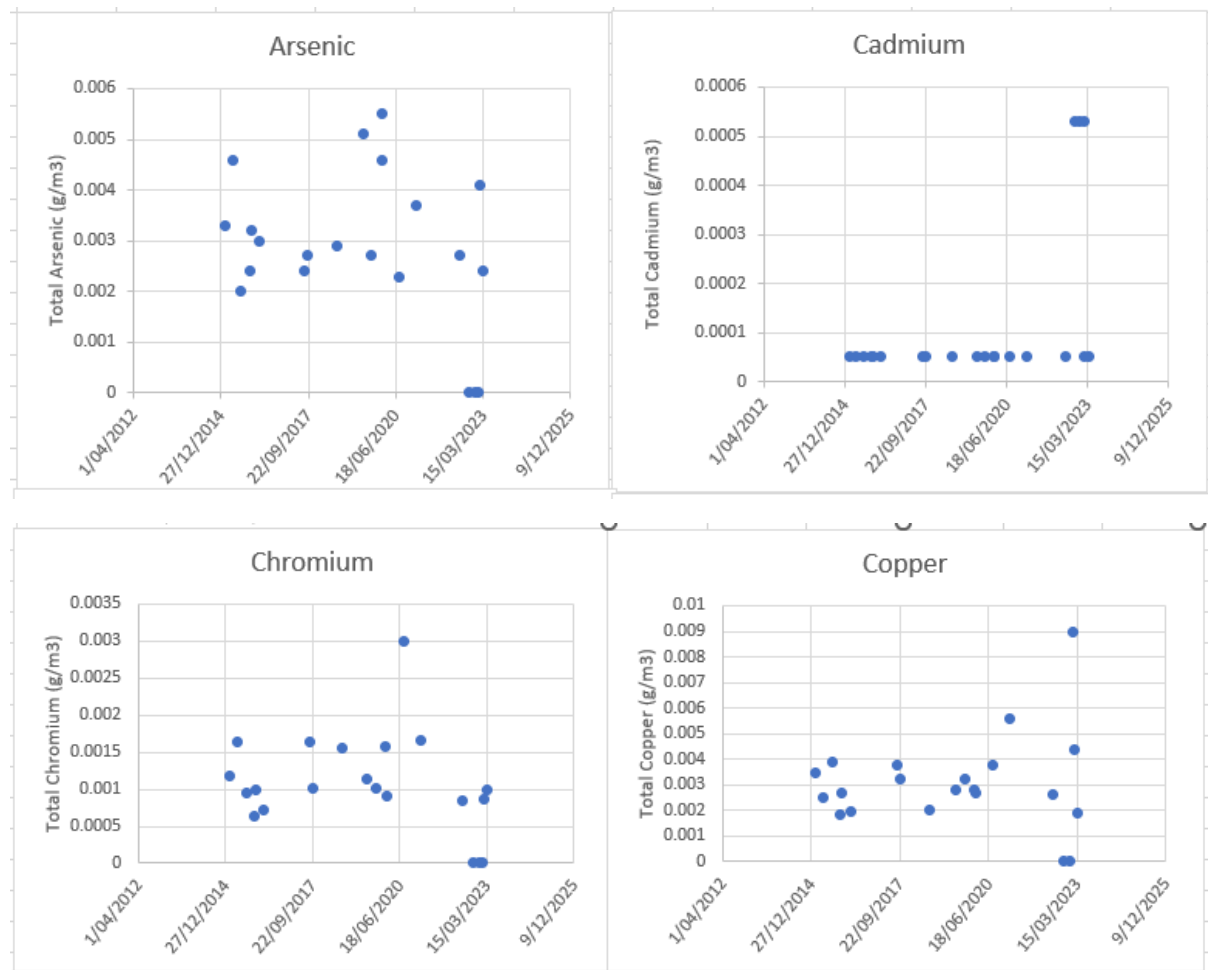


Figure 16: Total metals and metalloids in ocean outfall discharge between July 2022 and June 2023



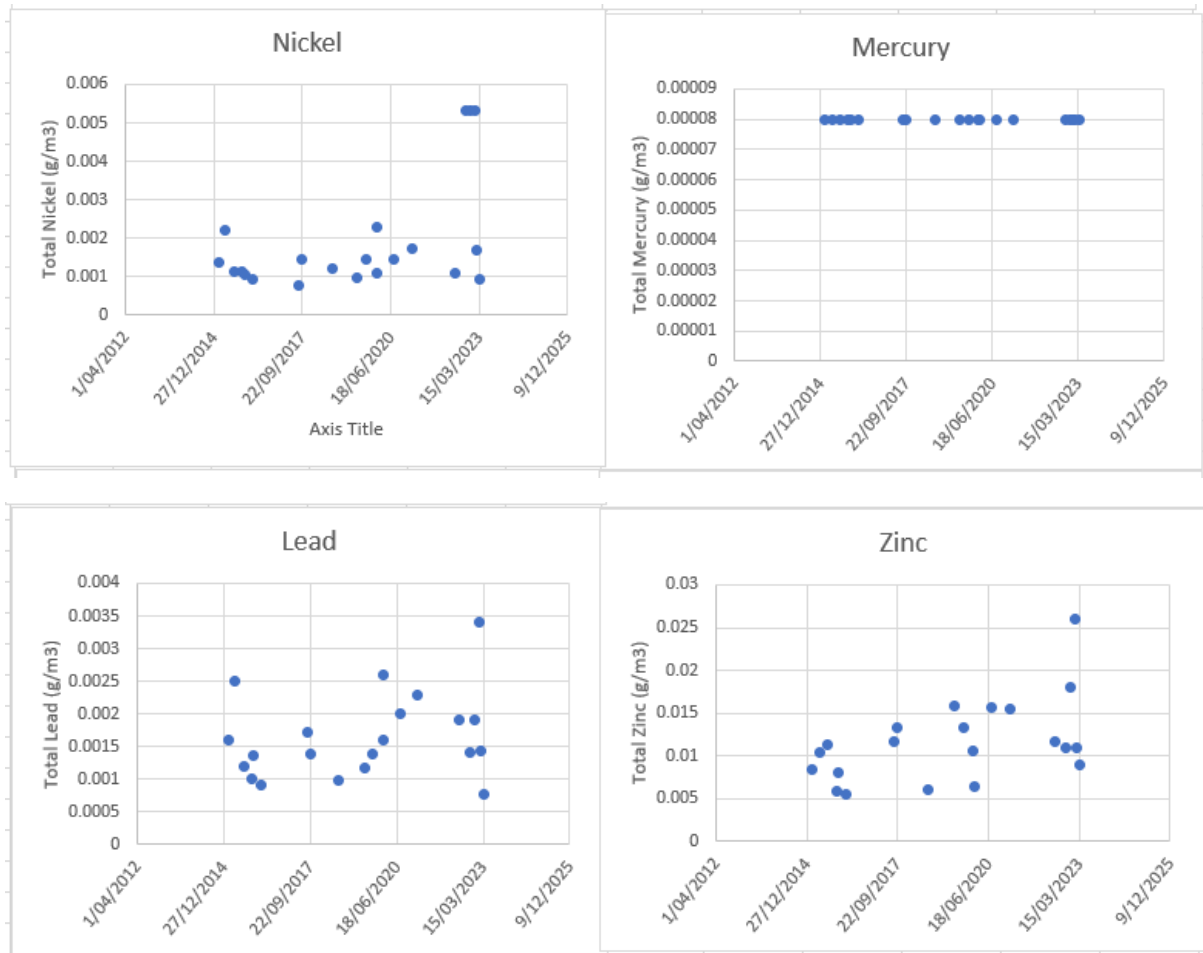


Figure 17: Total metals and metalloids in ocean outfall discharge between 2015 and 2023

### 2.3.6. Microbiological quality

The Woodend and Kaiapoi WWTPs have ultraviolet (UV) disinfection systems in operation to reduce bacterial numbers in the discharge. During the 2022/23 monitoring period the UV system was in continuous operation for the Woodend WWTP and predominantly operates at the Kaiapoi plant as it is activated whenever pre-set levels of bacteria are detected.

Consent CRC041162.2 specifies weekly monitoring of three faecal indicator bacteria:

- Faecal coliforms
- Enterococci
- *Escherichia coli* (*E. coli*)

The faecal indicator monitoring data for 2022/23 is summarised in Table 8 and is compared with the previous year (2021/22). This data is plotted alongside relevant consent limits as shown in the Figures on the following pages. The sampling frequency for faecal indicator bacteria during the current monitoring period complied with the requirements of Condition 9.

The graphs on the following page show Faecal Coliform numbers below relevant seasonal consent limits over the full 2022/23 monitoring period. Hence full compliance with Condition 12 was achieved for faecal coliforms.

Table 8: Faecal indicator bacteria in the ocean outfall discharge (cfu/100 mL).

Indicator	July 2022 to June 2023			July 2021 to June 2022			Consent Limit	
	N	Median	Range	N	Median	Range	Standard	High
<b>Faecal coliforms (summer: Nov-Feb)</b>	18	150	10-410	17	69	21 – 510	1,000	5,000
<b>Faecal coliforms (winter: March - Oct)</b>	34	115	10-2000	23	50	10 – 1,300	9,000	20,000
<b>Enterococci</b>	52	52	10- 24,200	48	40	10-2,440	500	1,500
<b><i>E. coli</i></b>	52	90	10- 1,400	49	50	10-990	-	-

Note: "For each period (summer: November–February; winter: March–October) no more than six out of eight consecutive samples may exceed the 'standard' value and no more than two out of eight consecutive samples may exceed the 'high' value. N: number of samples.

Enterococci numbers in a wastewater discharge of this type are typically lower than faecal coliform or *E. coli* numbers, which are more likely to include non-human derived faecal indicator bacteria as well as human- derived sources. Consent limits for enterococci do not vary between seasons as they do for faecal coliforms, although there is still a standard (500 cfu/100 mL) and high (1,500 cfu/100 mL) limit.

The resource consent allows for six out of eight consecutive samples to exceed the standard limit, and two out of eight consecutive samples to exceed the high limit. There were only three occasions out of a total of 52 samples through 2022/23 when the enterococci exceeded 500 cfu/100mL, and only two occasions through the year when samples exceeded the 1,500 cfu/100mL "high" limit and these were not consecutive. Almost all samples through the year were well beneath the "standard" limit.

The Council believes a likely cause of the individual enterococci spikes in the graph below are from biofilm sloughing off within the pipe when the sample is taken which causes an occasional very high enterococci reading. This is not representative of the usual water quality of the discharge.

In any case, full compliance with Condition 12 was achieved for enterococci with both the standard and high consent limits.

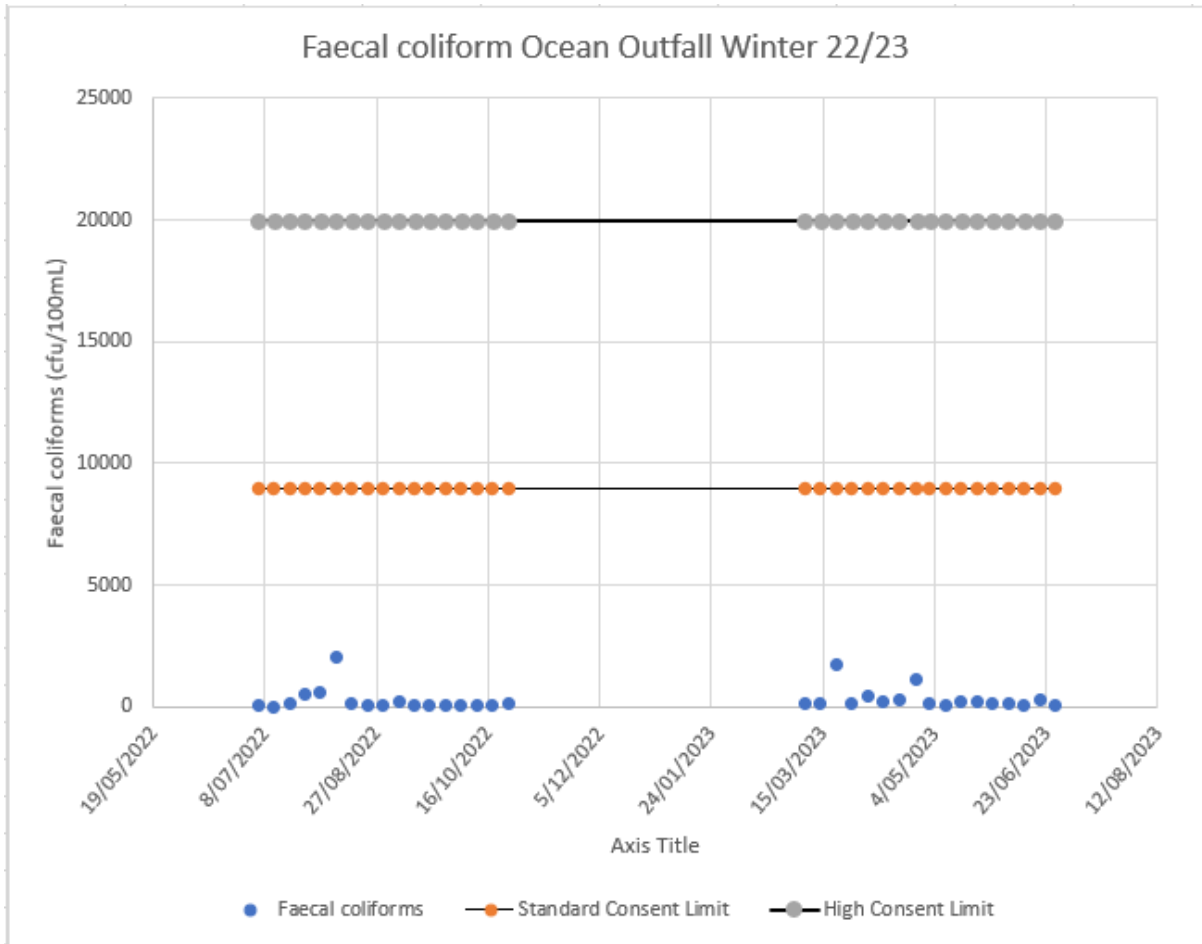


Figure 18. Faecal coliforms in ocean outfall discharge between July 2022 and June 2023 (winter samples only)

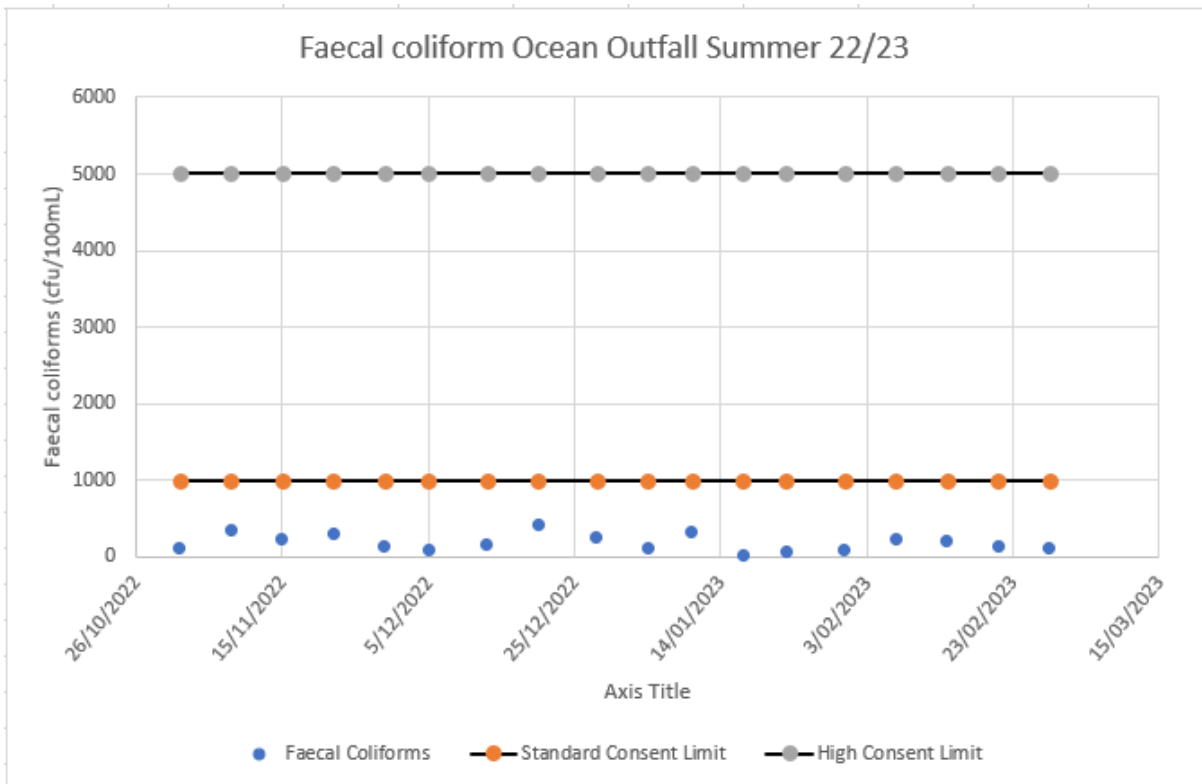


Figure 19. Faecal coliforms in ocean outfall discharge between November 2022 and February 2023 (summer samples only)



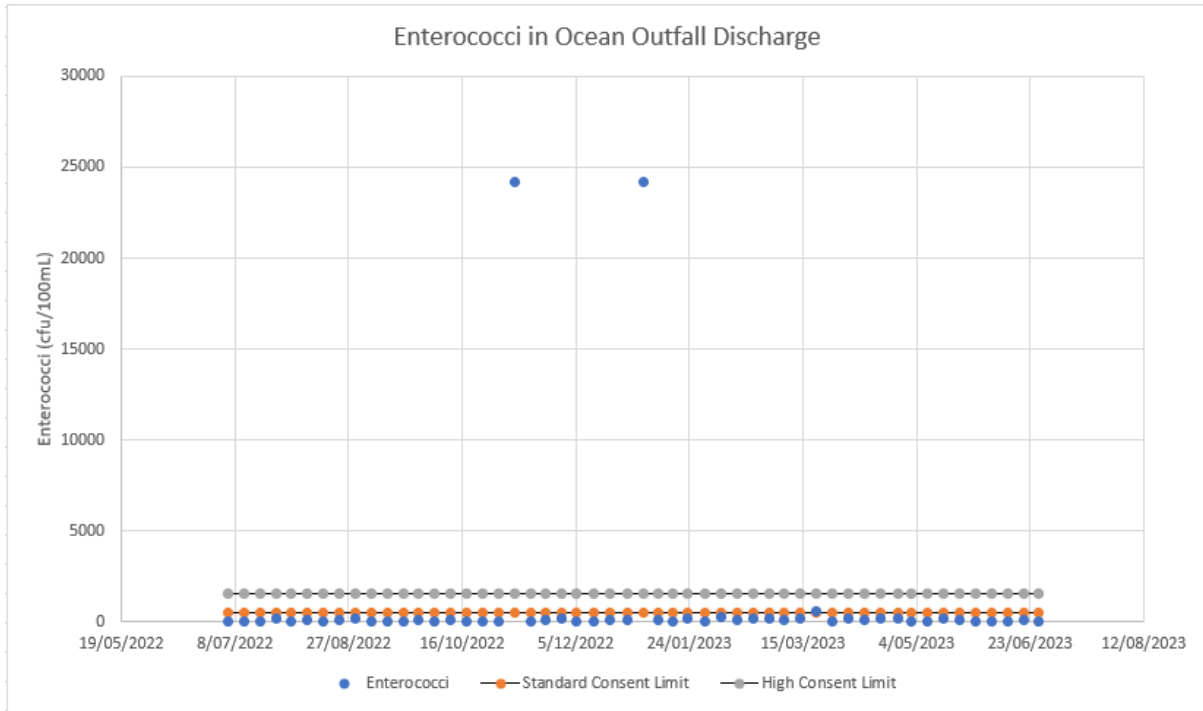


Figure 20. Enterococci in ocean outfall discharge between July 2022 and June 2023

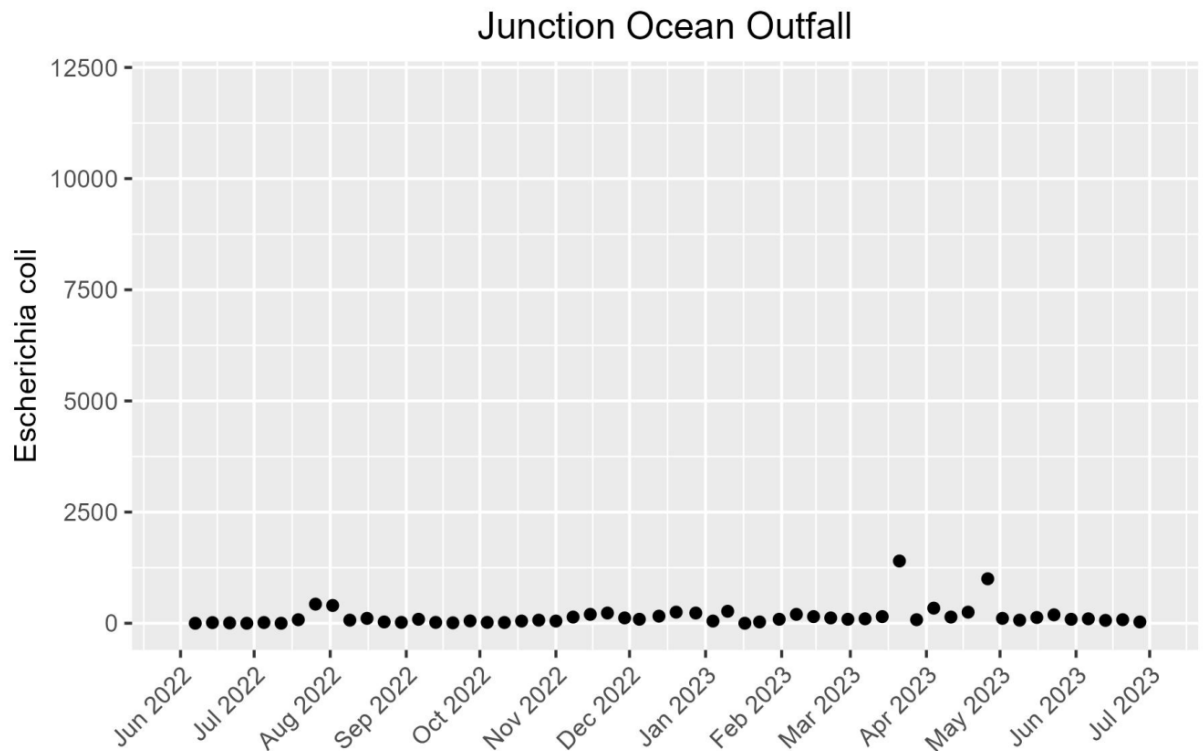


Figure 21. Escherichia coli in ocean outfall discharge between July 2022 and June 2023

### Human pathogens

The results for the 2022/23 human pathogen tests are shown in Table 9 alongside results from the previous monitoring periods. Human enterovirus, adenovirus, *Campylobacter* and *Salmonella spp.* are required to be sampled annually, as the three-monthly sampling was only required for the first two years.

The human pathogen sampling requirements of Condition 9(d) were met in full in 2022/23. When sampled, human enterovirus and adenovirus were below their respective MDL during the 2022/23 monitoring period (see Appendix L). There are no consent limits for human pathogens.

Table 9: Human pathogens in ocean outfall discharge.

Pathogen	March 2023	March 2022	March 2021
<b>Human enterovirus (pfu/10 L)</b>	Not detected	Not detected	Not sampled
<b>Human adenovirus (iu/10 L)</b>	Not detected	Not detected	<10
<b>Campylobacter</b>	Detected	Not detected	Detected
<b>Salmonella spp. (/500 mL)</b>	Not detected	Not detected	Not detected

Note: Units: pfu = plaque forming units; iu = infectious units. \* Pathogen monitoring during 2015 occurred over various dates.

#### 2.3.7. Organochlorine pesticides, PCBs and PAHs

The annual monitoring for organochloride pesticides, polychlorinated biphenyls (PCBs) and polycyclic aromatic hydrocarbons (PAHs) was undertaken in March 2023 (TRIM 230502061483). The full results are presented in Appendix A. There are no limits for organochloride pesticides, PCBs and PAHs, specified in the resource consent.

#### 2.3.8. Summary

Overall, all requirements of conditions 9 – 12 have been met. The following are the main points from the outfall monitoring program:

- The plants are performing well, with monitoring showing the effluent quality comfortably meeting the consent requirements.
- The frequency of sampling was undertaken as required by the consent conditions.
- All organochlorine pesticide, PCB and PAH results were below their respective method detection limits.

## 2.4. Condition 13 – Woodend Beach, The Pines Beach and Waimakariri River mouth

### 2.4.1. Monitoring requirements

Condition 13 of CRC041162.2 requires weekly monitoring for faecal coliforms and enterococci at Woodend Beach and The Pines Beach. Woodend Beach is located to the north of the ocean outfall and The Pines Beach to the south. Both locations are north of the Waimakariri River mouth, as shown in Figure 1. The frequency of monitoring during the 2022/23 period at Woodend Beach and Pines Beach complied with these requirements. In addition to the weekly monitoring at Woodend Beach and Pines Beach, WDC also sampled at the Waimakariri River Mouth.

### 2.4.2. Microbiological monitoring results

The microbiological data measured at each site are shown in Figure 22 and Figure 23, and summarised in Table 10.

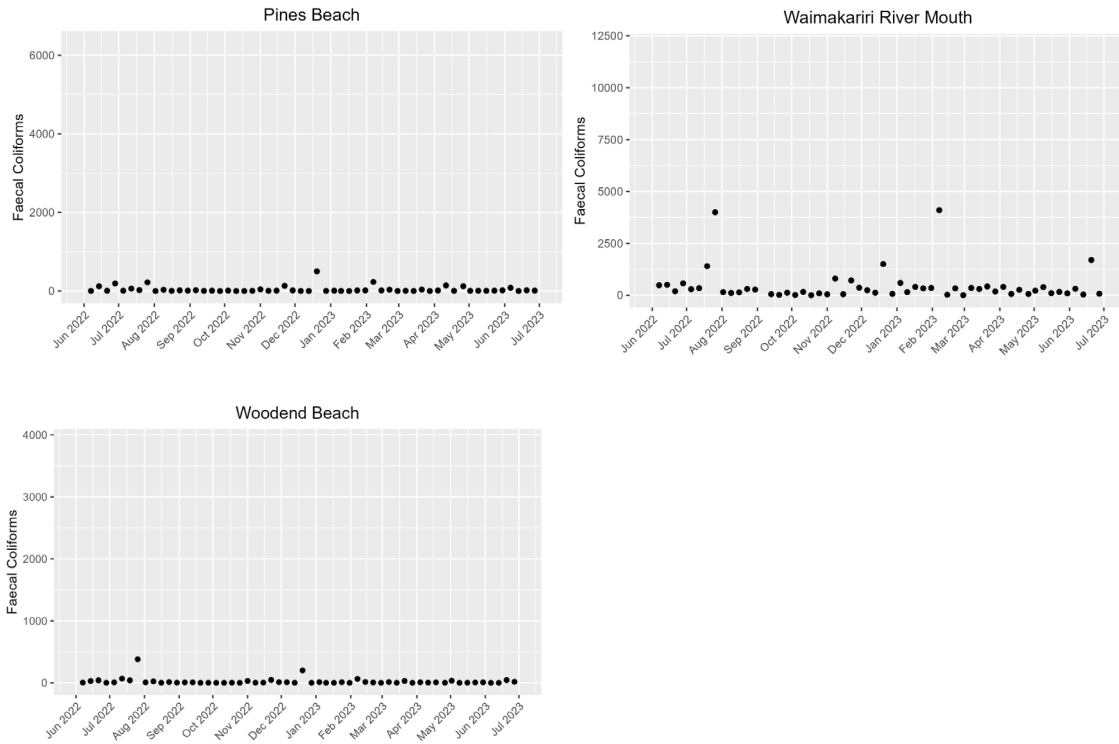


Figure 22: Faecal coliforms at Woodend Beach, The Pines Beach and the Waimakariri River Mouth between July 2022 and June 2023

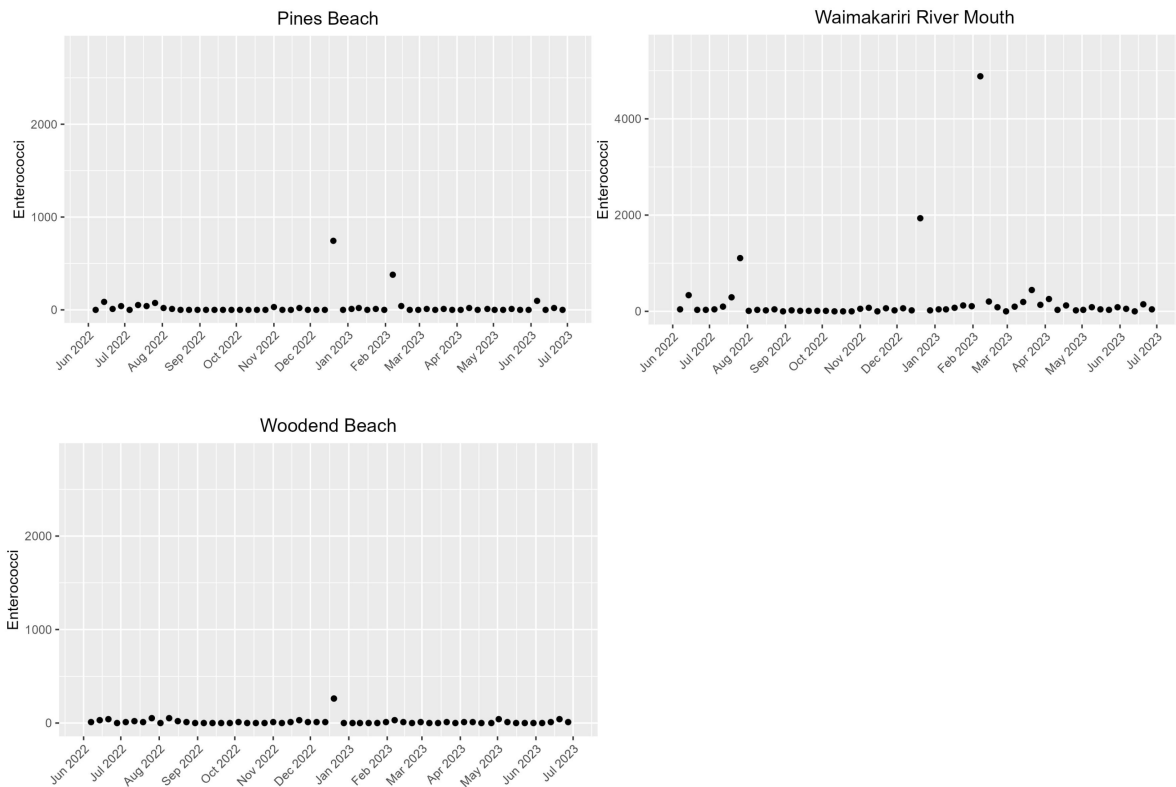


Figure 23: Enterococci at Woodend Beach, Pines Beach and Waimakariri River Mouth between July 2022 and June 2023

Table 10: Microbiological monitoring results for Woodend Beach, The Pines Beach and Waimakariri River Mouth July 2022 – June 2023

Indicator	Woodend Beach		The Pines Beach		Waimakariri River Mouth	
	N	Median (range)	N	Median (range)	N	Median (range)
Faecal coliforms (cfu/100 ml)	53	5	53	9	52	200
Enterococci (cfu/100 ml)	53	10	53	0* (Average '31')	53	41.3

Note: N: number of samples

\*Average is also provided for comparison as a large proportion of Pines Beach samples did not detect enterococci

Median numbers of faecal coliforms and enterococci were highest at the Waimakariri River Mouth in all monitoring reported this year (Figures 22 and 23) and Table 10. These results could be due to a number of factors that differentiate the river mouth water quality from Woodend and The Pines Beach, such as catchment contaminant inflow from the lowland tributaries [Styx River and Kaiapoi River] entering near the mouth.

Further possible causes of the higher coliforms and enterococci at the river mouth include birdlife from Brooklands Lagoon or pigeons nesting below the Williams Street Bridge in Kaiapoi. A further factor is the short survival rate of faecal coliforms in marine waters.

#### 2.4.3. Compliance summary – Beaches

The monitoring requirements in Condition 13 for sampling at Woodend Beach and The Pines Beach have been met in full during the 2022/23 monitoring period.

### 2.5. Condition 14 – Visual Observations

As required by Condition 14, WDC make visual observations at each sampling site to assess the presence of conspicuous oil or grease films, scums or foams or floatable materials. Wind speed and direction were also recorded and are available on request.

During the 2022/23 period, no conspicuous oil or grease films, scums or foams, or floatable materials were noted at either Woodend Beach or the Pines Beach on any of the weekly site visits during the monitoring.

### 2.6. Conditions 15 to 26 – Water Quality, Surface Sediments and Benthic Infauna

WDC was granted a variation to the conditions of consent, effective from 12 March 2009, relating to the sampling of mixing zone water quality, sediments and Benthic Infauna. Sampling is required after three years following commissioning of the ocean outfall and at five yearly intervals thereafter.

Water quality, surface sediments and Benthic Infauna sampling was undertaken in May 2022 and provided to Environment Canterbury with the 2021/22 Annual Compliance report. The next sampling under Conditions 15 – 26 is due in 2027.

### 2.7. Condition 30 – Complaints

Condition 30 states the following:

*“The consent holder shall maintain and keep a complaints register for all aspects of all operations in relation to the discharge into the ocean. The register shall detail the date, time and type of complaint, cause of the complaint, and action taken by the Consent Holder in response to the complaint. The register shall be available to the Canterbury Regional Council at all reasonable times.”*

WDC maintains a complaints register in accordance with the requirements of Condition 30 (see Appendix K).

There were no complaints received for the 2022/23 monitoring period.

### 2.8. WWTP Operations, Maintenance and Major Shutdowns

There were no major shutdowns of the ocean outfall in the 2022/23 monitoring period. The plants have performed well with no major issues.

### 2.9. Summary of Compliance – CRC041162.2

A summary of compliance with condition CRC041162.2 is presented in Table 11 below.

Table 11: Summary of compliance for 2022/23 for consent CRC041162.2.

Consent condition	Description	Compliance
<b>Condition 2</b>	Discharge volume and rate	Full compliance
<b>Condition 9</b>	Ocean outfall discharge quality	Full compliance
<b>Condition 11</b>	Discharge BODs, TSS, ammoniacal-N limits	Full compliance
<b>Condition 12</b>	Discharge microbiological limits	Full compliance
<b>Condition 13</b>	Woodend Beach and The Pines Beach	Full compliance
<b>Condition 14</b>	Visual observations	Full compliance
<b>Condition 15 – 26</b>	Water quality, surface sediments and benthic infauna	No testing was required this monitoring period – Full compliance
<b>Condition 30</b>	Complaints	Full compliance

### 3. CRC041049 – DISCHARGE FROM KAIAPOI WWTP

#### 3.1. Condition 2 – Groundwater Quality Monitoring

Condition 2 states the following:

*“The consent holder shall monitor on-site bores 1, 2, and 3 and two new monitoring bores within 200 metres of the site, on a monthly basis for a period of up to two years after the introduction of Rangiora effluent into the wetland, thereafter at three monthly intervals. Samples from the monitoring shall be analysed for faecal coliforms, E. coli, nitrate-nitrogen and ammoniacal-nitrogen.”*

The locations of the groundwater quality monitoring bores are shown in Figure 24. The regional groundwater flow is assumed to be towards the east in the direction of the coast. Bore 1 (labelled as WDC1) and Bore A are considered ‘control’ bores as they are located up-gradient of the WWTP, whereas bores 2, 3 (labelled as WDC2 and WDC3, respectively) and B are ‘effects’ bores as they are down-gradient from the WWTP. Effects of the WWTP may be evident in groundwater quality through a comparison of the ‘control’ bores with the down-gradient bores’ water quality.

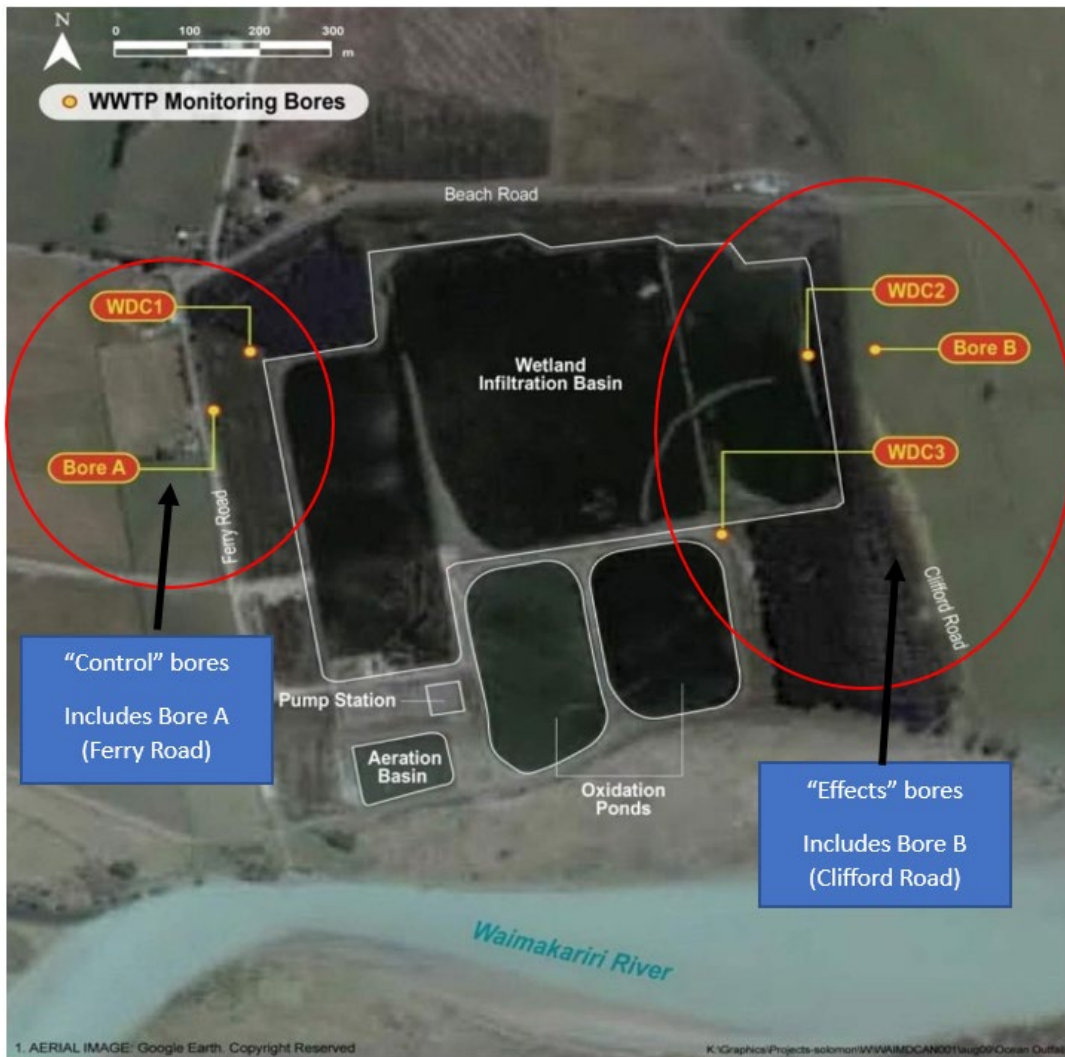


Figure 24: Location of Kaiapoi monitoring bores

Although the two-year period of monthly sampling required by Condition 2 was met as of February 2008, monthly sampling continued until February 2010 when three-monthly sampling commenced. Four samples were collected during the 2022/23 monitoring period (refer to Table 12). Therefore, the three-monthly sampling requirement was met.

### 3.2. Groundwater Monitoring Results

#### 3.2.1. Nutrients

Nutrient concentrations in the five bores for the 2022/23 monitoring period are shown in Table 12. Nitrate nitrogen (nitrate-N) data is plotted in Figure 25 and ammoniacal-N data is plotted in Figure 26.

Data correction has been required for the 2022/23 year for WDC1 and WDC3 as results were inconsistent with previous sample data. A suspected “swap” of results in raw data had occurred due to a previous site map (now revised – see above) which did not clearly align with pre-set laboratory container labels. This has been subsequently corrected in the above revised site map, below table, graphs and supporting spreadsheet (Appendix F). Nitrate-N results show low detection levels in all monitored bores. Ammoniacal Nitrogen results show higher ammonia concentrations in the down-gradient “effects” bores.

Table 12: Nitrate-N and ammoniacal-N concentrations in Kaiapoi WWTP groundwater monitoring bores: 1 July 2022 until 30 June 2023

Bore	Nitrate-nitrogen (g/m <sup>3</sup> )				Ammoniacal-nitrogen (g/m <sup>3</sup> )			
	Aug 22	Oct 22	Jan 23	April 23	Aug 22	Oct 22	Jan 23	April 23
<b>WDC1 (control)*</b>	0.010	< 0.02	< 0.02	< 0.002	0.010	< 0.010	0.019	0.016
<b>Bore A Ferry Road (control)</b>	< 0.002	< 0.002	< 0.002	< 0.002	0.081	0.082	0.096	0.094
<b>WDC2 (effect)*</b>	< 0.002	< 0.002	< 0.002	< 0.002	-	12.9	12.7	12.9
<b>WDC3 (effect)*</b>	< 0.02	< 0.002	< 0.002	< 0.002	9.4	9.0	8.8	11.9
<b>Bore B Clifford Road (effect)</b>	< 0.02	< 0.02	0.008	< 0.002	6.2	5.4	6.7	7.4

\*data correction has been applied to these items in the table and supporting Appendix F spreadsheet data for WDC1, WDC2 and WDC3 to reconcile bore locations with site maps and sample labels. Ongoing investigation and reconciliation of bore locations with data outputs is underway through improved mapping and on-site investigation.

Table 13: Lab Sheet, Container Label and Site Map Reconciliation Table.

Bore Index – Map	Lab Sheet and Container Label Reference
<b>WDC1 (control)</b>	Kaiapoi Bore 1
<b>Bore A Ferry Road (control)</b>	Ferry Road
<b>WDC2 (effect)</b>	Kaiapoi Bore 2
<b>WDC3 (effect)</b>	Kaiapoi Bore 3
<b>Bore B Clifford Road (effect)</b>	Clifford Road

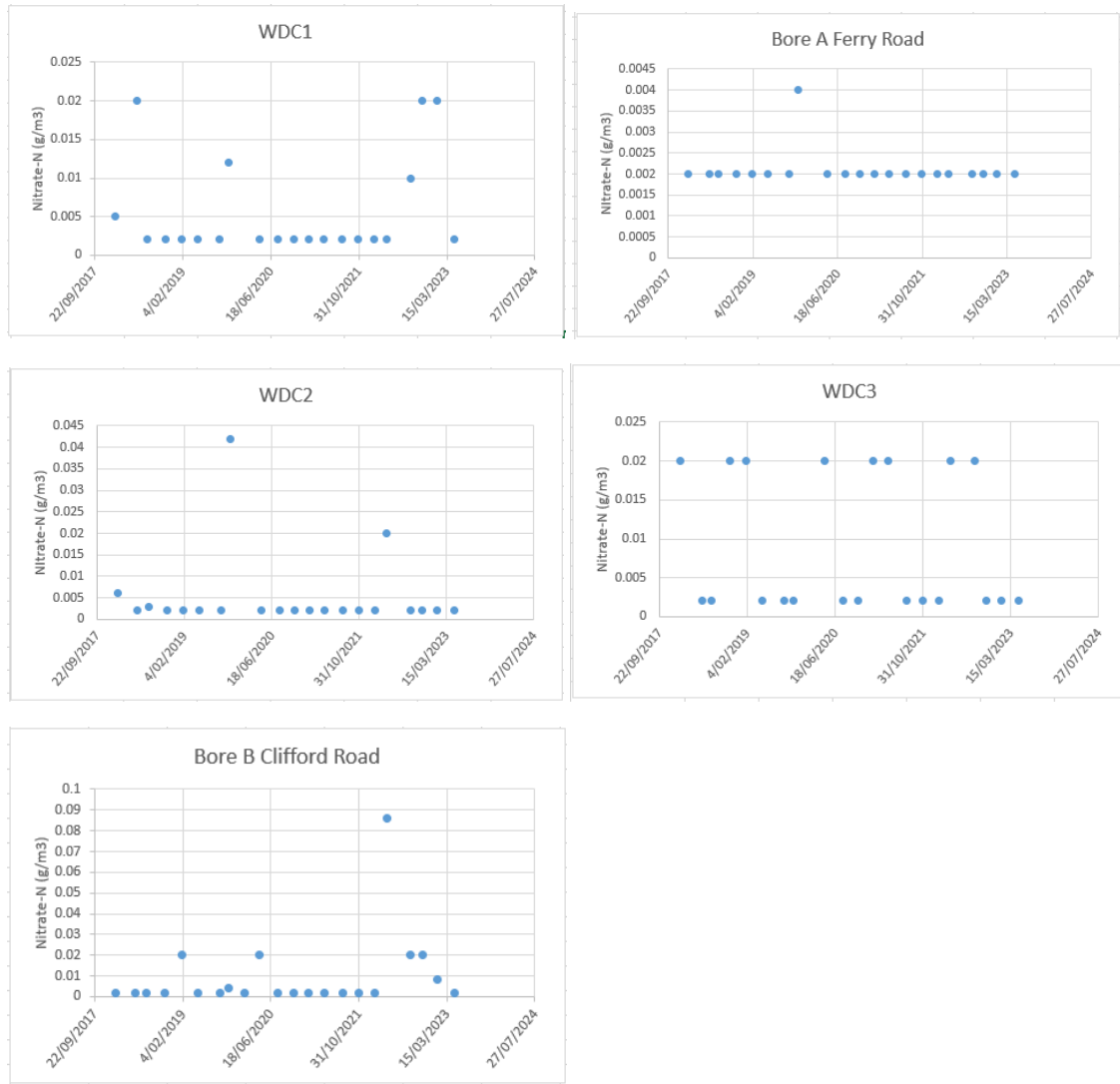


Figure 25: Nitrate-N concentrations in Kaiapoi WWTP monitoring bores between 2018 and 2023



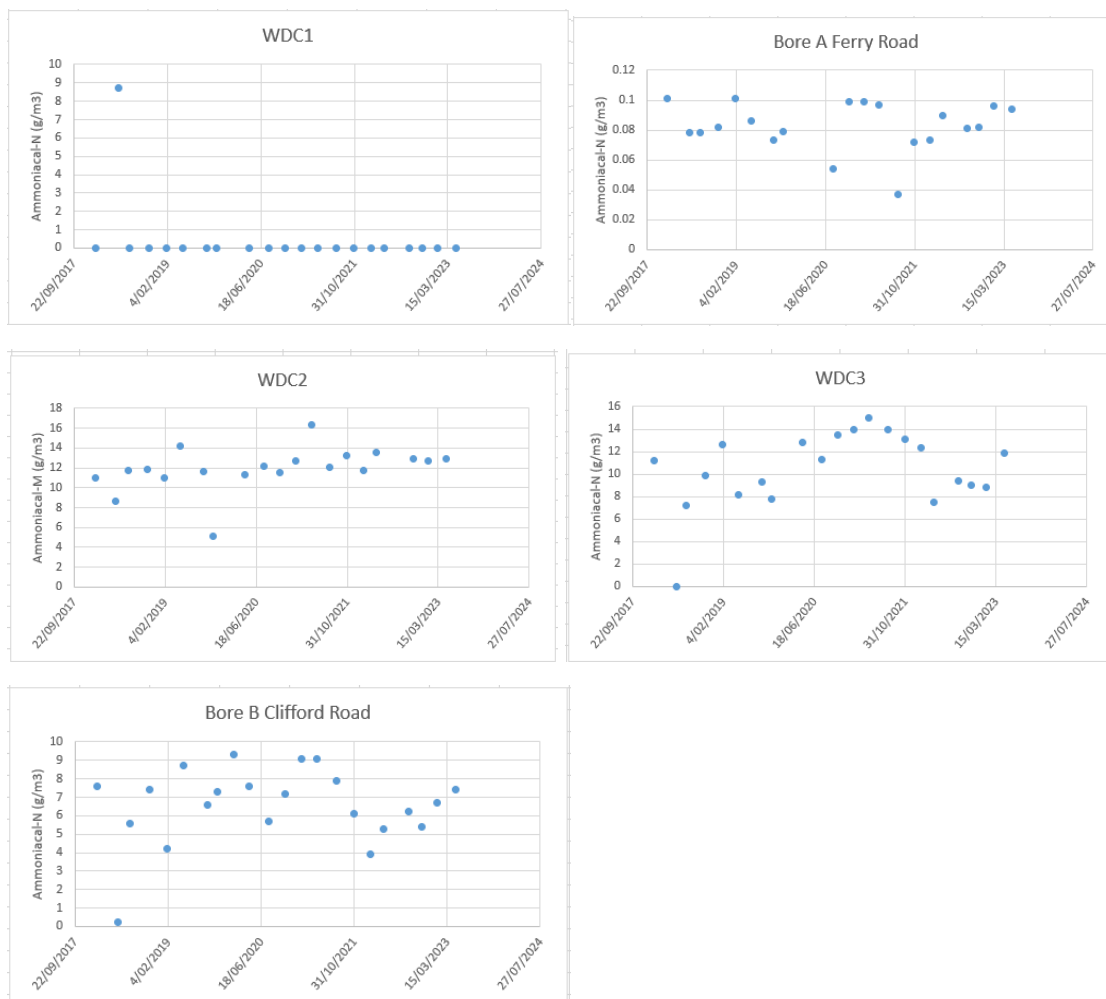


Figure 26: Ammoniacal-N concentration in groundwater monitoring bores from 2018 – 2023 (includes raw data correction in 2022/23)

### 3.2.2. Faecal indicator bacteria

*E. coli* and faecal coliform numbers measured during sampling in 2022/23 are tabulated in Table 13 and shown on Figure 27 and Figure 28, respectively.

*E. coli* and faecal coliform numbers in groundwater were mostly not detected in either the control or effects bores. However there was a spike in both populations in the laboratory results for the April 2023 WDC1 bore, which is a control bore upgradient of the direction of groundwater flow through/beneath the plant. It is considered likely that results from the WDC 1 were swapped with WDC 3 therefore data correction of results has been undertaken in the graphs, table and spreadsheet. However, this observed spike was a unique “one-off” event. Any confusion over bore location will be resolved through future sampling now that the site map has been reconciled with container labels and staff have been provided additional details to clarify the bore locations.

Table 14: Escherichia coli and faecal coliforms in Kaiapoi WWTP groundwater monitoring bores.

Bore	Escherichia coli (cfu/100mL)				Faecal coliforms (cfu/100 mL)			
	Aug 22	Oct 22	Jan 23	April 23	Aug 22	Oct 22	Jan 23	April 23
<b>WDC1 (control)*</b>	<1	<1	<1	<1	2	<1	<1	<1
<b>A Ferry Road (control)</b>	<1	<1	<1	<1	<1	<1	<1	<1
<b>WDC2 (effect)</b>	<1	<1	<1	2	<1	<1	<1	2
<b>WDC3 (effect)*</b>	<1	<1	<1	3,800	<1	<1	<1	4,500
<b>B Clifford Road (effect)</b>	<1	<1	<1	4	<1	<1	<1	4

\*Data correction has been applied to WDC1 (control) and WDC3 (effect) bores for the April 2023 result as discussed above.

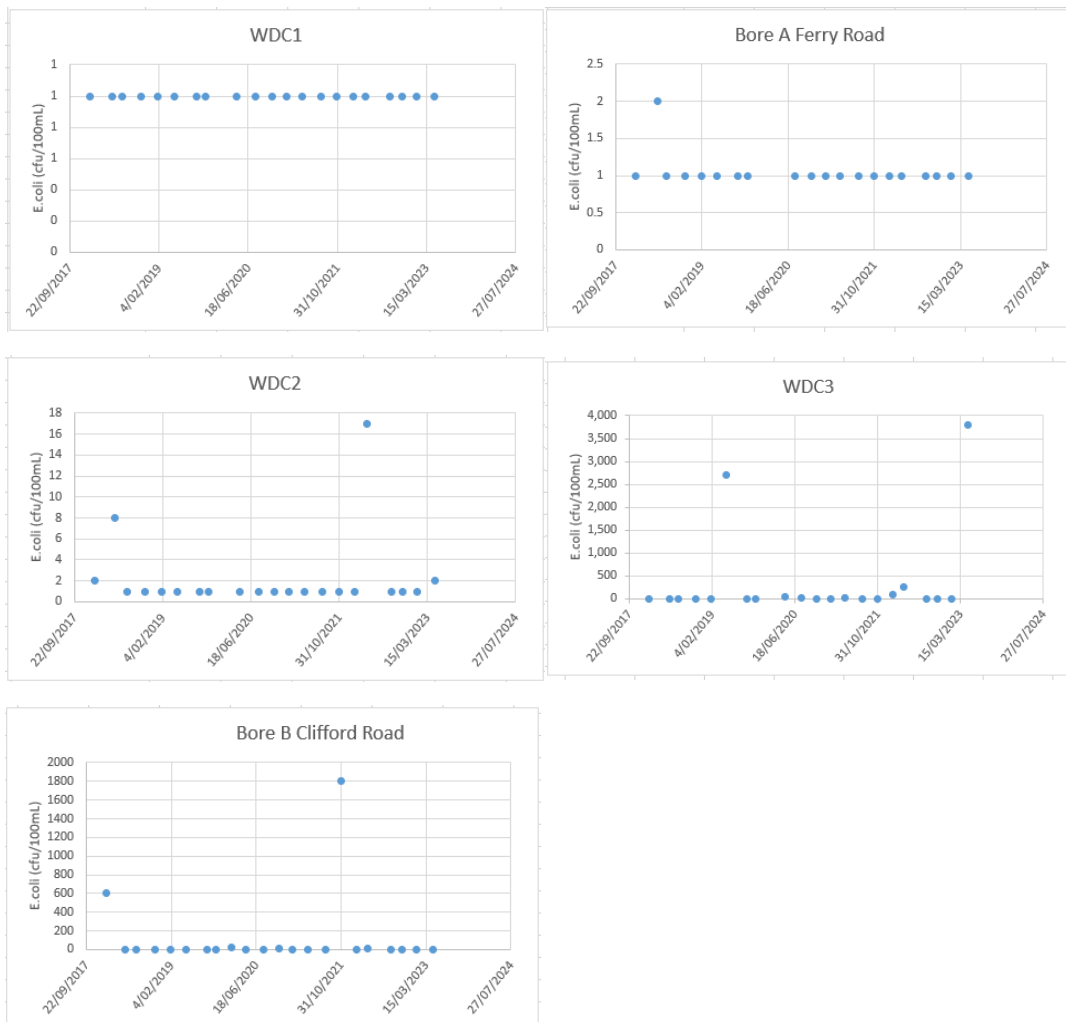


Figure 27: Escherichia coli in Kaiapoi WWTP monitoring bores between 2018 and 2023

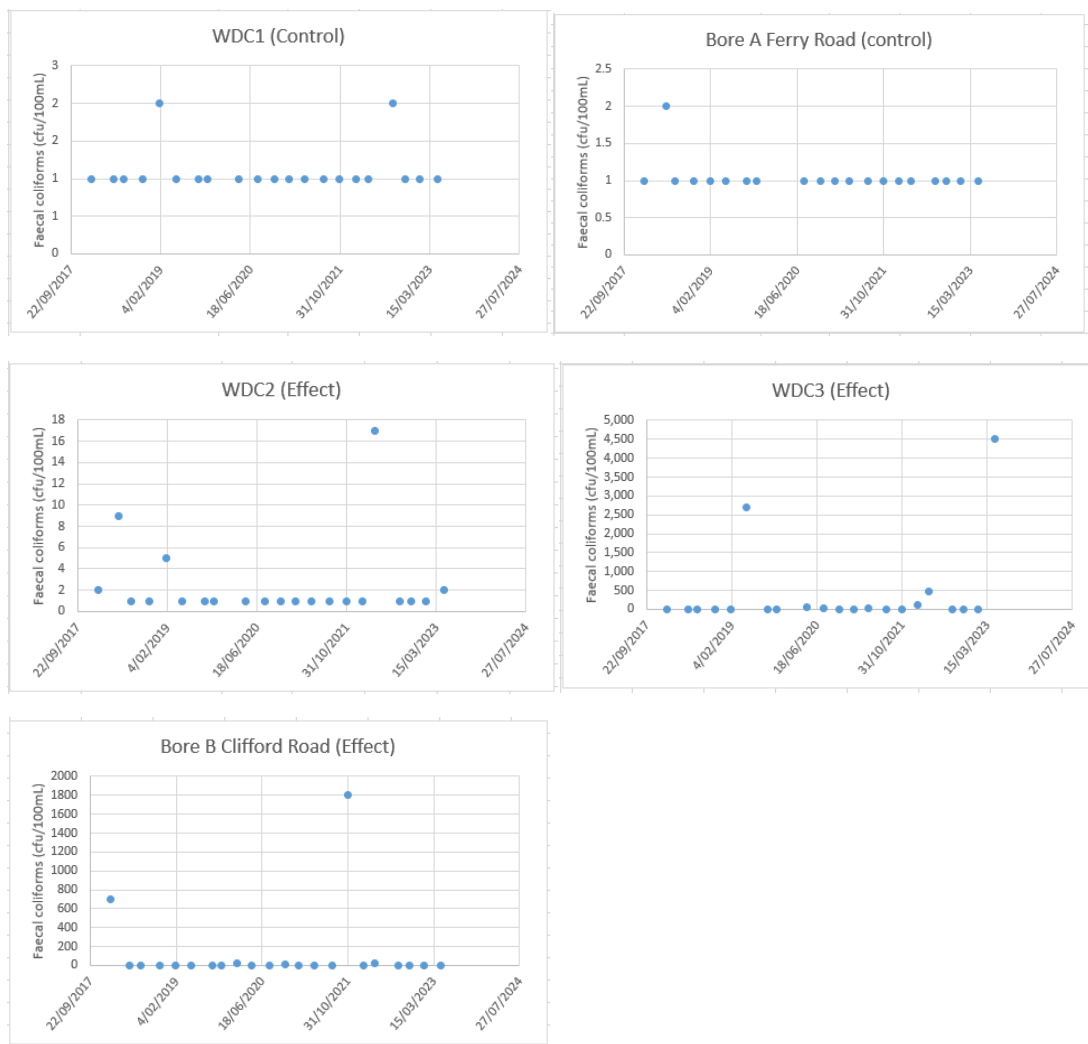


Figure 28: Faecal coliforms in Kaiapoi WWTP monitoring bores between 2018 and 2023

### 3.3. Condition 6 – Operating and Reporting

There were no major works undertaken at the Kaiapoi WWTP in the 2022/23 monitoring period.

### 3.4. Summary of Compliance – CRC041049

WDC has complied with the monitoring and reporting requirements of resource consent CRC041049 (Table 14). Groundwater monitoring of five bores in the vicinity of Kaiapoi WWTP in 2022/23 indicated that the WWTP influences groundwater quality down gradient with increasing levels of Ammoniacal-N in shallow groundwater, similar to that identified in previous monitoring periods.

Table 15: Summary of compliance for 2022/23 under CRC041049.

Consent condition	Description	Compliance
Condition 2	Groundwater monitoring	Full compliance
Condition 6	Annual reporting	Full compliance

## 4. CRC168391 – FROM WOODEND WASTEWATER TREATMENT PLANT

### 4.1. Overview

The Woodend WWTP is located approximately 23 km north of Christchurch (Figure 29) and receives wastewater from Woodend, Waikuku Beach, Pegasus, Tuahiwi and Woodend Beach. The WWTP consists of two inlet screens, three aeration basins, two settling ponds and a wetland. Treated wastewater passes through an ultraviolet (UV) disinfection system before being pumped to the ocean outfall in Pegasus Bay between The Pines Beach and Woodend Beach, north of the Waimakariri River mouth.



Figure 29: Location of Woodend WWTP and groundwater monitoring sites.

Resource consent compliance for the period 1 July 2022 to 30 June 2023 (the monitoring period) has been assessed using monitoring data provided by WDC. WDC undertakes additional monitoring at the WWTP which, although is not required by the consent, is included in this report where relevant.

## 4.2. Conditions 5 – 6: Seepage

### 4.2.1. Record keeping for daily volumes

The resource consent requires WDC to keep records of daily volumes received by the Woodend WWTP and daily volumes discharged to the ocean outfall. As shown in Figure 30, the Woodend WWTP receives influent wastewater from six wastewater pump stations. These are:

- Gladstone Road pump station
- Petries Road pump station
- Woodend Beach pump station
- Waikuku Beach WWTP
- Pegasus Main Street pump station
- Mary Ellen Street pump station
- Kesteven Place pump station

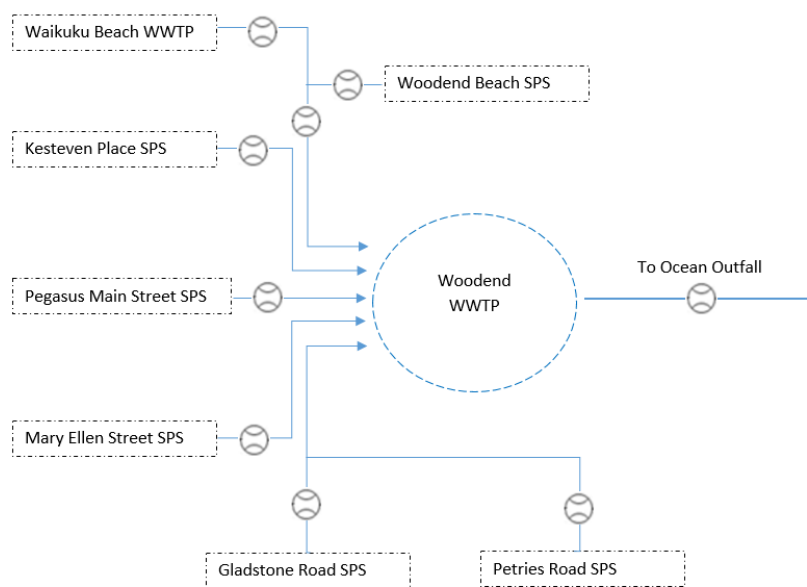


Figure 30: Schematic Woodend sewer network

Inflow records from the electromagnetic flow meters at Gladstone Road, Petries Road, Woodend Beach, Waikuku Beach WWTP, Pegasus Main Street, Mary Ellen Street and Kesteven Place for the monitoring period were recorded by the WDC SCADA system. These volumes are presented as the combined daily inflow volumes mapped alongside rainfall data from the Woodend, Gladstone weather station for the corresponding period on the same figure for comparison.

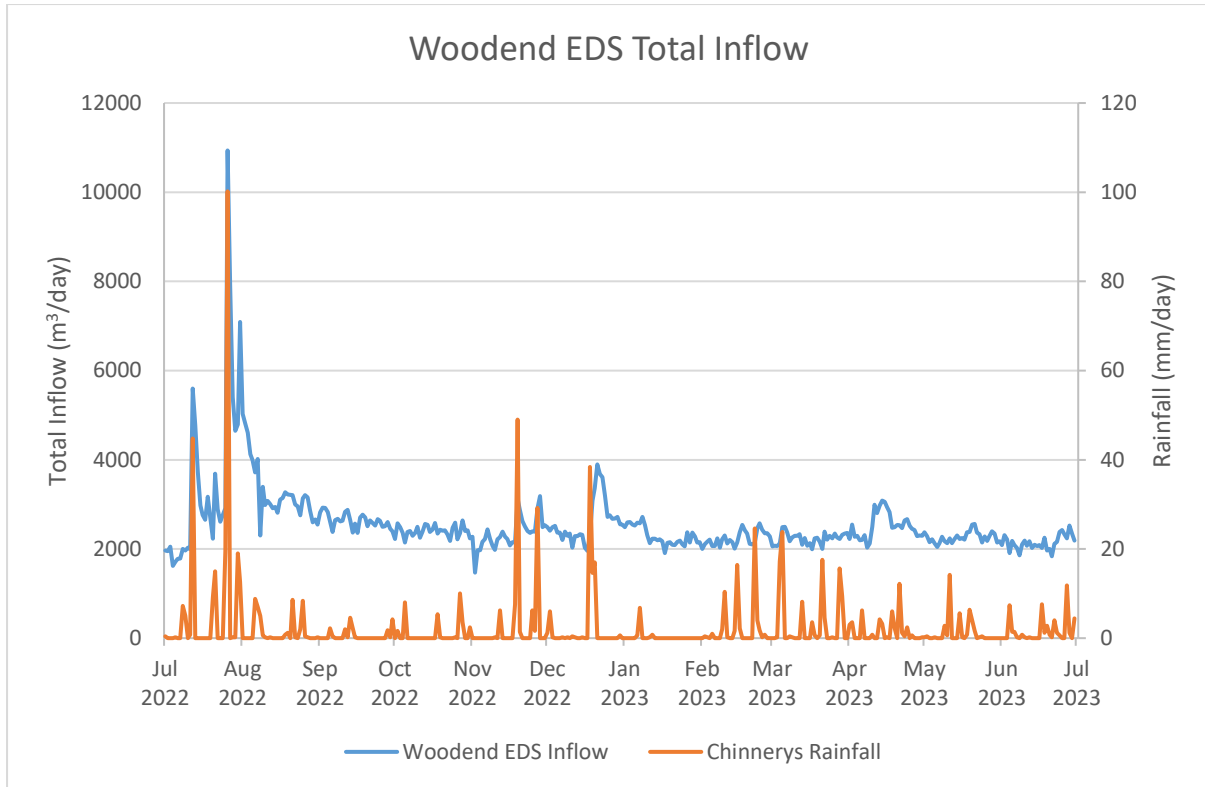


Figure 31: Daily inflow volumes July 22 – June 2023 plotted with rainfall at Woodend.

Outflow data is measured by an electromagnetic flow meter and logged via a SCADA system. Flows from Woodend WWTP to the ocean outfall for the 2022/23 monitoring period are shown in Figure 32. Flow data for the Woodend WWTP is available in TRIM 230719108975 (see Appendix C).

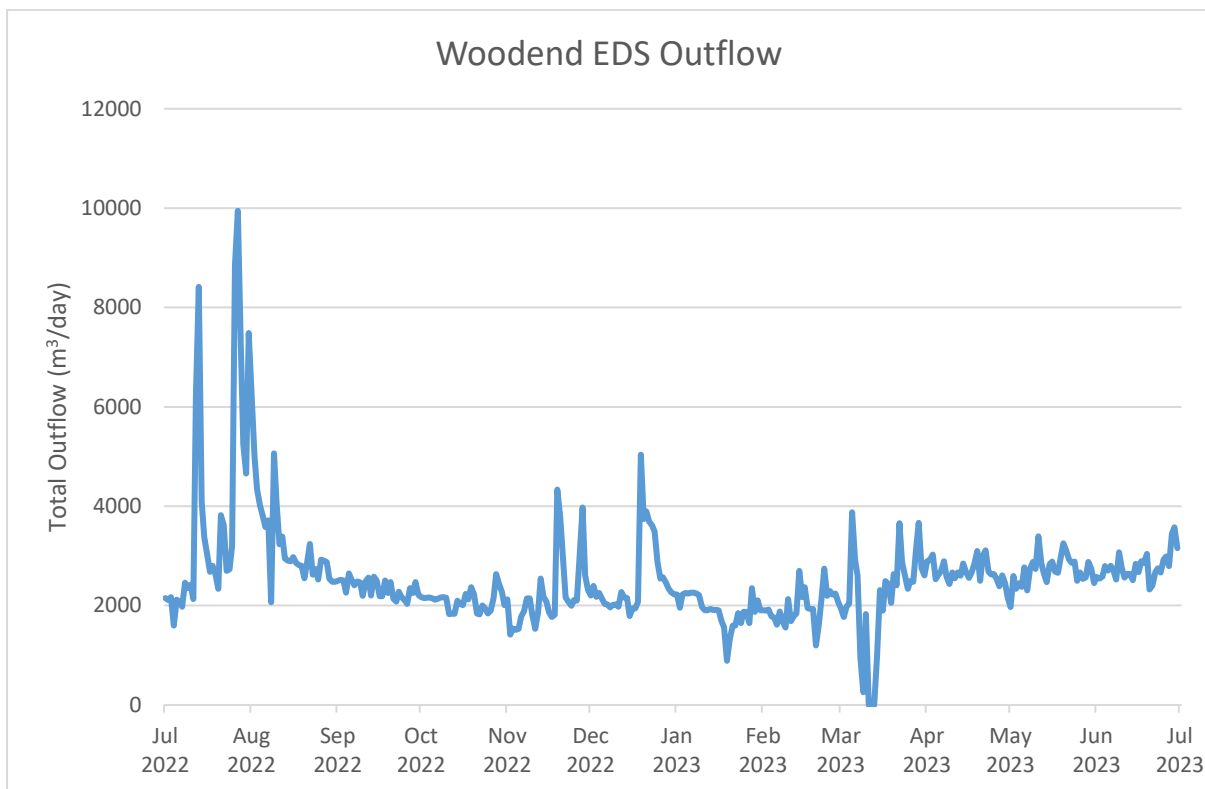


Figure 32: Daily outflow volumes (m³/day) from Woodend WWTP to ocean outfall July 2022 to June 2023

#### 4.2.2. Daily seepage discharge volumes

The resource consent states that the volume of treated wastewater discharged via seepage should be calculated by subtracting the volume of wastewater discharged to the ocean outfall from the volume of wastewater received at the WWTP. Calculated seepage volumes for the monitoring period are shown in Figure 33. Please note seepage values will not be accurate when either inflow or outflow data is missing, such as during the period from 8 to 14 March 2023. During this short period it appears from the above “outflow” graph that the data “drops out”. The prescribed method for calculating the discharge via seepage also does not account for:

- Pond / Wetland attenuation and fluctuating water levels
- Rainfall
- Evaporation from pond/wetland water surfaces and evapotranspiration from wetland plants
- Pond buffering (this can be significant during changes in plant operation)

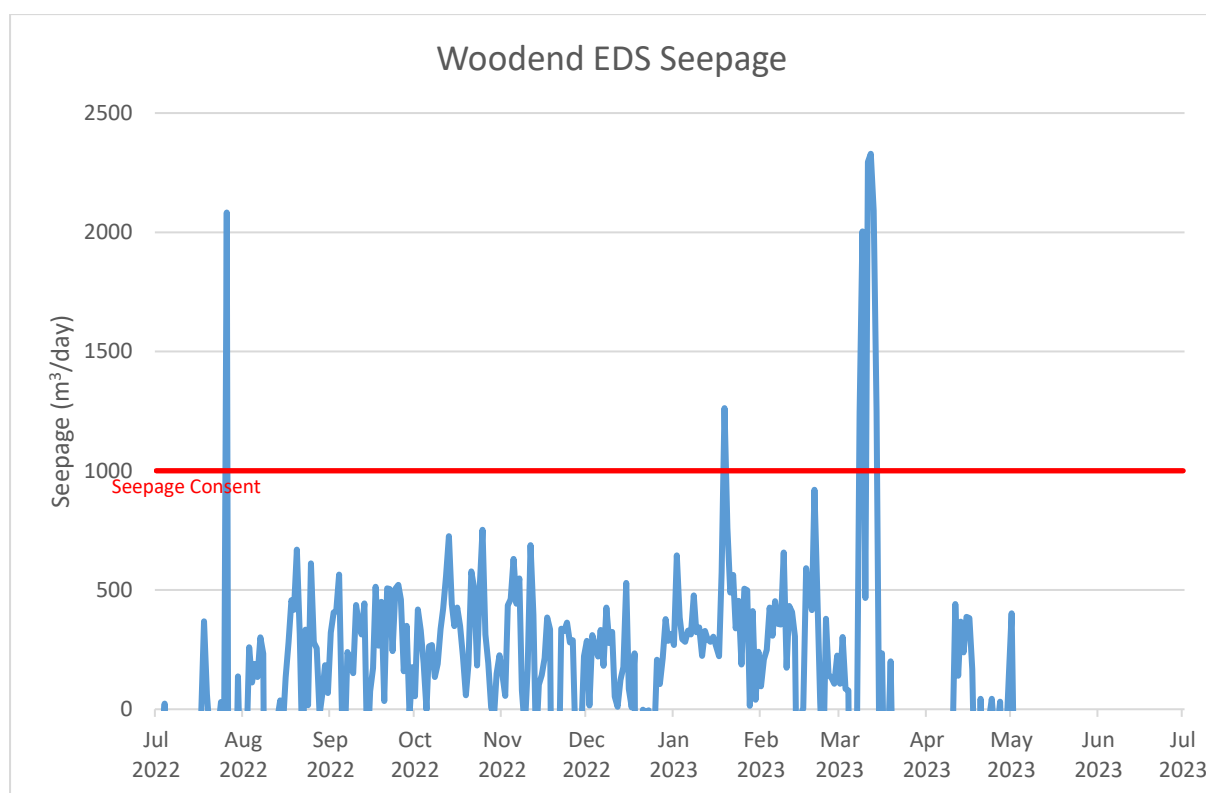


Figure 33: Calculated daily seepage volumes ( $m^3/day$ ) July 2022 to June 2023

Condition 5 states that;

“the volume of treated effluent discharged to land via seepage shall not exceed 1000 cubic metres per day.”

The data shows that over the 2022/23 monitoring period WDC has generally complied with the daily seepage volume consent limit of 1,000  $m^3/day$ . However, the calculated seepage volumes using the method prescribed in the consent exceeded the consented limit on one occasion on the 26 July 2022 (refer Figure 33). This occurred in a day with high inflow (26 July) followed immediately by high outflow on the subsequent day (27 July) (refer Figures 31 and 32). The difference between the inflow and outflow under these conditions is due to a temporary (around 24 hour) increase in storage levels within the ponds and wetlands rather than any actual discharge to land via seepage. The data indicates

the timeframe of conveyance of effluent through the plant between the inlet and outlet during the treatment process. The seepage data also shows the progression of effluent through the plant as the calculated seepage rates became very low over the days following the exceedance event.

The other seepage event on 19 January 2023 occurred during a sudden drop in discharge volume because of pump operation and pond water level buffering during that day. There was no corresponding variation of plant inflow from usual levels. This result is considered an outlier in terms of pump cycles and volume discharged and is considered unlikely to represent a material seepage to ground.

The apparent consent limit exceedance on 11 and 12 March 2023 occurred because of a water meter recording failure over the period from 8 March to 14 March (see raw data Appendix C). During this period the water meter did not accurately record, or ceased to record, the level of outflow from the plant. During this timeframe only the plant inflow was recorded, which means the inflow volume without subtracting the outflow was recording values higher than the consent limit. This is not a material consent breach but rather a meter recording error which has been subsequently corrected.

The data indicates that on average over the 2022/23 monitoring period verified, actual compliance with the daily seepage volume consent limit has been achieved.

### 4.3. Conditions 9 to 11 – Groundwater Monitoring

#### 4.3.1. Monitoring requirements

Condition 9 of the resource consent requires two monitoring bores (south-east and west) to be sampled at three-monthly intervals. The south-east bore is located down-gradient of the WWTP and the west bore is located up-gradient (Figure 29 above).

In accordance with the Groundwater Monitoring Plan (WDC 2008), which is required under Condition 15, WDC began monitoring two domestic bores in February 2007, located on the Robinson and McKenzie properties directly to the west (up-gradient) of the WWTP (also shown in Figure 29 above). Although the bores on these properties are consented for domestic water supply, both properties have an alternative water source supplied by WDC where they now receive a restricted water supply (2 m<sup>3</sup>/day) from the Woodend water supply.

#### 4.3.2. Depth to groundwater

Depth to groundwater was measured in the south-east and west bores on 4 occasions, as required, during the 2022/23 monitoring period (Table 15). Therefore, compliance with Condition 10 was met in full.

The reason for the absence of groundwater depth data results for the McKenzie and Robinsons bores is that these are private water supplies, not able to be readily accessed by Council.

#### 4.3.3. Groundwater quality

Groundwater samples were collected and analysed for nitrate-N, ammoniacal-N and faecal coliforms, as per Condition 11. The results are shown in Figures 34 to 36 and summarised in Table 15 below. There are no consent limits for these parameters.



Table 16: Groundwater quality monitoring at Woodend WWTP from July 2022 to June 2023.

Sample	Bore	Top Water Level (m)	Ammoniacal-N (g/m <sup>3</sup> )	Nitrate-N (g/m <sup>3</sup> )	Faecal coliforms (cfu/100ml)
19 August 2022	McKenzie (up-gradient)	N/A	<0.010	<0.002	<1
	Robinsons (up-gradient)	N/A	0.015	<0.002	80
	West (up-gradient)	3.6	0.94	<0.02	<1
	South-east (down-gradient)	3.2	<0.010	32	<1
27 October 2022	McKenzie (up-gradient)	N/A	<0.010	<0.002	<1
	Robinsons (up-gradient)	N/A	<0.10	0.04	<1
	West (up-gradient)	3.5	0.96	<0.002	<1
	South-east (down-gradient)	3.0	0.038	15.8	<1
17 January 2023	McKenzie (up-gradient)	N/A	<0.010	<0.002	<1
	Robinsons (up-gradient)	N/A	0.012	<0.002	<1
	West (up-gradient)	3.5	0.92	<0.02	<1
	South-east (down-gradient)	5.5	0.112	24	<1
28 April 2023	McKenzie (up-gradient)	N/A	<0.010	<0.002	<1
	Robinsons (up-gradient)	N/A	<0.010	<0.02	<1
	West (up-gradient)	3.5	0.99	<0.02	<1
	South-east (down-gradient)	2.8	0.13	29	<1

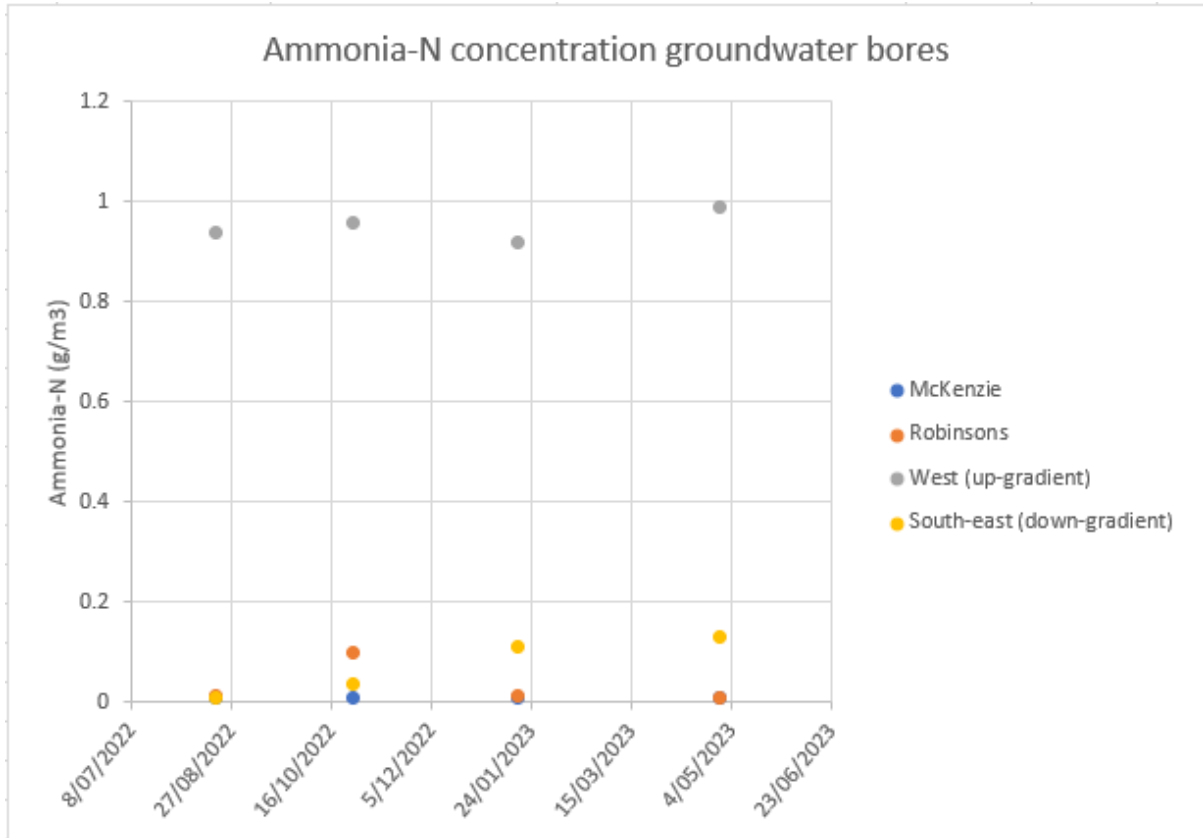


Figure 34: Ammoniacal-N concentration on groundwater monitoring bores from July 2022 to June 2023

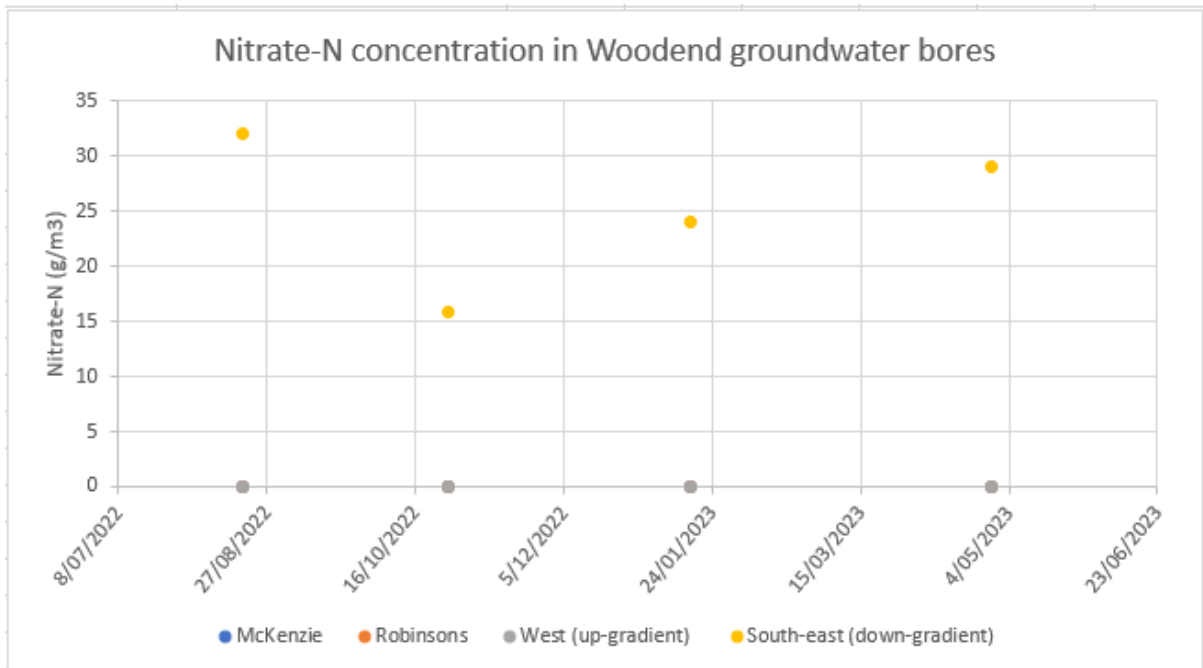


Figure 35: Nitrate-N concentration in groundwater monitoring bores from July 2022 to June 2023

As can be seen from these graphs and above table, Nitrate-N levels are elevated in the groundwater bore down-gradient of the Woodend WWTP, but mostly below detection in the other bores. Ammoniacal-N concentrations were only elevated in the west (up-gradient bores) in the past year,

which would likely have a different source than seepage from the Woodend WWTP discharge into groundwater.

Faecal coliforms were detected in only the Robinson bore (80 cfu/100 mL, August 2022). Any results lower than detection are graphed as one.

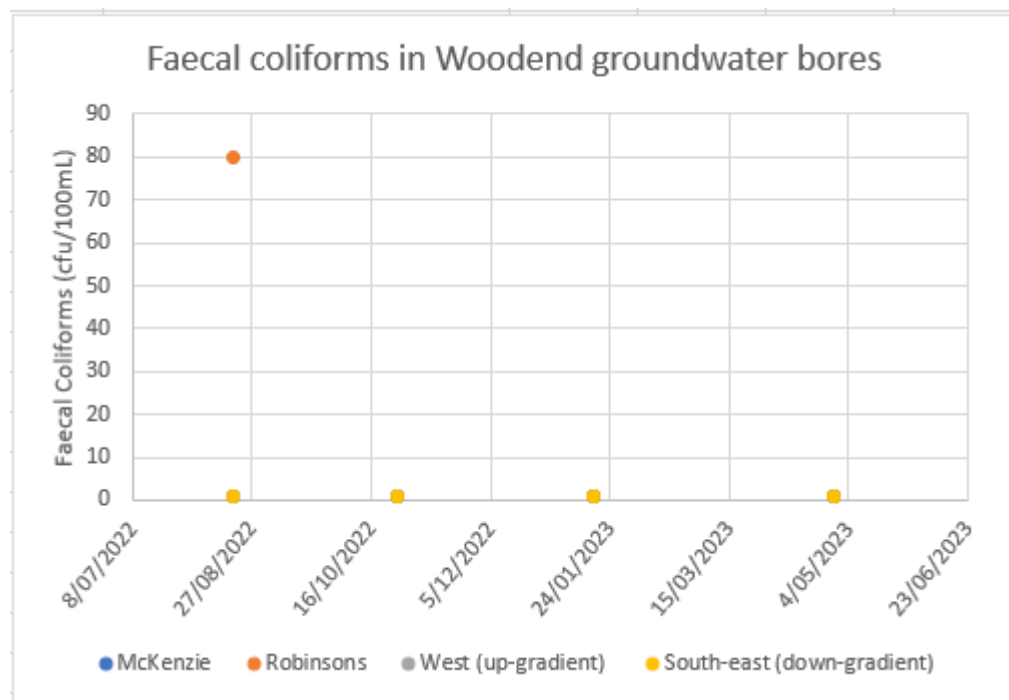


Figure 36: Faecal coliforms numbers in groundwater monitoring bores from July 2022 to June 2023

#### 4.4. Operations and Maintenance

During the 2022/23 monitoring period there were no major capital works. The plant operation and maintenance has been standard with no significant unplanned maintenance required.

#### 4.5. Summary of Compliance – CRC168391

Record keeping of wastewater volumes complied with the requirements of the resource consent and enabled seepage volumes to be calculated. Seepage volumes for the 2022/23 monitoring period met the requirements of Conditions 5 and 6.

Groundwater monitoring records for 2022/23 were complete, with groundwater levels (at the two bores where it is possible to take readings; some of the well heads are sealed) and water quality samples being collected on four occasions. Therefore, the requirements of Conditions 9, 10 and 11 were met in full.

The groundwater monitoring undertaken in 2022/23 indicates that:

- Ammoniacal-N concentrations in groundwater down-gradient of the Woodend WWTP were lower than that measured from the up-gradient west bore during the 2022/23 year. The Woodend WWTP has historically been a likely contributor to elevated ammoniacal-N concentrations in down-gradient groundwater. Elevated ammonia in the up-gradient west bore in the most recent monitoring year would likely have another source in the surrounding land use rather than the WWTP discharge. The results in the up-gradient west bore are

however within the historic range (<2 g/m<sup>3</sup>) (see Appendix G “Woodend WWTP Groundwater” for the long-term data history records).

- The long-term trend in Ammoniacal-N in the south east bore is for levels to fluctuate from “below detection” in some years to elevated above 2 g/m<sup>3</sup> in other years. There is a long-term fluctuation tendency in this data rather than any notable increase or decrease trend over time (see Appendix G “Woodend WWTP Groundwater” for long-term data history records).
- Nitrate-N concentrations in the down gradient bore have elevated levels compared to the up-gradient bores. On review of data over a 14 year period the concentrations of Nitrate-N have reduced. Prior to 2009 levels were recorded at 95 g/m<sup>3</sup>. Concentrations in the down gradient bore have stabilised in the last 5 years (see Appendix G “Woodend WWTP Groundwater” for data history records).

Overall, WDC has achieved compliance with the conditions of resource consent CRC168391.

## 5. CRC031724 – DISCHARGE TO JOCKEY BAKER CREEK

### 5.1. Monitoring and Reporting Requirements

Resource consent CRC031724 was granted in 2004 to drain groundwater from subsoil drains and toe drains around the infiltration wetland into the coastal marine area of Jockey Baker Creek in the vicinity of Ferry Road, Kaiapoi.

In the event a discharge occurs into Jockey Baker Creek an alarm is raised in SCADA to inform the operators the event has occurred. If this occurs samples are to be taken as per Conditions 5 and 6.

The consent CRC031724 has been rarely exercised since the commissioning of the Ocean Outfall. During high rain events, the discharge via sub-surface drains to the Jockey Baker Creek has become effectively obsolete since the commissioning of the ocean outfall in 2006.

The consent has however been retained by the Council because it allows a discharge of any surplus stormwater from a ‘toe’ drain that surrounds the wetlands. This discharge occurs only during high rainfall events, when the toe drain flow exceeds 5 litres a second. This is expected to be a rare event and the discharge will be almost entirely storm run-off, not effluent.

Retention of the consent ensures the Council can continue to divert any surplus runoff away from the plant’s effluent treatment system so as to not overwhelm it and assist it to avoid any reduction in effectiveness of the wastewater treatment.

There was no discharge into Jockey Baker Creek during the 2022/23 monitoring period.

## 6. CRC145027 – DESLUDGING AT RANGIORA WASTEWATER TREATMENT PLANT

### 6.1. Monitoring and Reporting Requirements

Resource consent CRC145027 was granted in October 2014 to permit the discharge of dewatered sludge removed from wastewater Pond 1A at the Rangiora WWTP to land. Sludge is suction dredged, then piped via a closed system to geotextile bags for storage and dewatering.

The existing geotextile bags are slowly dewatering, Council will be assessing long term options for disposal of the biosolids in the future.

The monitoring requirements are set out in Conditions 16 and 17:

*Condition 16*

“On completion of the pond dredging operation and commencement of the dewatering phase, the consent holder shall either:

- a) Sampling the drainage water from the dewatering/dewatered sludge at six monthly intervals for the following parameters:
  - Arsenic
  - Copper
  - Cadmium
  - Chromium
  - Lead
  - Mercury
  - Nickel
  - Zinc, with all metals in the soluble form; and
  - Total Nitrogen
  - Ammoniacal Nitrogen
  - Dissolved Reactive Phosphorus; or
- b) A subsequent sampling regime and timeframe that has received written approval from the Chief Executive of the Canterbury Regional Council or delegate shall be undertaken.”

*Condition 17*

“The consent holder shall either:

- a) Monitor the downstream monitoring bore M35/9177 at six monthly intervals (generally September and April) for the following parameters:
  - pH
  - Ammoniacal Nitrogen
  - Total Nitrogen
  - Metals (Zinc, Copper and Arsenic in the soluble form); or
- b) A subsequent sampling regime and timeframe that has received written approval from the Chief Executive of the Canterbury Regional Council or delegate shall be undertaken.”

The reporting requirements are set out in Condition 20 and state that the annual report is to include the following details:

- The discharge point of drainage water.
- Findings of the three monthly inspections of the liner, bund and drainage.
- Results of laboratory analyses undertaken in the previous 12-month period.
- Details of any spills.

## 6.2. Monitoring Results

### 6.2.1. Drainage water discharge point

All discharge from the discharge chamber is currently pumped back into Pond 1A at the Rangiora WWTP. There is no intention to move the discharge of drainage water to land discharge. Drainage water will be permanently discharged to the treatment plant for further treatment.

### 6.2.2. Three monthly inspections

Inspections of the sludge pond are done on a weekly basis, which is more regular than the three-monthly frequency required by the resource consent. There have been no reports of any issues associated with the liner, pump, bund or drainage from the sludge pond during the 2022/23 monitoring period.

### 6.2.3. Laboratory analyses

Samples from the sludge pond pump chamber and M35/9177 were collected on the following dates:

- 30 August 2022
- 28 February 2023

If the discharge is below the trigger levels, the drainage water can be discharged direct to ground. Condition 16 of the resource consent requires two samples to be collected annually, at six monthly intervals, thus compliance with the monitoring requirements of Condition 16 was met during the 2022/23 monitoring period.

Table 17: Dewatering sample results and comparison with trigger values.

Parameter (gm/m <sup>3</sup> )	30 August 2022	28 Feb 2023	Trigger Levels <sup>1</sup>
<b>Arsenic</b>	<0.02	<0.02	0.2
<b>Cadmium</b>	0.023	0.0196	
<b>Chromium</b>	<0.010	<0.010	
<b>Copper</b>	1.24	1.49	
<b>Lead</b>	0.01	0.011	
<b>Mercury</b>	<0.00008	<0.00008	
<b>Nickel</b>	0.139	0.142	1.6
<b>Zinc</b>	11.4	9.6	30
<b>Total Nitrogen</b>	42	37	224
<b>Ammoniacal-N</b>	19.1	5.3	30
<b>Dissolved Reactive Phosphorus</b>	0.043	0.019	

Condition 17 of the resource consent requires two samples to be collected annually, at six monthly intervals. Therefore, compliance with the requirements of Condition 17 were met in full during the 2022/23 monitoring period.

The results are shown in Table 17 and compared with 80% of the relevant maximum allowable value (MAV) reported in the New Zealand Drinking-Water Standards (NZDWS). Condition 14 states that should subsequent groundwater monitoring under Condition 17 show an upward trend extending

<sup>1</sup> If monitoring data is below the trigger level drainage from the liner can be discharged direct to ground.

over four consecutive sampling events, or a trigger level reaches 80% of the relevant MAV, then the discharge of dewatering water to land must cease and be returned to the treatment pond. All parameters recorded concentrations less than their respective 80% of MAV (where applicable), while pH was within the recommended range (MoH 2008). No trends are evident from review of the groundwater data in the below table.

It is noted that WDC is not discharging to land so groundwater quality will not be affected by the sludge pond.

Table 18: Groundwater monitoring results for Bore M35/9177.

Parameter	31 <sup>st</sup> August 2021	1 April 2022	30 <sup>th</sup> Aug 2022	28 <sup>th</sup> Feb 2023	80% of MAV <sup>2</sup>
<b>pH</b>	7.1	7.5	7.5	7.3	7.0-8.52
<b>Total Nitrogen</b>	0.85	0.93	0.47	1.21	-
<b>Ammoniacal-N</b>	<0.010	<0.010	0.052	<0.010	1.2
<b>Soluble Arsenic</b>	<0.0010	<0.0010	<0.0010	<0.0010	0.008
<b>Soluble Copper</b>	<0.0005	<0.0005	<0.0005	<0.0005	1.6
<b>Soluble Zinc</b>	0.0021	<0.0010	<0.0010	<0.0010	1.2

#### 6.2.4. Spills

There were no spills during the 2022/23 monitoring period.

#### 6.3. Operations and Management

There have been no significant operational changes that have an effect on CRC145027. The long-term plan for the discharge is to continue to return the drainage water back to the treatment plant. Discharge to ground will not be undertaken. Options to obtain a variation to the consent need to be assessed to provide for final disposal of the dewatered sludge, if required in future.

#### 6.4. Summary Compliance – CRC145027

The monitoring and sampling results completed during the 2022/23 monitoring period are fully comply with Conditions 16 and 17.

<sup>2</sup> Maximum Allowable Value as defined in the New Zealand Drinking Water Standards as at time of granting the consent.

## 7. CRC173124 – DISCHARGE CONTAMINANTS TO AIR - RANGIORA WASTEWATER TREATMENT PLANT

### 7.1. Monitoring and Reporting Requirements

The following is an extract from the consent that outlines the sampling requirements.

#### *Condition 2*

The wastewater treatment ponds and aeration basin shall be operated so that the dissolved oxygen concentrations of the wastewater in the ponds are maintained at levels of no less than two grams per cubic metre, based on the ten percentile of annual results during the hours of measurement as stated in Condition 3.

#### *Condition 3*

Dissolved oxygen levels shall be measured in each pond between the hours of 11am and 2pm on one day in every seven day period.

#### *Condition 4*

The consent holder shall maintain a record of dissolved oxygen measurements which shall include the following information:

- The date and time the measurements were taken; and
- Water temperature at the time the measurements were taken; and
- Dissolved oxygen concentrations; and
- Identification of the pond in which the measurements were taken.

The graph on the following page shows Dissolved Oxygen in the Rangiora WWTP Ponds (Pond 1A, Pond 1B, Pond 2 and Pond 3), for which a minimum level of 2 mg/L is required to be maintained for the 10 percentile of annual results.



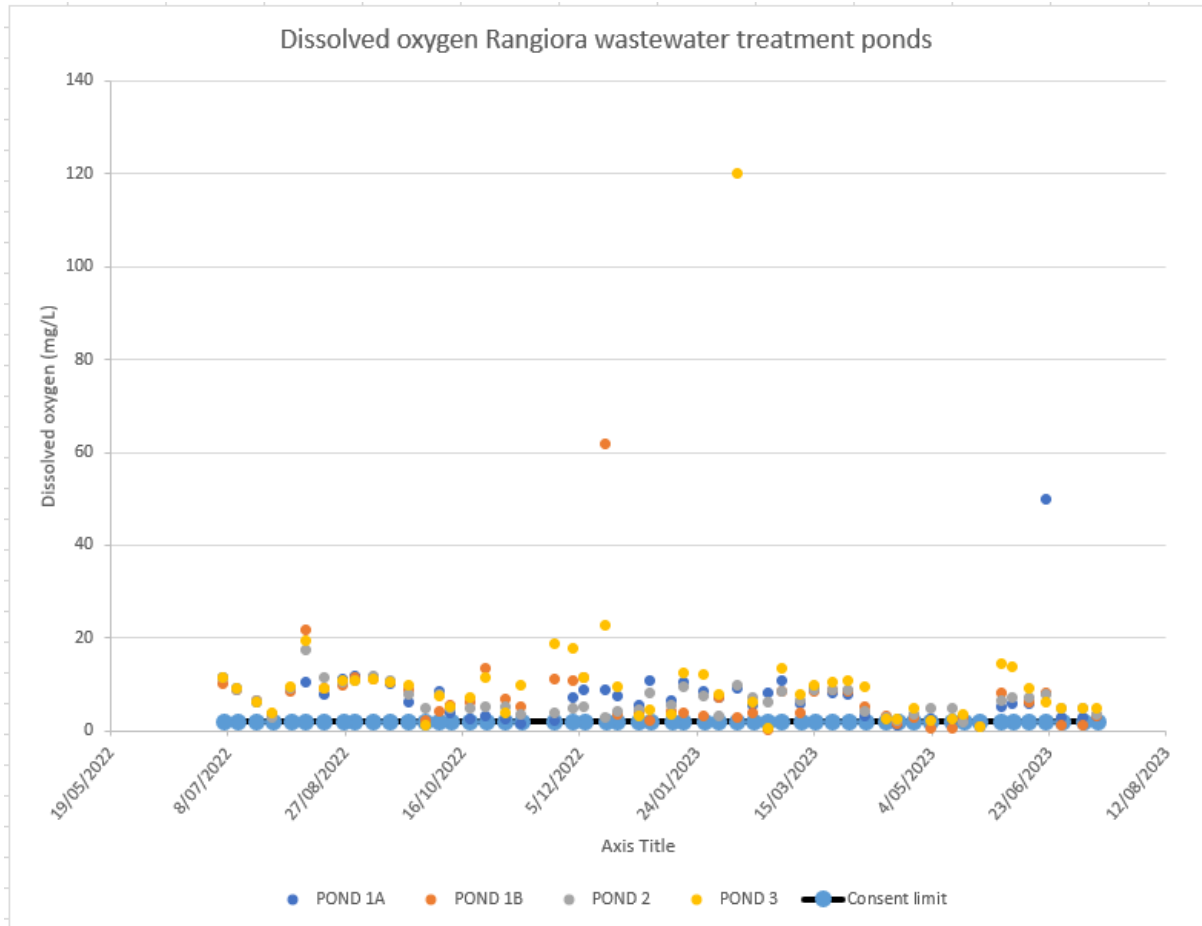


Figure 37: Dissolved Oxygen in Rangiora WWTP ponds July 2022 to June 2023

The 10 percentile of annual results is:

2.24mg/L	Pond 1A
1.23mg/L	Pond 1B
2.9mg/L	Pond 2
2.5mg/L	Pond 3

Results for Pond 1B were particularly low during some weeks in May and June 2023. However the 10<sup>th</sup> percentile for all annual data from all ponds combined is 2.3mg/L. Therefore the pond Dissolved Oxygen annual data combined met the 10 percentile for annual results measure of no less than 2mg/L (see Appendix I for raw data records).

The data shows Conditions 2 and 4 have been met and Condition 3 mostly met. The operators visit the sites weekly and record the data that is electronically recorded. This data has been forwarded to ECAN electronically and is available upon request. It is noted in recent years some of the samples were not taken within required timeframes. WDC has now put in place measures to ensure compliance with Condition 3 in the future, sampling within 11am until 2pm as far as achievable within available resources.

Note that Conditions 9, 10, 11, 12 are no longer applicable. These relate to the using of sprays that were used to remove NH4. These have been decommissioned.

## 7.2. Odour Complaints

There were no odour complaints for the 2022/23 monitoring period (see Complaints Register in Appendix K).

## 7.3. Summary of Compliance

Compliance has been fully met for CRC173124.

