Waimakariri District Council

Utilities and Roading Committee

Agenda

Tuesday 10 December 2024
1pm

Council Chambers
215 High Street
Rangiora

Members:

Cr Joan Ward (Chairperson)
Cr Robbie Brine
Cr Niki Mealings
Cr Philip Redmond
Cr Paul Williams
Mayor Dan Gordon (ex officio)

WAIMAKARIRI
DISTRICT COUNCIL

AGENDA CONTENTS – UTILITIES AND ROADING COMMITTEE

The Chairperson and Members
UTILITIES AND ROADING COMMITTEE

A MEETING OF THE UTILITIES AND ROADING COMMITTEE WILL BE HELD IN THE COUNCIL CHAMBER, RANGIORA SERVICE CENTRE, 215 HIGH STREET, RANGIORA, ON TUESDAY 10 DECEMBER 2024, AT 1PM.

Sarah Nichols
GOVERNANCE MANAGER

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

BUSINESS

Page No

1 APOLOGIES

2 CONFLICTS OF INTEREST

Conflicts of interest (if any) to be reported for minuting.

3 CONFIRMATION OF MINUTES

3.1 **Minutes of the meeting of the Utilities and Roading Committee held on Tuesday, 19 November 2024.**

8 – 19

RECOMMENDATION

THAT the Utilities and Roading Committee:

(a) **Confirms** the circulated Minutes of the meeting of the Utilities and Roading Committee held on 19 November 2024 as a true and accurate record.

3.2 **Matters Arising (From Minutes)**

4 DEPUTATION/PRESENTATIONS

Nil.

5 REPORTS

5.1 **School Cycle Skills Education Programme "Cycle Sense" – Joanne McBride (Roading and Transport Manager) and Peter Daly (Road Safety Coordinator/Journey Planner)**

20 – 25

RECOMMENDATION

THAT the Utilities and Roading Committee:

(a) **Receives** Report No. 241127209580.

(b) **Notes** that Cycle Sense is an established Cycle Skills Education Programme being delivered in schools in the Waimakariri District.

(c) **Notes** that training has been delivered to 752 Year six students across 22 schools over the last 12 months.

(d) **Notes** that there are no other similar training programmes on offer or available through other agencies at this time.

(e) **Notes** that the current contract will run until 30 June 2025 at a scaled-back scope.

(f) **Notes** that the current budgets set through the Long-Term Plan allow for the continuation of scaled-back cycle skills training in schools to the value of $60,000.

(g) **Circulate** this report to Community Boards for their information.

5.2 **Herbicide Update and Usage by Council and Contractors in 2023/24 – Sophie Allen**

26 – 38

RECOMMENDATION

THAT the Utilities and Roading Committee:

(a) **Receives** Report No. 241111199427.

(b) **Notes** that herbicide use is minimised where possible for Council operations and only used where deemed necessary by Council staff and contractors. Other (i.e. mechanical) weed control options are used where they are deemed more appropriate.

(c) **Notes** the herbicides and their use are as approved by the Environmental Protection Authority (EPA).

(d) **Notes** the specific recommendations for the improvement of the Council practices as contained in section 4.29 of the report (Trim 241111199427).

(e) **Notes** that spraying over water by Council and its contractors is very limited, with a preference for mechanical maintenance for rural drains and stockwater races. If spraying is carried out, it is following consent CRC120402 and glyphosate 360 is applied for this. No diquat has been used by the Council in 2023-24, although permitted by CRC120402.

(f) **Notes** that the budgets in the LTP 2024-34 have been based on continuing to use herbicides, including glyphosate, for weed control, where deemed necessary by Council staff and contractors.

(g) **Notes** that the Environmental Protection Authority decided not to review the herbicide glyphosate in 2024, as there was insufficient evidence that an update was required from the previous review conducted in 2016.

(h) **Notes** the planned review of polyoxyethylene amine (POEA) surfactants commonly used with herbicides by the Environmental Protection Authority due to claims that these surfactants should be restricted.

(i) **Circulates** this report to Community Boards, Drainage Advisory Groups and the Waimakariri Water Zone Committee.

5.3 **Rangiora Stormwater Annual Report 2023/24 and Monitoring Programme Report 2023/24 – Jason Recker (Stormwater and Waterways Manager) and Lorena Cardenas Corrales (3 waters Compliance Officer)**

39 – 239

RECOMMENDATION

THAT the Utilities and Roading Committee:

(a) **Receives** Report No. 241113201107.

(b) **Notes** that compliant results were achieved during wet weather events for total suspended solids in all urban waterways and total ammoniacal nitrogen; likewise, guideline values were met during dry weather sampling as an indicator of stream health components including values for dissolved oxygen, temperature, pH, total ammoniacal nitrogen and total suspended solids in all urban waterways.

(c) **Notes** that there were exceedances (non-compliances) during wet weather events of dissolved copper and dissolved zinc in some Rangiora waterways, and dissolved reactive phosphorus and *E. coli* in all Rangiora waterways, except Cam River; and during dry weather sampling guidelines were exceeded for conductivity (South Brook and No. 7 Drain), dissolved inorganic nitrogen and *E. coli*, with the last two also specifically showing exceeding results at three sites, two in South Brook and one in No. 7 Drain.

(d) **Notes** that trend analysis this year identifies an increasing trend for dissolved zinc in the North Brook (at Lilybrook Park), Middle Brook (at Bush Street) and in the North Drain (at Coldstream Road); an increase trend for dissolved copper in the Middle Brook (at Bush Street); a decrease trend of dissolved zinc in the South Brook (at Railway Road) and decrease trends at South Brook Pond C for dissolved copper and total suspended solids.

(e) **Notes** the follow-up investigations and further improvements summarised in section 4.3 of the report will be carried out by 3 Waters staff under existing budgets in 2024- 25.

(f) **Notes** that a Rangiora Stormwater Management Plan 2025-2040 is currently being drafted as required by CRC184601, which addresses exceedances and incorporates improvements presented in these reports.

(g) **Circulates** these reports to the Waimakariri Water Zone Committee, and the Rangiora-Ashley Community Board.

6 PORTFOLIO UPDATES

6.1 **Roading – Councillor Philip Redmond**

6.2 **Drainage, Stockwater and Three Waters (Drinking Water, Sewer and Stormwater) – Councillor Paul Williams**

6.3 **Solid Waste– Councillor Robbie Brine**

6.4 **Transport – Mayor Dan Gordon**

7 QUESTIONS UNDER STANDING ORDERS

8 URGENT GENERAL BUSINESS

9 MATTERS TO BE CONSIDERED WITH THE PUBLIC EXCLUDED

In accordance with section 48(1) of the Local Government Official Information and Meetings Act 1987 and the particular interest or interests protected by section 6 or section 7 of that Act (or sections 6, 7 or 9 of the Official Information Act 1982, as the case may be), it is moved:

That the public be excluded from the following parts of the proceedings of this meeting:

9.1 Confirmation of Public Excluded Minutes from 19 November 2024.
9.2 Contract 24/41 Rangiora Woodend Road Booster Main Stage 1 Tender Evaluation and Contract Award Report.
9.3 Contract 24/60 Water Main Crossing Wales Street Rail Corridor Tender Evaluation and Contract Award Report.
9.4 West Eyreton UV Treatment Upgrade – Tender Approval.
9.5 Contract 202480 309 High Street Demolition (Old Police Building) Report to Accept Invited Price.

The general subject of each matter to be considered while the public is excluded, the reason for passing this resolution in relation to each matter, and the specific grounds under section 48(1) of the Local Government Official Information and Meetings Act 1987 for the passing of this resolution are as follows:

CLOSED MEETING

See Public Excluded Agenda (separate document)

Item No.	Subject	Reason for excluding the public	Grounds for excluding the public.
9.1	Confirmation of Public Excluded Minutes from 19 November 2024	Good reason to withhold exists under Section 7	To enable any local authority holding the information to carry on, without prejudice or disadvantage, commercial activities LGOIMA 7(2)(h).
9.2	Contract 24/41 Rangiora Woodend Road Booster Main Stage 1 Tender Evaluation and Contract Award Report	Good reason to withhold exists under Section 7	To protect the privacy of natural persons and enable the local authority to carry on without prejudice or disadvantage, negotiations (including commercial and industrial) negotiations and maintain legal professional privilege. LGOIMA Section 7 (2)(a), (g) and (i).
9.3	Contract 24/60 Water Main Crossing Wales Street Rail Corridor Tender Evaluation and Contract Award Report	Good reason to withhold exists under Section 7	To protect the privacy of natural persons and enable the local authority to carry on without prejudice or disadvantage, negotiations (including commercial and industrial) negotiations and maintain legal professional privilege. LGOIMA Section 7 (2)(a), (g) and (i).
9.4	West Eyreton UV Treatment Upgrade – Tender Approval	Good reason to withhold exists under Section 7	To protect the privacy of natural persons and enable the local authority to carry on without prejudice or disadvantage, negotiations (including commercial and industrial) negotiations and maintain legal professional privilege. LGOIMA Section 7 (2)(a), (g) and (i).
9.5	Contract 202480 309 High Street Demolition (Old Police Building) Report to Accept Invited Price	Good reason to withhold exists under Section 7	To protect the privacy of natural persons and enable the local authority to carry on without prejudice or disadvantage, negotiations (including commercial and industrial) negotiations and maintain legal professional

			privilege. LGOIMA Section 7 (2)(a), (g) and (i).

OPEN MEETING

NEXT MEETING

The next meeting of the Utilities and Roading Committee will be held on Tuesday 25 February 2025 at 9am.

Workshop

- *Engineering Code of Practice – Review of Stormwater Design Standards – Colin Roxburgh (Project Delivery Manager)*

A MEETING OF THE UTILITIES AND ROADING COMMITTEE HELD IN THE COUNCIL CHAMBER, RANGIORA SERVICE CENTRE, 215 HIGH STREET, RANGIORA ON TUESDAY 19 NOVEMBER 2024 AT 9.04AM.

PRESENT

Councillors J Ward (Chairperson), N Mealings and P Williams.

IN ATTENDANCE

Deputy Mayor N Atkinson and Councillor B Cairns.

G Cleary (General Manager Utilities and Roading), J McBride (Roading and Transport Manager), K Simpson (3 Waters Manager), C Fahey (Water and Wastewater Asset Manager), M Liu (Infrastructure Resilience Manager), K Straw (Civil Projects Team Leader), D Young (Senior Engineering Advisor), D Mansbridge (Project Engineer) and C Fowler-Jenkins (Governance Support Officer).

1 APOLOGIES

Moved: Councillor Mealings Seconded: Councillor Williams

THAT apologies for absence be received and sustained from Mayor Gordon, Councillors Brine and Redmond.

CARRIED

2 CONFLICTS OF INTEREST

There were no conflicts declared.

3 CONFIRMATION OF MINUTES

3.1 Minutes of the meeting of the Utilities and Roading Committee held on Tuesday 15 October 2024.

Moved: Councillor Williams Seconded: Councillor Mealings

THAT the Utilities and Roading Committee:

(a) **Confirms** the circulated Minutes of the meeting of the Utilities and Roading Committee held on 15 October 2024, as a true and accurate record.

CARRIED

3.2 Matters arising (From Minutes)

There were no matters arising.

3.3 **Notes of a workshop of the Utilities and Roading Committee held on Tuesday 15 October 2024.**

Moved: Councillor Williams Seconded: Councillor Mealings

THAT the Utilities and Roading Committee:

(a) **Receives** the circulated Notes of a workshop of the Utilities and Roading Committee held on 15 October 2024.

CARRIED

4 DEPUTATION/PRESENTATIONS

Nil.

5 REPORTS

5.1 **Taaffes Glen Road Request for Council to Maintain the Paper Road Section to Pinchgut Track – C Grabowski (Roading Operations Team Leader) and J McBride (Roading and Transport Manager)**

J McBride spoke to the report noting it provided information following a request for additional maintenance on Taaffes Glen Road. The section was considered to be private access on a paper road so was not a road that the Council had regularly maintained. The Council had maintained the first 5.8 kilometres of the road up to the cattle yards which was extended slightly a year and a half ago. There were three properties on the road. Traffic volumes were last counted in 2020 with the count station located close to the Loburn Whiterock and Quarry Road intersection. The volumes was around 51 vehicles per day which was estimated at approximately 18 near the stock yards. Staff had outlined three options in the report.

Councillor Williams enquired if there were any other paper roads in a similar situation to this that staff were aware of. J McBride was unsure that there was one that was quite the same situation. The difference was the Department of Conservation being a land owner on the road due to the recreational demand in the area.

Councillor Mealings asked when the infrequent assistance would be carried out. J McBride noted that staff would set up a touch point after a flood event or at regular time intervals to have that conversation with the residents which would most likely be to offer to lay metal on the access way.

Moved: Councillor Ward Seconded: Councillor Williams

THAT the Utilities and Roading Committee:

(a) **Receives** Report No. 241105193133.

(b) **Approves** Option three being adopted, which includes providing infrequent assistance for the residents but not taking over responsibility for maintenance of the access and notes the likely cost would be around $1,000 to $2,000 every three years, which can be accommodated from within existing Road Maintenance Budgets.

(c) **Notes** that this infrequent assistance would likely include occasional patch metalling on the road (approximately 3 yearly or following a weather event) or the provision of a small quantity of unsealed road metal for the residents to place.

(d) **Notes** that signage will be erected before the first ford, warning of the fords ahead and recommending 4-wheel drive access beyond that point.

(e) **Notes** that should a contribution be agreed as per the recommendations in this report, then this would be to recognise the additional users who are accessing the DoC carpark, however, notes the road status would remain private access over paper road, and as such does not pose future liability to Council.

CARRIED

Councillor Ward thanked staff for the report. She commented that having a discussion with the Department of Conservation could be very valuable especially if the Department deemed the road to be a recreational asset. If recreational activity in the area increased traffic it should contribute to the upkeep of the road.

Councillor Mealings commented that it was a good solution and if the residents were happy with what staff had suggested that was a great outcome.

5.2 **Amended Roading Capital Works Programme for Approval – K Straw (Civil Projects Team Leader) and J McBride (Roading and Transport Manager)**

J McBride spoke to the report noting the report sought approval to amend the Roading Capital Works Programme following the outcome of reduced funding from the National Land Transport Programme. This was further to the report that was brought to Council in October 2024 which confirmed changes to maintenance operations, renewals projects and capital projects. The main area of impact was footpath renewals which had a significant reduction in budget which flowed on from impacts to the kerb and channel renewal programme and new transport infrastructure. Kerb and channel renewals had been reviewed, staff had considered sites where renewals could continue without impacting the footpaths. There were some sites such as Akaroa Street which had to be moved out as the footpath could not be included with the kerb and channel works. For the bus shelter programme staff had focused on the delivery of shelters and seats rather than the real time displays.

Councillor Williams asked if the Council would get a 51% subsidy on some of this work. J McBride replied that the Council would for the footpath renewals.

Councillor Williams asked if the Council would be paying 100% of the cost. J McBride explained that the Council would not, however staff had to update the programmes by concentrating on the streets where they could do the kerb and channel work without renewing the footpath(s) which meant the Council would only be carrying out subsidised work.

Councillor Mealings noted that Wilson Drive was included in the programme, however she had noticed that there were some mark outs on Kiwi Place. J McBride noted that there were two separate budgets and the programmes for the mark out works were managed separately. This report dealt with footpath renewals where the Council was renewing an entire stretch of footpath. The footpath maintenance budget would be used where there were isolated areas which needed repairs.

Councillor Ward commented that staff had a huge task in prioritising work within a limited budget.

Moved: Councillor Williams Seconded: Councillor Mealings

THAT the Utilities and Roading Committee:

(a) **Receives** Report No. 241016179221.

(b) **Approves** the updated 2024/25 Roading Capital Works Programme Version 03 and Indicative Three-Year Programme as per attachment i.

(c) **Notes** that the updated programme was required to ensure that all proposed works fitted within the available budgets.

(d) **Notes** that the key changes to the programme is a reduction in footpath renewal work.

(e) **Circulates** this report to all Boards for their information.

CARRIED

Councillor Williams thanked staff for the report. He commented that we were moving into hard times, it was hard cutting things however some of it was very necessary.

Councillor Mealings commented that it was not an easy job for staff to prioritise these works and offset the budget, however staff had done a good job.

5.3 **July 2023 Flood Recover Progress update – M Liu (Infrastructure Resilience Manager) and K Simpson (3 Waters Manager)**

M Liu spoke to the report noting as of the previous week all 88 investigations had been completed and approved. All 126 maintenance works had been undertaken. Thirty one customer advice actions had been provided to residents. Of the 24 immediate works projects, 17 had been completed, five were in the design phase and two were in the tender process. She noted that this was the last progress report for the July 2023 flood response projects, the remaining improvement works would be reported as part of the capital works reporting.

Councillor Williams noted that there were a lot of gravel islands in the Cam River. He asked if consideration had been given to dig these out or would they be left. K Simpson noted there was a section upstream of Bramleys Road Bridge where staff identified some gravel shoals as well as where some willow finger roots had built out into the channel. Those works were inspected and were proposed to be undertaken in November 2024. The other side was the survey work that Environment Canterbury had undertaken of the Cam River and had presented some of those results to the Kaiapoi-Tuahiwi Community Board. Staff were working on preparing a summary report that would be presented to the Committee.

Councillor Mealings noted on page 63 of the agenda, that no action customer advisory was given to residents at 97 and 97A Threlkelds Road. She asked if that was because there were proposed works scheduled under the bridge. K Simpson noted there was an update on Threlkelds Road. Initially the advice to the residents had just been advice however, staff had since done a more detailed investigation and held meetings with the residents and Environment Canterbury, who would be upgrading the flood gate that discharged into the Cam River.

In response to a questions from Councillor Cairns, K Simpson explained that to date Environment Canterbury had only investigated the section of the Cam River between Bramleys Road and the Kaiapoi River. There were a number of sections of the stop bank that had been identified as low. There was one section near Revells Road which the Council had identified which required a pipe and for the stop bank to be raised. Council had put allocated funds for the budget which would address this section. Staff were planning to scope the works however the physical works would be undertaken by Environment Canterbury and charged to the Council's budget.

Councillor Cairns asked why the Council would be paying when it was Environment Canterbury's responsibility. K Simpson replied that the Council would cover the cost of the pipe installation as it was required to drain the land and Environment Canterbury had taken the opportunity to bring the stop bank up to the design level.

Councillor Cairns thought that stopbanks were there to mitigate flooding. He asked why it was then the Councils responsibility to install the pipe. K Simpson replied that it was a grey area and explained that there was a need to drain the land side of the stopbank which was something that Environment Canterbury were not responsible for.

Deputy Mayor Atkinson did not understand why the Council would pay for the part of the stopbank given it was not its asset. K Simpson was happy to raise the issue with Environment Canterbury.

Moved: Councillor Williams Seconded: Councillor Mealings

THAT the Utilities and Roading Committee:

(a) **Receives** Report No. 241031189619.

(b) **Notes** that all 88 investigations have been completed and approved.

(c) **Notes** that all 126 maintenance actions have been completed.

(d) **Notes** that of the 24 immediate works projects, 17 projects have been completed, and 7 are in the design phase.

(e) **Notes** that the Infrastructure Resilience Team has taken over the delivery of the remaining improvement works and the proposed future works.

(f) **Notes** that the total cost estimate for the flood recovery work is $4.055 million.

(g) **Notes** that the expenditure to date is $3,612,550 and the final forecast expenditure of $4.113 million.

(h) **Notes** the estimated 1.42% budget exceedance of $57,598.

(i) **Notes** that this budget exceedance will increase the District Drainage rate by approximately $0.14 or 0.4% per property from 2025/26 onwards.

(j) **Notes** this is the last progress update report on the July 2023 flooding event as all investigations have now been completed and approved. The remaining improvement works will be reported as part of the Capital Works Programme report presented to Audit & Risk Committee each quarter.

(k) **Circulates** this report to all Community Boards for information.

CARRIED

Councillor Williams commented that it was good to see this moving forward.

Councillor Mealings congratulated staff on their progress.

Deputy Mayor Atkinson commented in regard to Environment Canterbury that the Council needed costs to fall where they lie and he was sure that Environment Canterbury did things for the Council. As long as the balance was maintained and if assets were being produced then they needed to be paid by the people who owned them.

Councillor Ward reiterated that following the floods which had required extra effort and responses from staff had resulted in an amazing job. She thanked staff for the work they had done.

5.4 Eastern District Sewer Scheme and Oxford Sewer Scheme Annual Compliance Reports 2023/24 – C Fahey (Water & Wastewater Asset Manager)

C Fahey spoke to the report noting the purpose was to provide an update on the consent compliance for the Eastern District and Oxford Sewer Schemes for the 2023/24 compliance year. She explained that full compliance was achieved for the Eastern District Scheme relating to environmental events during the compliance year with the exception of low level oxygen levels measured at the Rangiora Wastewater Treatment Plant, however this did not affect the overall compliance of the system. Full compliance was also achieved for the Oxford Sewer Scheme consenting conditions during the compliance monitoring

period. There were some non-compliances relating to the overflow of the holding pond at Oxford due to the rain event in July 2023 and due to an issue with the irrigator.

Councillor Williams asked if the irrigator was finished and operational. C Fahey noted that the two op irrigators were operational. The irrigator line was replaced a few years ago so that staff could get monitoring data for the rotation.

Councillor Williams noted there was a lot of public debate about sludge in the Kaiapoi Wastewater plant. C Fahey noted that staff were preparing a workshop on the matter for the Committee.

Councillor Cairns asked if the Council added chemicals to the ponds to reduce the effluent. C Fahey explained that the last stage in the wastewater treatment process was UV treatment to kill the bacteria before it was discharged.

Moved: Councillor Williams Seconded: Councillor Ward

THAT the Utilities and Roading Committee:

(a) **Receives** Report No. 241104191893.

(b) **Notes** that full compliance was achieved for all Eastern District Sewer Scheme (EDSS) Ocean Outfall consent conditions relating to environmental limits during the 2023-24 monitoring period, with the exception of low dissolved oxygen levels measured at the Woodend and Rangiora WWTPs, which did not impact on the overall performance of the treatment system and had no environmental impact on the receiving environment.

(c) **Notes** that full compliance was achieved for the Oxford Sewer Scheme consent conditions relating to environmental limits during the 2023-24 monitoring period. There were some non-compliances relating to temporary overflow of the wet weather holding pond during the July 2023 weather event and the lack of monitoring data to clearly demonstrate that the depth limit for effluent application at the irrigation field had been achieved. These did not affect the overall performance of the wastewater treatment system and had no environmental impact on the receiving environment.

(d) **Notes** that Environment Canterbury (ECan) are currently reviewing the Annual Compliance Monitoring Reports for the 2023-24 period and a compliance report will be issued by ECan following the completion of their review

(e) **Circulates** this report to all Community Boards for their information.

(f) **Circulates** a copy of this report to Te Ngāi Tūāhuriri Rūnanga, Te Kōhaka o Tūhaitara Trust and Waimakariri Water Zone Committee for their information.

CARRIED

Councillor Williams thanked staff for the report. He commented that it was good to see that full compliance had been achieved.

Councillor Ward appreciated staff keeping Councillors informed.

5.5 Water Quality and Compliance Annual Report 2023/24 – C Fahey (Water & Wastewater Asset Manager)

C Fahey spoke to the report noting the purpose was to update the Committee on the annual Water Quality and Compliance review for the 2023/24 compliance year. She noted this was based on the drinking water quality assurance rules, released in November 2022. For the 2023/24 compliance year all Council supplies that had chlorine treatments and UV treatments installed achieved greater than 99% compliance. The remaining supplies that either did not have full chlorine treatment for the entire compliance year or had not yet had UV treatment installed, the supplies had not met the full compliance. She noted currently

Ohoka, West Eyreton, Sotuh Belt Rangiora and one site in Kaiapoi were still non-operational for UV treatment.

Councillor Mealings noted the Ohoka Supply, was a class one bore and the report noted that it did not require UV treatment. She asked why the Council then needed to install UV. C Fahey explained that Ohoka currently had chlorine treatment as its primary biological treatment to gain bacterial compliance. One of the rules for bacterial compliance was that you needed to have a minimum chlorine contact time for the chlorine in the water and that was determined by the size of the reservoir. Currently the reservoirs were not adequately sized so did not achieve the required contact time. With UV treatment it provided a protozoa barrier, which could allow the Council to meet bacteria compliance.

Councillor Mealings asked if the loss of data failure was based on IT or was it the various locations software. C Fahey replied that staff had been battling to collect data as for two days the server had lost the data.

Moved: Councillor Williams Seconded: Councillor Ward

THAT the Utilities and Roading Committee:

(a) **Receives** Report No. 241103190628.

(b) **Notes** that the assessment of the 2023-24 compliance year is based on the Drinking Water Assurance Rules (DWQAR) that came into effect in November 2022 which are much more stringent than the old Drinking Water Standards New Zealand (DWSNZ) 2005 (Revised 2018).

(c) **Notes** that for the 2023-24 compliance year, all supplies that had chlorine and UV treatment installed for the entire period achieved greater than 99% compliance. The remaining supplies did not achieve full compliance mainly due to chlorination not being implemented for the entire compliance period and UV treatment not yet being installed. There were also some technical non-compliances relating to sampling and data capture issues.

(d) **Notes** that Council's water supplies will not be fully compliant with the new DWQAR until December 2025 when the last two water supplies (West Eyreton and Ohoka) have UV treatment installed.

(e) **Circulates** this report to the Community Boards for their information.

(f) **Circulates** a copy of this report to Te Ngāi Tūāhuriri Rūnanga, Te Kōhaka o Tūhaitara Trust and Waimakariri Water Zone Committee for their information.

CARRIED

Councillor Williams felt that Waimakariri had some of the best and safest drinking water in the Country. He believed staff were doing an above excellent job.

Councillor Ward thanked staff for the exemplary almost perfect record.

6 CORRESPONDENCE

6.1 Letter from Roundhill Farm regarding maintenance Taaffes Glen Road

Moved: Councillor Mealings Seconded: Councillor Williams

THAT the Utilities and Roading Committee

(a) **Receives** the letter in Item 6.1.

CARRIED

7 PORTFOLIO UPDATES

7.1 Drainage, Stockwater and Three Waters (Drinking Water, Sewer and Stormwater) – Councillor Paul Williams

Water

- The UV installation works are now expected to be completed by the end of the year. The UV units at the Pegasus, Domain Road and Peraki WTP are now operational. The South Belt and Darnley Square UV installations will be operational over the next 6 weeks.
- The tender for the West Eyreton UV installation and the Two Chain Road third well drilling is about to be awarded.
- The works to install the 450mm water main in Blackett Street is now complete with reinstatement works underway.
- The Rangiora Woodend Road water main in Woodend has just been awarded.

Wastewater

- Staff have initiated the midge management plans, including midge trapping and spraying at Woodend and Kaiapoi WWTPs of the season.
- The septage disposal facility has been awarded and construction is underway.
- The Raven Quay works covering wastewater, water and stormwater pipe upgrades has been tendered.

Drainage

- Staff are still monitoring the vegetation establishment at Cones Road Drain Upgrade and will look at whether additional weir modifications are warranted.
- Drainage improvement works at Tram Road and Topito Road are now complete. The works at Upper Sefton is awarded about to commence on site and is expected to commence before Christmas.
- There is a bus trip for the Ohoka-Mandeville Drainage Advisory Group on the 4th December to observe the existing issues and discuss the proposed Stage 1 and Stage 2.

8 MATTERS REFERRED FROM COMMUNITY BOARDS

8.1 Approval to install No-stopping restrictions along the frontage of no. 464 Mandeville Road, Mandeville – D Mansbridge (Project Engineer) and S Binder (Senior Transportation Engineer)

D Mansbridge spoke to the report which sought approval to establish no stopping restrictions outside 464 Mandeville Road as per the attached plan. The extent was 11 metres to the east of the Mandeville Village entry and 8 metres to the west of the entry of 464 Mandeville Road. Parking outside 464 Mandeville Road had been an historic issue since the development of Mandeville Village with vehicles parking too close to the access way and causing sight distance issues.

Councillor Williams asked who had raised the issue of parking. D Mansbridge noted that main concern had come from the hire centre at 464 Mandeville Road.

Councillor Williams asked how many parks would be removed. D Mansbridge noted that two carparks would be removed.

Moved: Councillor Mealings Seconded: Councillor Williams

THAT the Utilities and Roading Committee:

(a) **Approves** the installation of no-stopping restrictions on the northern side of Mandeville Road, for a distance of 11m east of the Mandeville Village entry and 8m west of the entry to no. 464 Mandeville Road.

(b) **Notes** that although the Hire Centre has not yet been constructed, staff will proceed with the installation of the no-stopping lines upon acceptance of this report, in line with discussions with the adjacent landowner.

(c) **Notes** that there is a resource consent application under review (RC245278) for further development of the Mandeville Village. The recommendations of this report are separate to this application and will have no bearing on its outcome.

CARRIED

Councillor Mealings commented that she was quite familiar with the situation. Currently it was not that big an issue however once the further development got underway it would become an issue, therefore it made sense to install restrictions now.

Councillor Williams commented that he was normally against removing car parks however this one was for safety and the public were requesting it, therefore he had no issue with the restrictions.

8.2 **Approval of Design for 309 High Street Car Park Design – D Mansbridge (Project Engineer) and G Maxwell (Project Support Coordinator)**

K Straw spoke to the report noting the report was presented to the Rangiora-Ashley Community Board and sought its endorsement of the design. The design was as per the District Plan requirements and allowed for an additional 57 off road carparking spaces. The design utilised the excess space that was created from the two former vehicle entrances to 309 High Street when it was the former Police station. That space was insufficient for additional parking areas, so it was being developed into a functional space for refuge collection, seating, a gathering space and cycle parking and did not utilise the existing easement to Church Street as that would result in a reduction of parking. The design allowed for an additional on road mobility parking space in High Street and maintained the existing P5 to pick up and drop off. However, the Rangiora-Ashley Community Board raised concerns of whether this area was needed as a mobility park. Following the meeting staff had confirmed the number of mobility parks in the District Plan and and confirmed that no additional mobility parking in High Street was required. The Board was also was concerned about the location of the bike parking and whether or not it obstructed the footpath. Staff had checked that and if bikes were parked there there was an unobstructed width of 2.7 metres which was well within the standards. He noted the report was also referred to the District Planning and Regulation Committee for the time restrictions.

Moved: Councillor Williams Seconded: Councillor Ward

THAT the Utilities and Roading Committee:

(a) **Approves** the Scheme Plan for the proposed car park at 309 High Street (as per attachment i).

(b) **Approves** relocation of the existing mobility park to the immediate west of the existing mobility park.

(c) **Approves** the conversion of the existing mobility park to a P5 park.

(d) **Notes** that the existing mobility parking within the existing Town Hall car park (accessed off King Street) will remain following the completion of the car park redevelopment.

CARRIED

Councillor Ward thought that the plan was brilliant. She believed that the carpark needed to be sealed as there were a lot of elderly people that went to the theatre.]

Councillor Mealings commented that she liked how staff had utilised the space which included seating and bike parks. She liked that it was proposed to be P180 because there was a lack of those in the town.

Councillor Williams stressed that the Council made sure the public knew that it was public parking and not just for the cinema.

8.3 **East Belt New Footpath - Approval to Install No Stopping Restrictions and Approval for Small Portions of Hedge Removal at MainPower Oval – S Srinivasan – (Project Engineer PDU Civil) and J McBride (Roading & Transportation Manager)**

J McBride spoke to the report noting it sought approval to install no stopping restrictions outside 164 East Belt and for approval to remove a small portion of hedge at MainPower Oval. This was to allow for the installation of a new footpath along East Belt to connect through to Coldstream Road. The road through this area was narrow and there was limited space to install a path. She noted the report in the agenda was the one presented to the Rangiora-Ashley Community Board and the recommendations had been updated to include the need to consult with the property owner. Staff had met with the property owner, and they were happy with the proposed changes.

Moved: Councillor Williams Seconded: Councillor Ward

THAT the Utilities and Roading Committee:

(a) **Approves** the installation of 64.50m no-stopping restrictions outside 164 East Belt, Rangiora, with consultation with 164 East Belt residents.

(b) **Approves** the partial removal of the hedge along the boundary of MainPower Oval, at the locations shown within attachment (i.)

(c) **Notes** that the partial removal of the hedge is required to allow for the installation of the proposed footpath behind the buildings at MainPower Oval.

(d) **Notes** that where the hedge is to be removed, bollards will be installed to prevent vehicle access into MainPower Oval.

(e) **Notes** that the installation of the parking restrictions outside No. 164 East Belt is the result of the narrow road width in this portion of East Belt, where there is insufficient width to accommodate on-road parking.

(f) **Notes** that the Greenspaces Team have been involved in the development of the alignment through Mainpower Oval and are supportive of the partial removal of the hedge as required.

CARRIED

Councillor Williams commented that he was happy staff had consulted with the property owner. He was concerned regarding security with Canterbury Cricket which had been covered by staff.

9 MATTERS FOR INFORMATION

Nil.

10 QUESTIONS UNDER STANDING ORDERS

Nil.

11 URGENT GENERAL BUSINESS

Nil.

12 MATTERS TO BE CONSIDERED WITH THE PUBLIC EXCLUDED

In accordance with section 48(1) of the Local Government Official Information and Meetings Act 1987 and the particular interest or interests protected by section 6 or section 7 of that Act (or sections 6, 7 or 9 of the Official Information Act 1982, as the case may be), it is moved:

Moved: Councillor Mealings Seconded: Councillor Williams

That the public be excluded from the following parts of the proceedings of this meeting:

11.1 Confirmation of Public Excluded Minutes from 15 October 2024.
11.2 Removal of Deeds Land – D Young (Senior Engineering Advisor).
11.3 Rangiora WWTP Septage Receiving Facility – Contract Award Report - Report to Management Team 21 October 2024.
11.4 Septic Tank Maintenance Contract 2024-2027 Tender Evaluation and Contract Award Report – Report to Management Team 21 October 2024
11.5 Contract 20/41 School Road Drainage Upgrade Tender Evaluation and Contract Award Report – Report to Management Team 4 November 2024

The general subject of each matter to be considered while the public is excluded, the reason for passing this resolution in relation to each matter, and the specific grounds under section 48(1) of the Local Government Official Information and Meetings Act 1987 for the passing of this resolution are as follows:

Item No.	Subject	Reason for excluding the public	Grounds for excluding the public.
11.1	Confirmation of Public Excluded Minutes from 15 October 2024	Good reason to withhold exists under Section 7	As per Section 7(2)(h) of the Local Government Official Information and Meetings Act 1987, to "enable any local authority holding the information to carry on, without prejudice or disadvantage, commercial activities."
11.2	Removal of Deeds Land	Good reason to withhold exists under Section 7	Resolves that the report, attachments, discussion and minutes remain public excluded for reasons of protecting the privacy of natural persons and enabling the local authority to carry on without prejudice or disadvantage, negotiations (including commercial and industrial) negotiations and maintain legal professional privilege as per LGOIMA Section 7 (2)(e), i.e. 'avoid prejudice to measures that prevent or mitigate material loss to members of the public'".
11.3	Rangiora WWTP Septage Receiving Facility – Contract Award Report - Report to Management Team 21 October 2024	Good reason to withhold exists under Section 7	Resolves that the recommendations in this report be made publicly available but that the contents remain public excluded as there is good reason to withhold in accordance with Section 7 (h) of the Local Government Official Information and Meetings Act; "enable any local authority holding the information to carry out, without prejudice or disadvantage, commercial activities"
11.4	Septic Tank Maintenance	Good reason to	Resolves that the report, attachments,

Item No.	Subject	Reason for excluding the public	Grounds for excluding the public.
	Contract 2024-2027 Tender Evaluation and Contract Award Report- Report to Management Team 21 October 2024	withhold exists under Section 7	discussion and minutes remain public excluded for reasons of protecting the privacy of natural persons and enabling the local authority to carry on without prejudice or disadvantage, negotiations (including commercial and industrial) negotiations and maintain legal professional privilege as per LGOIMA Section 7 (2)(a), (g) and (i).
11.5	Contract 20/41 School Road Drainage Upgrade Tender Evaluation and Contract Award Report – Report to Management Team 4 November 2024	Good reason to withhold exists under Section 7	Approves that the report, attachments, discussion and minutes remain public excluded for reasons of protecting the privacy of natural persons and enabling the local authority to carry on without prejudice or disadvantage, negotiations (including commercial and industrial) negotiations and maintain legal professional privilege as per LGOIMA Section 7 (2)(a), (g) and (i). Approves the recommendations becoming public, however the report, discussion, minutes and attachments remain public excluded.

CARRIED

CLOSED MEETING

The public excluded portion of the meeting commenced at 10.29am until 10.39am.

OPEN MEETING

Moved: Councillor Williams Seconded: Councillor Mealings

THAT open meeting resumes, and the business discussed with the public excluded remains public excluded unless otherwise resolved in the individual resolutions.

CARRIED

NEXT MEETING

The next meeting of the Utilities and Roading Committee will be held on Tuesday 10 December 2024 at 1pm.

THERE BEING NO FURTHER BUSINESS, THE MEETING CLOSED AT 10.40AM.

_____
Chairperson

_____
Date

WAIMAKARIRI DISTRICT COUNCIL

REPORT FOR INFORMATION

FILE NO and TRIM NO:	CMS 06-03 / 241127209580
REPORT TO:	UTILITIES AND ROADING COMMITTEE
DATE OF MEETING:	10 December 2024
AUTHOR(S):	Peter Daly, Road Safety Coordinator / Journey Planner Joanne McBride, Roading and Transport Manager
SUBJECT:	School Cycle Skills Education Programme "Cycle Sense"
ENDORSED BY: (for Reports to Council, Committees or Boards)	General Manager / Chief Executive

1. SUMMARY

1.1. The purpose of this report is to update the Utilities & Roading Committee on the Cycle Skills Education Programme in the Waimakariri District known as "Cycle Sense".

1.2. Cycle training in Waimakariri District schools has been delivered through the Road Safety Education programme since 2017 with co-funding through the National Land Transport Programme.

1.3. For the 12-month period from 1 July 2023 to 30 June 2024, cycle skills training has been delivered to 752 primary school children (Year 6), in 22 schools across the district by the North Canterbury Sports & Recreation Trust (NCSRT).

1.4. Cycle Skill training teaches important skills which children are able to apply in their everyday life.

2. RECOMMENDATIONS

THAT the Utilities and Roading Committee:

(a) **Receives** Report No. 241127209580.

(b) **Notes** that Cycle Sense is an established cycle skills education programme being delivered in schools in the Waimakariri District.

(c) **Notes** that training has been delivered to 752 Year 6 students across 22 schools over the last 12 months.

(d) **Notes** that there are no other similar training programmes on offer or available through other agencies at this time.

(e) **Notes** that the current contract will run until 30 June 2025, at a scaled back scope.

(f) **Notes** that the current budgets set through the Long-Term Plan allow for continuation of scaled back cycle skills training in schools to the value of $60,000.

(g) **Circulates** this report to Council and Community Boards for their information.

3. BACKGROUND

3.1. Historically in New Zealand Ministry of Transport traffic officers provided cycle skills training in schools. Since the merger with Police in 1992, no government agency has had the capacity or funding to deliver this service, leaving a significant gap in children's education in this area.

3.2. In mid-2017 the NZ Transport Agency advised they were investing in a National Cycling Education System that would improve the reach, quality and efficiency of cycling education, to contribute to making cycling a safer and more attractive transport choice. The national programme called "Bike Ready" was subsequently launched in mid-2018.

3.3. In October 2017 Council approved funding to deliver a cycle skills education programme in schools alongside the NLTP which had become available.

3.4. The cycle skills education programme that was developed for the district was based on the NZTA system of training called "Bike Ready" and is delivered to Year 6 students in primary schools. The local programme is branded "Cycle Sense".

3.5. The Bike Ready programme outlines the different grades of training as well as the guidelines to be followed when delivering the programme. Accreditation can be undertaken to become a "Bike Ready' qualified provider.

3.6. The North Canterbury Sport & Recreation Trust was approached as they had an existing and respected presence in schools across the district and an existing relationship with Council. The same type of partnership is utilised by other councils around the country to deliver cycle skills programmes.

3.7. A Contract for Service Delivery was subsequently signed by both the North Canterbury Sport & Recreation Trust and Council regarding delivery of the programme.

3.8. Council provides a vehicle and trailer to transport the required logistics (bicycles etc) to the various schools and pays for the cost of training delivery into schools as arranged and coordinated by the Sports Trust.

3.9. Cost of delivery figures for the 21/24 NLTP period are as follows

Description	2021 / 2022	2022/2023	2023/2024
Attending Students	796	561	752
Total annual cost	$113,551	$101,552	$111,625
Total delivery cost per student	$142.65	$181.02	$148.44

3.10. Cycle Skills training is delivered in two Grades:

3.10.1. Grade 1 – delivered in school grounds

This covers the functions of the bike e.g. brakes, gears, pedalling, moving off and stopping, riding in straight lines, riding curves.

3.10.2. Grade 2 – delivered on public roads adjacent the school grounds.

This training is the first introduction for most children to safe road use. Concepts of intersections, Give Ways, Compulsory Stops, scanning, awareness and anticipation are introduced, and form part of the students journey to becoming a safer road user.

3.11. Cycle Sense training encourages safe riding behaviour when those who have had the training children are riding to the shops, to the park, to their friends' places. It promotes cycling as an active transport option for general use, not just for travelling to school.

3.12. Some schools are more active than others at encouraging active transport, including by providing safe and secure cycle parking facilities. Cycle stands at various schools are shown in Figure 1, 2 and 3.

Figure 1 – Rangiora Borough School Bike/Scooter Stands

Figure 2 – Pegasus Bay School Bike/Scooter Stands

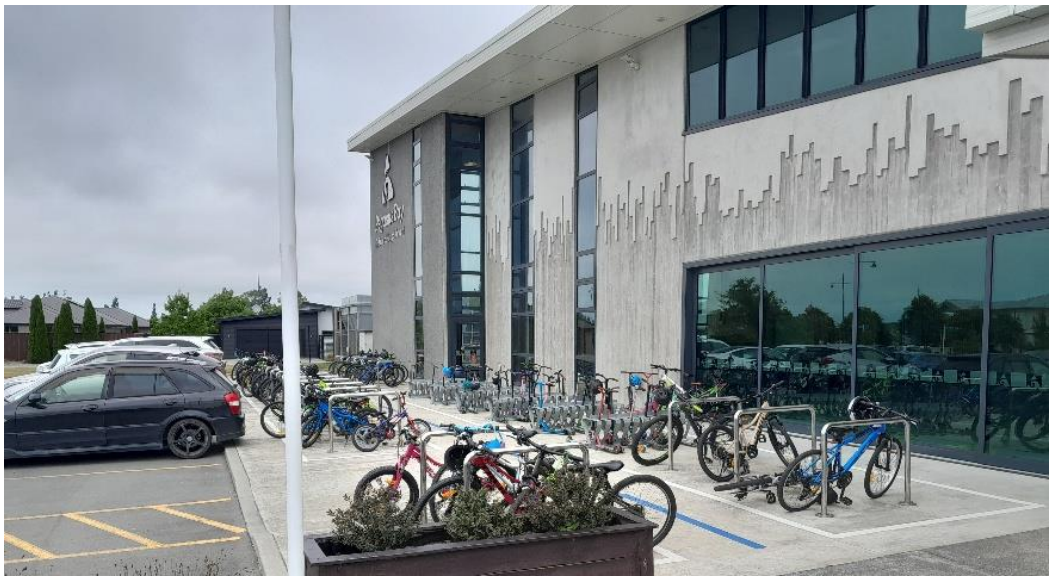

Figure 3 – Te Matauru School Bike/Scooter Stands

3.13. Notably, many children who don't ride their bikes to school are active bike riders. For example, in Pegasus, many children have expensive mountain bikes they regularly ride in the Tuhaitara Coastal Park and around the neighbourhood which their parents don't allow them to ride to school due to security concerns.

3.14. Councils current contract with the North Canterbury Sports & Recreation Trust for delivery of the Cycle Sense programme expires on 31 December 2024. An extension to that contract will see the programme continue to the end of the current financial year (30 June 2025). Funding is in place for this purpose.

4. ISSUES AND OPTIONS

4.1. This report is for information only and as such no issues / options have been outlined.

Implications for Community Wellbeing

There are implications on community wellbeing by the issues and options that are the subject matter of this report.

The Cycle Sense programme enhances community road safety in the short term, but also in the long term. The programme encourages safe road use practices and is the first step for many children to become responsible road users.

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

5. COMMUNITY VIEWS

5.1. **Mana whenua**

Te Ngāi Tūāhuriri hapū are not likely to be affected by or have an interest in the subject matter of this report.

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.

Schools are very supportive of the Cycle Sense programme, which has become a staple of the academic year, with links to the educational curriculum.

5.3. **Wider Community**

The wider community is likely to have an interest in the subject matter of this report. It is generally recognised as a positive thing that Council provides this service in schools.

6. OTHER IMPLICATIONS AND RISK MANAGEMENT

6.1. Financial Implications

There are no financial implication arising from the information / matters raised in this report.

It is however noted that in the 2024/27 National Land Transport Programme (NLTP) government priorities changed, and government funding for cycle education programmes was significantly reduced.

The current budgets set through the Long Term Plan allow for continuation of scaled back cycle skills training in schools, with funding of $60,000 being available.

This budget is included in the Long Term Plan, and will be further considered through the 2025/26 Annual Plan process, due to the reduction in co-funding available.

Vehicle and Trailer

The Cycle Sense van is owned by Council for the programme. The Cycle Sense trailer is a bespoke trailer purchased by Council specifically for the Cycle Sense programme, having been designed to meet the programmes' needs e.g. carrying bicycles and equipment. Council pays for the running and upkeep of the van and trailer.

In terms of costs, fuel, registration, WoF and servicing the van costs approximately $2,500 per year. The trailer cost is estimated at $600 per year.

In the event that the programme ceases, then there would need to be consideration as to whether these assets would be kept or sold. The vehicles will need to be retained until 30 June 2025, as a minimum. Beyond this consideration could be given to their future usage, however it is recommended the trailer be kept, should the programme be redeveloped in future.

6.2. Sustainability and Climate Change Impacts

The recommendations in this report do have sustainability and/or climate change impacts.

Using active transport reduces the number of vehicle trips which reduces emissions.

6.3 Risk Management

There are risks arising from the adoption/implementation of the recommendations in this report.

Failing to provide cycle education leaves a gap in these critical skills for children.

6.3 Health and Safety

There are health and safety risks arising from the adoption/implementation of the recommendations in this report.

Cycle education improves children's knowledge about safe use of the road.

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

Not applicable.

7.3. **Consistency with Community Outcomes**

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

The relevant community outcomes are:

Social:

A place where everyone can have a sense of belonging…

- Our community has equitable access to the essential infrastructure and services required to support community wellbeing.

Environmental:

…that values and restores our environment…

- Our district is resilient and able to quickly respond to and recover from natural disasters and the effects of climate change.
- Our district transitions towards a reduced carbon and waste district.
- The natural and built environment in which people live is clean, healthy and safe.

7.4. **Authorising Delegations**

The Utilities & Roading Committee are responsible for matters relating to Roading and Transport, and as such it is appropriate for the Committee to receive this information.

WAIMAKARIRI DISTRICT COUNCIL

REPORT FOR INFORMATION

FILE NO and TRIM NO:	DRA-14 / 241111199427
REPORT TO:	UTILITIES AND ROADING COMMITTEE COMMUNITY AND RECREATION COMMITTEE
DATE OF MEETING:	10 December 2024 (Utilities and Roading Committee) 25 February 2025 (Community and Recreation Committee)
AUTHOR(S):	Sophie Allen – Water Environment Advisor
SUBJECT:	Herbicide update and usage by Council and contractors in 2023-24
ENDORSED BY: (for Reports to Council, Committees or Boards)	General Manager / Chief Executive

1. SUMMARY

1.1. This report summarises herbicide usage by the Council and its contractors in 2023-24 for public areas and/or areas that are beside waterways. This scope includes areas in the work programmes for maintaining rural drainage, stockwater races, green spaces such as parks, stormwater management areas, and the road reserve (including roadside drains).

1.2. Council herbicide usage and recommendations for improvements will be reported annually to the Utilities and Roading Committee and the Community and Recreation Committee. This report is the first in this proposed standardised annual report format. This annual reporting will also review important updates in relevant herbicide research, as well as reassessments and approvals of herbicide and their additives under the Environmental Protection Authority (EPA).

1.3. Various Waimakariri community members have raised concerns regarding the safety of herbicides to human health and ecosystems in the past and particularly in 2023-24 regarding possible effects on aquatic environments.

1.4. Herbicide usage is minimised by Council where possible, with other methods such as mechanical cleaning used. Herbicides for Council operations are only used as approved by the EPA, and where deemed necessary by Council staff and contractors. Operating procedures are in place to ensure best practice and label instructions for herbicides and their additives are followed.

1.5. The EPA decided in July 2024 that there was not sufficient evidence to require a review of the herbicide Glyphosate in New Zealand. None of the herbicides, as used by Council, are under current reassessment by the EPA. Some herbicides when used in aquatic environments are under reassessment by the EPA, such as Triclopyr, Haloxyfop and Diquat, however the Council does not use these herbicides in aquatic environments.

1.6. The EPA has stated they plan to carry out a review of polyoxyethylene amine (POEA) surfactants commonly used with herbicides by the EPA, due to claims that these surfactants should be restricted. Alternative surfactants to POEA have some limited availability in New Zealand, such as found in products Ravensdown Glyphosate G360 and 540. Council staff will monitor review findings from the EPA when published.

1.7. The Herbicide Spray Management Plan for WDC consent CRC120402 (see Attachment i), for spraying plants in drains and stockwater races) is recommended to be reviewed for updates in best practice and schedules of the applicable areas. The WDC ‘No Spray

Register' is recommended to be more publicly advertised on the WDC website as an option for landowners for berms and other adjacent Council land such as reserves. A frequently asked questions (FAQ) section about herbicides is also recommended to be created on the WDC website.

Attachments:

i. Herbicide Spray Management Plan for CRC120402 TRIM161004101992

2. RECOMMENDATION

THAT the Utilities and Roading Committee:

(a) **Receives** Report No. 241111199427.

(b) **Notes** that herbicide use is minimised where possible for Council operations and only used where deemed necessary by Council staff and contractors. Other (i.e. mechanical) weed control options are used where they are deemed more appropriate.

(c) **Notes** the herbicides and their use are as approved by the Environmental Protection Authority (EPA).

(d) **Notes** the report recommendations:

Recommendation 1: Prepare annual herbicide usage reports following a standard format and scope as outlined in this report.

Recommendation 2: Instruct staff to update the Herbicide Spray Management Plan for consent CRC120402 for best practice and schedule of locations where the consent applies.

Recommendation 3: Monitor the Environmental Protection Authority for relevant reassessments, reviews or approval changes of herbicides and additives used. Specifically analyse the proposed EPA review of POEA surfactants used with herbicides when published for recommended actions.

Recommendation 4: Note updates to relevant peer-reviewed research on health and environmental effects of herbicides and common additives that WDC uses.

Recommendation 5: Detail the option on the WDC website to join the 'No Spray' register for properties that do not wish for herbicide spraying on their berms, in order to make this option more accessible to all.

Recommendation 6: Create a WDC website page of Frequently Asked Questions (FAQs) regarding herbicide usage.

Recommendation 7: Extend the scope of the WDC Roading 'No Spray' register to possibly include other areas that border private property such as Council reserves and stormwater management areas, if appropriate alternative management is agreed by the private property owner. Potentially incorporate the 'No Spray' register information maintained by the contractor for the stockwater races.

Recommendation 8: Require that the minimum level of qualification for any person (WDC staff and contractors) undertaking herbicide application is a Growsafe Basic Certificate.

(e) **Notes** that spraying over water by Council and its contractors is very limited, with a preference for mechanical maintenance for rural drains and stockwater races. If spraying is carried out, it is following consent CRC120402 and glyphosate 360 is applied for this. No diquat has been used by the Council in 2023-24, although permitted by CRC120402.

(f) **Notes** that the budgets in the LTP 2024-34 have been based on continuing to use herbicides, including glyphosate, for weed control, where deemed necessary by Council staff and contractors.

(g) **Notes** that the EPA decided not to review the herbicide glyphosate in 2024, as there was insufficient evidence that an update was required from the previous review conducted in 2016.

(h) **Notes** the planned review of polyoxyethylene amine (POEA) surfactants commonly used with herbicides by the EPA, due to claims that these surfactants should be restricted.

(i) **Circulates** this report to Council, Community Boards, Drainage Advisory Groups and the Waimakariri Water Zone Committee.

3. BACKGROUND

3.1. Waimakariri District Council has received increasing concerns in recent years from the community regarding herbicides practices and the potential impact of herbicides on waterways within the Waimakariri District. In 2024, multiple residents have raised concerns that herbicide usage could have caused dieback of weedbeds in the Ruataniwha Cam River and Kaiapoi River.

3.2. Use of herbicides in public areas and beside waterways are the areas that community members have primarily raised for their concerns, therefore are the proposed scope of annual reporting. Herbicide usage by WDC in other areas is thought to be minimal and *ad hoc*, making it difficult to track, therefore is out of the proposed scope of this annual reporting. This annual reporting will provide clarity to community members about WDC herbicide practices as well as provide potential improvement recommendations.

3.3. Due to community concerns, WDC has minimised spraying aquatic vegetation such as watercress and monkey musk, preferring to use primarily mechanical methods to manage excess weed growth in drains with baseflow. Spraying herbicide into dry drain inverts and woody weed pest species on adjacent riparian banks has continued as the preferred control option.

3.4. WDC has prepared previous reports regarding herbicide usage. A report in 2018 conducted a review of the use of glyphosate by WDC and examined alternative options. A report in 2019 also looked at glyphosate, and recommendations for improvement to practices. A report in 2022 provided an update on spraying practices, herbicide brands and volumes used by WDC and its contractors.

4. ISSUES AND OPTIONS

Annual reporting

4.1. WDC staff propose to report annually to the Utilities and Roading Committee and Community and Recreation Committee regarding Waimakariri District Council (WDC) herbicide usage and recommendations for improvements. After discussion with WDC staff, this annual report is proposed to follow a standardised annual report format, with data also collated in a spreadsheet for comparison between years.

4.2. The data that are proposed to be reported for each financial year includes:

4.2.1. Council operations and contracts that include the application of herbicides in public spaces and/or next to waterways;

4.2.2. Brands of herbicide used;

4.2.3. Brands of additives used;

4.2.4. Volumes of herbicide used; and

4.2.5. A short general statement on locations where herbicides are used (riparian margins, dry drains, public parks etc), types of application, and summary of target species for the herbicide.

EPA and international reviews

4.3. All herbicides and additives reported as used by WDC and its contractors in 2023-24 are approved for their use by the EPA. Grounds have been established by EPA to reassess substances used as aquatic herbicides, namely:

4.3.1. Endothall dipotassium salt

4.3.2. Diquat dibromide

4.3.3. Metsulfuron-methyl

4.3.4. Haloxyfop-R-methyl

4.3.5. Imazapyr isopropylamine

4.3.6. Triclopyr triethylamine

4.4. Triclopyr (such as in Grazon and Tordon Pastureboss) and haloxyfop (in Gallant) are used in various forms for terrestrial use by WDC and its contractors, however the EPA is not reviewing terrestrial use of these herbicides. Diquat is approved for use under consent CRC120402 for weed control in stockwater races and rural drains, however WDC does not use Diquat despite this approval.

4.5. Glyphosate is a common herbicide used by council and its contractors. The EPA decided in July 2024 that there was not sufficient evidence to require a new review on its use in New Zealand, with the last review of 2016 still standing. The EPA concluded in the 2016 review that glyphosate-based products are not likely to cause harm if users follow the label instructions with appropriate usage.

4.6. There is international debate on the human health effects of glyphosate. In 2015, the IARC (International Agency for Research on Cancer) classified glyphosate and its derivatives in Group 2A, as probable human carcinogens. In 2022, the European Food Safety Authority stated that the available data did not provide sufficient evidence to prove the mutagenic/carcinogenic effects of glyphosate. Therefore, the European Commission decided to renew the approval of glyphosate use for another 10 years.

4.7. Before the EPA approves a substance (such as glyphosate), they assess potential impacts on human health and the environment and weigh up its risks and benefits. They use the latest scientific data, including research and decisions made by overseas regulators. If the substance is approved, rules are put in place to reduce risks, such as how to label, package up and dispose of the substance, and there may be restrictions on who can use it. The EPA considers that the existing rules for using glyphosate and glyphosate-containing products are sufficient to manage any potential risks to human health and the environment.

4.8. EPA has stated that they plan to undertake a review into a non-ionic surfactant called polyoxyethylene amine (POEA) that is often added to glyphosate products. POEA has hazardous properties and can be toxic to aquatic organisms. There is only a limited range of glyphosate products available in New Zealand without POEA. WDC staff intend to monitor the EPA review of POEA for any changes to approved uses of the surfactant.

Rural drainage

4.9. Rural drainage works are carried out under contract CON2019/43. Predominantly rural drainage works are carried out via mechanical methods, such as using an excavator with a root rake bucket.

4.10. Herbicides that were reported to be used for rural drain maintenance in 2023-24 were for woody weed and grass control of dry drains near Oxford in April 2024 (Tordon Brushkiller and Glyphosate with Pulse penetrant), and for willow stump treatment (Glyphosate) on Flaxton Road in May 2024. Total volumes used were:

- Tordon Brushkiller XT – 0.3 Litres (active ingredients aminopyralid and picloram)
- Agpro Glyphosate 510 – 18.8 Litres
- Pulse (penetrant additive to herbicide) – 1 Litre

4.11. The rural drainage contractor adheres to the WDC Drainage Maintenance Management Plan (2020) and a Standard Operating Procedure (SOP) for spray drift. In the year 2023-24, the only rural drains sprayed were selective dry drains near Oxford in April 2024:

- Warren Road - North (400m reach) and Warren Rd - South (868m reach)
- Oxford Road (2610m reach)
- Barracks Road (1160m reach)
- Bush Rd/Mill Rd – (gorse and broom sprayed along a reach of 1330m)
- Bush Rd - Crallans Drain (847m reach)
- Woodside Rd (680m reach)

4.12. Any spraying of emergent weeds within a waterway, if carried out, would be according to the consent conditions of CRC120402 and the Herbicide Spray Management Plan (Attachment i), however no such spraying was carried out in the period 2023-24.

4.13. Section 7.3 of the WDC Drainage Maintenance Management Plan (2020) covers herbicide usage and Council approach for staff discretion to select the most appropriate management option, whilst minimising the usage if herbicide where possible. The DMMP also details best practice if herbicide is used, a summary of the EPA review for glyphosate, and its potential impacts on the environment.

Stockwater races

4.14. Stockwater race maintenance is contracted out by WDC. Private landowners also carry out maintenance on sections of the races. A ‘No Spray’ register option is maintained by the Council stockwater contractor for landowners to request no herbicide spraying is undertaken on stockwater races within or adjacent to their property.

4.15. The contractor is a registered chemical applicator with specific training requirements, and occasionally use a subcontractor who is also a registered chemical applicator. They also have a Standard Operating Procedure that they follow.

4.16. The contractor uses herbicide to control grasses and woody weeds such as gorse and broom. Emergent weeds, such as watercress and monkey musk are usually maintained via mechanical removal. Herbicide spray over the stockwater races for emergent weed control is used only in places where there is lack of access for an excavator for example and is carried out following consent CRC120402 conditions and the Herbicide Spray Management Plan.

4.17. Total volumes used for stockwater race maintenance in 2023-24 were:

- Glyphosate Green 510 - 160 Litres
- Pulse penetrant (an organo-silicone surfactant added to herbicide) – 16 Litres estimated

- A limited amount of Tordon Brushkiller for vehicle accessways only (active ingredients of aminopyralid and picloram)

Parks, reserves and stormwater management areas

4.18. WDC maintains urban green space maintenance, such as parks and reserves, and also carries out maintenance for stormwater management areas under contract CON2016/51. The herbicides and volumes used for weed management in 2023-24 under this contract were:

- Rainbow and Brown Glyphosate 360 – 407 Litres (estimate)
- Wet and Forget– 15 Litres (active ingredient of alkyl dimethyl benzyl ammonium chloride)
- Agpro Trichloram Brushkiller – 46 Litres
- Pichloram gel (for cut and paste) – 3.220 Kg (sold by weight)
- Agpro spray maximiser (additive to herbicides) – 10 Litres

4.19. Target species over the year have been annual grasses, broadleaf weeds, annual weeds, cleavers, dock, blackberry, gorse, old man's beard, moss and mould. The contractor uses chemicals sparingly, mainly spot spraying by knapsack. Areas near waterways have seen mechanical and digger weed removal along with weed eating during 2023-24 to minimise chemical usage. The contractor does not spray in water or over waterways.

4.20. The contractor has SOP documentation for 'Handling and Storage' and 'Weed Spraying'. Their staff that apply chemicals have been through the Grow Safe chemical training course and have certification. The contractor uses digital chemical diaries and have an app which has direct access to safety data sheets and hazard identification forms. The bulk of weed spraying is spot-spraying predominantly around garden beds. Wherever possible the contractor heavily mulches gardens to reduce chemical use. If there is a possibility of rain the contractor uses the Agpro spray maximiser.

Ecological restoration work

4.21. The Greenspace ranger is a contractor to WDC. They use sprays and gels for weed management or for site preparation for native restoration plantings. The ranger does not apply herbicides or other sprays over waterways. The ranger is a Growsafe Standard certificate holder, with a current certificate, and keeps a spray diary, follows label instructions - particularly for rainfast times and carries out weather watching for wind and rain.

4.22. Methods of application have included knapsack spraying, drilling and filling of tree trunks, and cut and pasting of stumps. Target plants have included annual and perennial grasses, annual and perennial broadleaf species, invasive climbers and vines, and shrubs and trees.

4.23. The volumes used in 2023-24 by the Greenspace ranger were -

- Orion Deal 360 and Nufarm Weedmaster G360– 35 Litres (both with glyphosate as the active ingredient)
- Corteva Grazon - 1 Litre (with triclopyr as the active ingredient)
- Nufarm Pulse Penetrant - 1 Litre (additive to herbicides)
- Envirodye blue - 0.7 Litres
- Corteva Vigilant 11 - 0.9 Litres (with the active ingredients aminopyralid and picloram)

- Kiwicare Weed Weapon Stump Stop - 2.6 Litres (active ingredient of glyphosate)

Road reserves – including roadside drains

4.24. Roading spray operations carried out under contract CON2019/43 relate to urban kerb and channel spraying, rural spraying around street furniture (signs, poles, edge marker posts, etc), around culvert ends and occasionally road drains. Overgrown vegetation that poses a roading safety risk (blind spots etc) at intersections and/or bridges is also sprayed.

4.25. The Waimakariri District Council roading contractor, provided quantities of chemical spraying undertaken in litres used in 2023-24 for roading purposes under CON2019/43. The types and amount of herbicide and additives used were:

- Lion 490 DST – 188.75 Litres (herbicide with glyphosate as the active ingredient)
- Tordon PastureBoss – 81.52 Litres (herbicide for woody weeds such as broom and gorse, with active ingredients triclopyr and aminopyralid)
- Li -1000 – 33.28 Litres (an anti-spray drift additive)

4.26. Herbicide is only used when deemed necessary by the Roading Team. Landowners are encouraged to not use herbicide on the banks of roadside drains and swales. An anti-drift additive is added to council roading chemical sprays to ensure minimal spray drift when applied. Spray is usually applied with the spray nozzle close to the ground to also help reduce drift.

4.27. The Waimakariri District Council continually adds to a 'No Spray' register for roadside berms, which members of the public can opt in to have their frontages added to. The 'No Spray' register is updated prior to spraying commencement every year. The register holds private information and therefore it not available to the public.

4.28. There is currently no information regarding the 'No Spray' register on the WDC website. However, residents are given the option to opt out of frontage spraying if they ask directly. The 'No-Spray' register is currently only for berm/road reserve maintenance.

Specific recommendations for improvement to WDC practices

4.29. The following is recommended to be undertaken to improve WDC herbicide practices:

4.29.1. Prepare annual herbicide usage reports following a standard format and scope as outlined in this report.

4.29.2. Update the Herbicide Spray Management Plan for consent CRC120402 for best practice and schedule of locations where the consent applies.

4.29.3. Monitor the Environmental Protection Authority for relevant reassessments, reviews or approval changes of herbicides and additives used. Specifically analyse the proposed EPA review of POEA surfactants used with herbicides when published for recommended actions.

4.29.4. Note updates to relevant peer-reviewed research on health and environmental effects of herbicides and common additives that WDC uses.

4.29.5. Detail the option on the WDC website to join the 'No Spray' register for properties that do not wish for herbicide spraying on their berms, in order to make this option more accessible to all.

4.29.6. Create a WDC website page of Frequently Asked Questions (FAQs) regarding herbicide usage.

4.29.7. Extend the scope of the WDC Roading 'No Spray' register to possibly include other areas that border private property such as Council reserves and stormwater management areas, if appropriate alternative management is agreed by the private property owner. Potentially incorporate the 'No Spray' register information maintained by the contractor for the stockwater races.

4.29.8. Require that the minimum level of qualification for any person (WDC staff and contractors) undertaking herbicide application is a Growsafe Basic Certificate.

Implications for Community Wellbeing

4.30. There are implications on community wellbeing by the issues and options that are the subject matter of this report. Herbicide usage can provide effective and economical control of weed species. However herbicides and their additives should be regularly monitored for updates on potential effects on human health and ecosystems.

4.31. 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 because of potential effects such as weakened mauri of ecosystems, and for the gathering of mahinga kai.

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 rivercare groups.

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.

6. OTHER IMPLICATIONS AND RISK MANAGEMENT

6.1. Financial Implications

There are not financial implications of the decisions sought by this report. This report is for information only.

Budgets included in the Annual Plan/Long Term Plan are based on the continuation of a limited use of herbicides for weed control.

6.2. Sustainability and Climate Change Impacts

The recommendations in this report do have sustainability and/or climate change impacts. Improvements in the usage of herbicides could have benefits for sustainability, such as for human health and for aquatic and terrestrial ecosystems.

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 potential health and safety opportunities arising from the adoption/implementation of the recommendations in this report, such as a reduced risk to human health from POEA surfactants if these are recommended to be phased out of usage by the EPA.

7. CONTEXT

7.1. Consistency with Policy

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

7.2. Authorising Legislation

7.3. Consistency with Community Outcomes

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

7.4. Authorising Delegations

No delegations apply as this report is for information only.

HERBICIDE SPRAY MANAGEMENT PLAN

1.0 ENVIRONMENTAL MANAGEMENT PLAN (EMP)

All spraying work shall be carried out in accordance with Resource Consent conditions. In addition, the following actions shall be taken to mitigate the risks of any adverse environmental and health effects:

1.1 Herbicides are to be prepared and applied according to the manufacturer's instructions supplied or on the sides of formulation containers.

1.2 The preparation of herbicide solutions shall be carried out in such a manner as to prevent the risk of back flow as per the Water Supplies Regulations 1961. At a minimum an air gap must be maintained at all times between the end of the hose and the herbicide solution in the tank.

1.3 Application shall be such that in the event of sudden, unexpected rainfall subsequent to spraying, there will be no risk to the environment from runoff. The operator must confirm latest weather predictions prior to commencement of spraying.

1.4 To avoid spray drift, herbicides shall not be applied to water races, drains and dry edges in conditions where the windspeed exceeds 8km/hr. An accurate method for assessing windspeed (at the commencement and during the day's operation) shall be put in place.

1.5 In the event of spray drift occurring beyond the area identified to be sprayed in the public notices, the operator shall immediately notify all potentially affected parties. These at minimum shall include the water race supervisor (0800 855 559), the WDC (03 313 6136), affected landowners, the operators of public or private drinking water supplies in the vicinity of spray drift, the Canterbury Regional Council (03 365 3828), if waterways may be affected Fish & Game New Zealand (03 366 9191), the local runanga within whose takiwa the incident occurred when areas for mahinga kai are in the area.

1.6 Herbicide application to water races and drains shall not occur when water is visually determined to contain too much sediment and/or mud.

1.7 An accurate method for assessing water flow (at the commencement and during the day's operation) shall be put in place.

1.8 Herbicides shall be sprayed as directly as possible (within 10 cm) onto the foliage of the target species so as to avoid downstream water contamination.

1.9 In the event of an accident resulting during the transportation or application of the herbicides, the following actions shall be taken:

(i) As soon as the operators become aware of an accident, they must immediately inform the WDC's Supervisor or the Contractor in Charge.

(ii) The WDC's Supervisor or Contractor in Charge must immediately assess the situation and take any urgent action that is necessary to prevent risk to humans, losses of livestock/waterway fauna, damage to the environment or damage to property. In the case of humans, basic first aid must be applied.

(iii) If required, the appropriate official emergency services must be alerted and/or summoned immediately.

(iv) If stock are at risk, the owner should be contacted directly to take appropriate measures. If the WDC's Supervisor or Contractor in Charge cannot make immediate contact, staff must act promptly to prevent stock losses by moving them away from affected areas.

(v) Do everything to contain spillage and prevent any herbicide from entering waterways, ponds, lakes, drainage systems or the sea. Spray vehicles shall be equipped with spillage containment materials including at least sand/sawdust, water and detergent.

(vi) Any recovered material shall be disposed of at an approved waste disposal site.

As soon as an accident has been assessed by the WDC's Supervisor or the Contractor in Charge, and initial actions (defined above) have been taken, s/he must inform the WDC, High Street, Rangiora.

The WDC will take the Supervisor or Contractor in Charge's report and decide what other action or additional measures must be taken.

The Waimakariri District Council will also be responsible for notifying the following parties of any accident or emergency:

Canterbury Regional Council, telephone (03) 365 3828

S/he will also notify Crown Public Health Ltd's Medical Officer of Health, Dr M A Briesman, telephone (03) 379 9480, regarding matters of poisoning of livestock, domestic animals, fish or the possible contamination of potable water. In the event of a spillage to water Fish & Game New Zealand (03 366 9191) shall also be notified.

1.10 Herbicide concentrations shall be kept in a separate container in a sealed compartment securely fastened to the operations vehicle.

1.11 Chemicals shall be stored in secure dangerous goods stores.

1.12 Surplus or expired chemicals and their containers shall be disposed of in a manner that prevents adverse effects on the environment. B J Dakins & Company Ltd are able to treat and dispose of diluted (rinse water) residues.

2.0 OPERATIONAL MANAGEMENT PLAN (OMP)

The management of safety on site at all field operations is to be the responsibility of the WDC's water race supervisor or Contractor in Charge to carry out the work. Work shall be carried out in accordance with the Agrichemical Users Code of Practice.

The following actions shall be taken to reduce or eliminate the potential for adverse effects against personnel, and the general public.

2.1 All applicators shall wear personal protective equipment. Respirator filters shall be changed regularly and suits and gloves thoroughly washed after each day of operation in a facility (e.g. shower or large washing basin) where washings can be diluted and flushed away.

2.2 Before application begins, the following tasks shall be carried out:

- equipment calibration and inventory check;
- confirm latest weather predictions especially with regard to spray drift potential and rainfall.

2.3 Application records shall be maintained daily. Information shall include chemicals sprayed, rate of application, location of spraying, and location of water sources used for preparing herbicide solutions and for cleaning spray equipment.

2.4 Scheduled service work shall be carried out at contractor depots/workshops.

2.5 If persons are encountered in a spraying location, the spraying personnel shall approach the people, explain their activity and request that they leave the area before continuing spraying.

2.6 In the event of an unresolved conflict with other persons arising, the spraying personnel shall:

- cease spraying in the location of the conflict;
- inform the WDC and CRC of the conflict;
- not proceed with spraying in that area until given permission by the WDC.

3.0 QUALITY PROCEDURAL PLAN (QPP)

The following quality procedural plan defines procedural aspects of spray operations:

3.1	Location	All of the Waimakariri District Council territory as defined by the Local Bodies Amalgamation of 1989.
3.2	Hours of Work	Monday to Saturday inclusive, sunrise to sunset (excludes all Sundays and Public Holidays).
3.3	Description of Operations	Weed control by spraying throughout Waimakariri District of water races, drains, roadways.
3.4	Key Personnel	Drainage Asset Manager Trevor Minchington Roading Asset Manager George Jason Smith Water Race Supervisor Phil Reid Operators

3.5	Standard Operating Procedures	QS-0383 General Maintenance Spraying
3.6	Implementation and Management	All new field staff should review the EMP, OMP and QPP prior to commencement of seasonal work.
3.7	Correspondence	All correspondence shall be documented and filed with the District Manager, Waimakariri District Council, Private Bag 1005, Rangiora.
3.8	Measurement and Testing	Regular auditing is required to monitor: vegetation condition between spraying rounds; and the quality of work following each spraying round. The Water Race Supervisor shall be responsible for ensuring these audits occur and are documented for the Water Races. The Drainage Asset Manager will be responsible for these audits for Stormwater Drains, and the Roading Asset Manager will be responsible for audits associated with the Roading Network
3.9	Compilation and Management of Records	Work methods, and any variations to these if these occur shall be documented and filed with the Drainage Asset Manager.
3.10	Non-Complying Work	Non-complying work shall be identified via audits and through: complaints logged on the WDC Service Desk. Remedial work shall be carried out as soon as possible after non-complying work has been verified.
3.11	Auditing of Plans	The Plans shall be reviewed at 12 month intervals. The review shall consider effectiveness of the plan, its implementation and any necessary changes. The Drainage Asset manager is responsible for ensuring reviews are performed and documenting any changes.
3.12	Spray Programme	The Drainage Asset Manager shall be responsible for: reviewing the programme as a result of vegetation condition reviews; and ensuring spraying work is completed in accordance with the programme.
3.13	Reports	The Drainage Asset Manager shall be responsible for completing the quarterly report to the management team which shall include: summary of work; performance indicators; updates to programme; and financial summaries.

WAIMAKARIRI DISTRICT COUNCIL

REPORT FOR INFORMATION

FILE NO and TRIM NO:	EXT-04-385 / 241113201107
REPORT TO:	UTILITIES AND ROADING COMMITTEE
DATE OF MEETING:	10 December 2024
AUTHOR(S):	Lorena Cardenas Corrales – 3 Waters Compliance Officer Jason Recker – Stormwater and Waterways Manager
SUBJECT:	Rangiora Stormwater Annual Report 2023-2024 & Monitoring Programme Report 2023-2024

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

General Manager | Chief Executive

1. SUMMARY

1.1. This report summarises the key findings of two reports:

1.1.1. The Rangiora Stormwater Network Discharge Consent CRC184601 Annual Report 2023-2024 and

1.1.2. The Rangiora Stormwater Monitoring Programme Report 2023-24.

1.2. The monitoring results are used to develop a programme of works to target areas where elevated levels of contaminants have been identified. This includes specific, catchment-based maintenance and operational interventions along with targeted areas proposed for further investigations.

1.3. In the 2023/24 year, most conditions of consent CRC184601 were assessed as compliant; however, some areas of non-compliance were identified, specifically related to certain contaminant levels. These are summarised below and explored in detail in the Rangiora Stormwater Monitoring Report 2023/24.

1.4. The results from wet weather sampling of 13 sites showed compliant results for the following contaminants in all urban waterways, in alignment with the guidelines set in the Canterbury Land and Water Regional Plan (CLWRP):

1.4.1. Total suspended solids (TSS); compliant in all sampling sites. This is monitored as a guide for erosion and sediment contamination (e.g. construction sites).

1.4.2. Total ammoniacal nitrogen (TAN); compliant in all sampling sites. Used as an indicator of pollution from wastewater and/or agricultural run-off (e.g. fertilisers).

1.5. From dry weather sampling of 6 sites, the following water quality parameters also met the guidelines set in the CLWRP: dissolved oxygen, temperature, pH, TAN and TSS. There were also some exceedances in conductivity (two sites), dissolved inorganic nitrogen (three sites), dissolved reactive phosphorus (two sites) and E. coli (three sites).

1.6. Despite these not being a compliance requirement for this consent, they are still monitored as an indicator of good ecosystem health in the streams before stormwater discharges.

1.7. Exceedances (i.e. non-compliances) during wet weather events were encountered for the following contaminants in specific stormwater sampling points discharging onto the following streams (from a total of 13 sampling sites):

1.7.1. Dissolved copper in the North Brook (4 sites).

1.7.2. Dissolved zinc in the North Drain (1 site), North Brook (4 sites) and Middle Brook (2 sites).

1.7.3. Dissolved reactive phosphorus: all urban waterways, except Cam River.

1.7.4. *E. coli*: all urban waterways, except Cam River.

1.7.5. Trend analysis was undertaken to compare monitoring data available from 2021-2024 against baseline data from 2014-2017 in the same sampling points. The objective was to detect any possible increase or decrease trends of contaminants in the urban waterways over time, using data from 6 years. This analysis revealed the following significant results:

- An increase trend over time is possible for dissolved zinc in the North Brook, at Lilybrook Park site, in the Middle Brook, on the western side of Bush Street, and in the North Drain
- An increase trend is also possible for dissolved copper in the Middle Brook, on the western side of Bush Street
- We have concerns over the increase trends, however our powers are limited.
- A decrease trend is possible for dissolved zinc in the South Brook, on the west side of Railway Road
- Decrease trends were identified in South brook Pond C for dissolved copper and TSS. This is a positive highlight and an objective we seek from the monitoring programme. Historical data available for comparison was from a site located in No.7 Drain further downstream from the Southbrook Pond C outlet, however this is not a true baseline as results are downstream of the mixing zone.

1.8. Recommendations from the Rangiora Stormwater Annual Report & Monitoring Programme 2023-2024 include:

- To investigate and address non-compliances of dissolved zinc in the North Brook as the highest priority, followed by the Middle Brook and North Drain, and also dissolved copper in the Middle Brook. Council can investigate the sources and gather evidence to escalate it further. To address the non-compliances fully, it is a combined responsibility between council, industry (for example with the use of zinc materials in the building industry), and government at a national level.

- Trialling localised street sweeping frequencies to mitigate and reduce the contaminant load in areas with recorded exceedances in dissolved zinc and copper. Based on research by NIWA, council can trial this with the Roading and Drainage Maintenance contract.

1.9. All recommendations issued last year have either been implemented or are in the process of being implemented (for details see section 4.1 from the Annual Report “Previous recommendations follow up”).

Attachments:

i. Rangiora Stormwater Network Discharge Consent CRC184601 Annual Report 2023-2024 (TRIM 241031189470)
ii. CRC184601 Rangiora Stormwater Monitoring Report 2023-2024 CRC184601 (TRIM 240805128819)
iii. Request to align the Roading and Maintenance Contract with SNDC Memo August 2024 (TRIM 240827144003)

2. RECOMMENDATION

THAT the Committee:

(a) **Receives** Report No. 241113201107.

(b) **Notes** that compliant results were achieved during wet weather events for total suspended solids in all urban waterways and total ammoniacal nitrogen; likewise, guideline values were met during dry weather sampling as an indicator of stream health components including values for dissolved oxygen, temperature, pH, total ammoniacal nitrogen and total suspended solids in all urban waterways.

(c) **Notes** that there were exceedances (non-compliances) during wet weather events of dissolved copper and dissolved zinc in some Rangiora waterways, and dissolved reactive phosphorus and *E. coli* in all Rangiora waterways, except Cam River; and during dry weather sampling guidelines were exceeded for conductivity (South Brook and No. 7 Drain), dissolved inorganic nitrogen and *E. coli*, with the last two also specifically showing exceeding results at three sites, two in South Brook and one in No. 7 Drain.

(d) **Notes** that trend analysis this year identifies an increasing trend for dissolved zinc in the North Brook (at Lilybrook Park), Middle Brook (at Bush Street) and in the North Drain (at Coldstream Road); an increase trend for dissolved copper in the Middle Brook (at Bush Street); a decrease trend of dissolved zinc in the South Brook (at Railway Road), and decrease trends at South Brook Pond C for dissolved copper and total suspended solids.

(e) **Notes** the follow up investigations and further improvements summarised in section 4.3 of this report, which will be carried out by 3 Waters staff under existing budgets in 2024-25.

(f) **Notes** that a Rangiora Stormwater Management Plan 2025-2040 is currently being drafted as required by CRC184601, which addresses exceedances and incorporates improvements presented in these reports.

(g) **Circulates** these reports to the Waimakariri Water Zone Committee, Rangiora-Ashley Community Board and Council.

3. BACKGROUND

3.1. A Stormwater Network Discharge Consent for Rangiora township (CRC184601) was granted in May 2021.

3.2. The discharge consent requires the Waimakariri District Council (WDC) to report to Environment Canterbury with an Annual Report at the end of each financial year (condition 35); and to outline the results of the stormwater Monitoring Programme for that financial year, discussing findings and trend analysis from the sampling of contaminants undertaken in the urban waterways of Rangiora, in comparison to baseline monitoring sampling undertaken in 2014-2017. Due to the nature of the information, these requirements are presented in separate reports.

3.3. WDC still has not had a response from Environment Canterbury on their assessment from the last submission of compliance for the 2021/23 financial year. This means that feedback from Environment Canterbury on the previous report was not available to improve the present report based on their feedback.

3.4. The Rangiora Stormwater Network Discharge Consent CRC184601 Annual Report 2023-2024 is the second annual report submitted to Environment Canterbury for consent CRC184601. The previous covering report submitted in May 2024 to this committee about this consent is available on TRIM 240506071112, and included the following attachments:

i. Rangiora Annual Stormwater Report 2021-23 (TRIM 240325047404).

ii. Rangiora Stormwater Monitoring report 2022-23 (TRIM 230919146639).

3.5. The Rangiora Annual Stormwater Report 2023-2024 and Rangiora Stormwater Monitoring Programme Report 2023-24 will be submitted to Environment Canterbury and Ngāi

Tūāhuriri Rūnanga as per consent condition 35, after presentation of these reports to this committee.

3.6. It is noted, this year the compliance guideline values, also known as default guideline values (DGVs), were adjusted for zinc and copper based on the specific pH, hardness and dissolved organic carbon (DOC) found at each site. The implications of this adjustment mean that last year we had the same guideline value to comply with for all sampling sites, while this year each site has a different value to comply with. As a result, the sites that were exceeding last year and this year for dissolved copper are different, while they remained the same for dissolved zinc.

3.7. The above changes on DGVs were recommended by Environment Canterbury, following new research and advice from NIWA on water chemistry affecting the bioavailability of heavy metals. WDC is required to adopt any new changes to guidelines for surface water (as per Condition 32 (c) from CRC184601).

3.8. The adjusted DGVs resulted in more complex graphs with specific compliance guidelines for each sampling site, based on their water chemistry, which are reported in the Rangiora Monitoring Programme Report 2023-24 under the Urban Impact section.

3.9. Compared to last year, the delivery of maintenance works from a Roading perspective was achieved this financial year. A memo with recommendations was prepared to inform the preparation of the next tender process for the Roading and Drainage maintenance contract, including meeting consent timeframes and the ability to increase street sweeping for targeted efforts in reducing the contaminant load (TRIM 240827144003).

3.10. In comparison to last year's exceedances, the findings are:

3.10.1. Dissolved copper: this year exceeded in the North Brook (4 sites). Last year's exceedances encountered in North Drain, North Brook and Middle Brook;

3.10.2. Dissolved zinc: this year exceedances found in the North Drain (1 site), North Brook (4 sites) and Middle Brook (2 sites); samples from Cam River, South Brook, No. 7 Drain and South South Brook were compliant. These findings are consistent with last year's monitoring.

3.10.3. Dissolved reactive phosphorus: this year exceeding in all urban waterways, except Cam River; same finding as last year.

3.10.4. *E. coli*: in all urban waterways except Cam River; same finding as previous year.

3.10.5. As noted above, some changes in exceedances for dissolved copper are likely due to DGVs adjustments, meaning the compliant/non-compliant assessment is more specifically tailored to the site depending on its water chemistry, which means some limits are less strict for specific sites.

3.11. With regards the stream health sampling, some values were met as summarized above (temperature, dissolved oxygen, TSS, TAN), and other values were exceeded, including:

3.11.1. Specific conductivity for two sites (South Brook and No. 7 Drain), which provides an indication of dissolved materials such as nutrients. This relates to pollution sources. Compared to last year, there is an improvement recorded for the Middle Brook, which exceeded the guideline last year but not this year.

3.11.2. Dissolved inorganic nitrogen for three sites (two in South Brook, one in No. 7 Drain). This is sampled as an indicator of the most bio-available forms (nitrate, nitrite and ammonia) of nitrogen for plants (such as aquatic weeds and algae) from agricultural run-off. There is also an improvement compared to last financial year, where 6 sites recorded exceedances including North Brook and Middle Brook, which were compliant this year.

3.11.3. Dissolved reactive phosphorus at two sites (South Brook and No. 7 Drain). DRP is recorded as an indicator of wastewater overflows or rural run off from phosphorus-based fertilizers. There were no exceedances recorded last year for this type of sampling.

3.11.4. E. coli, which exceeded guideline values for three sites (two in the South Brook and No. 7 Drain site). Last year, only the Middle Brook presented exceedances. This was followed up with a site-specific investigation this year, which did not pinpoint any E. coli concerns. This suggests E. coli contamination fluctuates with land use.

4. ISSUES AND OPTIONS

4.1. With this new reporting finalised, 3 Waters team has completed implementation of the recommendations from the Annual Report 2021-2023, which included:

4.1.1. Improving trend analyses for 2023-2024 using new data analyses tool (Time Trends, NIWA).

4.1.2. Incorporating maintenance records of sumps discharging to soakage chambers and improve record keeping.

4.1.3. To meet maintenance timeframes for financial year 2023-2024 as per the compliance requirements. There is a gap between the delivery timeframes of maintenance works from the roading and drainage maintenance contract (written in 2019), and the timeframes that the discharge consent requires this works to be delivered (written and approved in 2021). Because of this misalignment, meeting this item of compliance has been challenging in the past. However, as a result of roading team working together with contractors, this has been achieved for this financial year. More details can be found in the memo (attachment iii to this report).

4.1.4. Sought approval of revised first flush conditions by the Regional Manager Compliance at Environment Canterbury (awaiting response).

4.2. A full follow up on last year's recommendations implemented last year can be found in section 4.1 of the Annual Report (Attachment i)

4.3. The recommendations from the Rangiora Stormwater Annual Report and Rangiora Monitoring Report for 2023-2024 are:

4.3.1. Dissolved zinc non-compliances in the North Brook (at Lilybrook Park), in the Middle Brook (at western side of Bush Street) and in the North Drain (at Coldstream Road) are to be investigated and addressed as a priority.

4.3.2. Dissolved copper: Investigations and future treatment for dissolved copper in the Middle Brook at site on the western side of Bush Street is undertaken.

4.3.3. To address non-compliances of heavy metals (copper and zinc), it is suggested to trial targeted and increased street sweeping of the roadside channel in areas upstream of where elevated levels of dissolved copper and zinc are encountered. This was proposed last year, to reduce the contaminant load of heavy metals in waterways (based on research led by NIWA).

4.3.4. DRP: Follow up actions and investigations on high levels of dissolved reactive phosphorus from rural inputs are recommended for referral to Environment Canterbury, as they are outside the scope of the Rangiora stormwater network discharge consent.

4.3.5. E. coli: Faecal source tracking investigations are recommended ideally for all waterways, except the Cam River. At a practical level, due to budget limitations and this analysis having a high cost, it is proposed to select the top streams and

sites to reveal key information for this analysis (e.g. key sites in North Brook, Middle Brook, South Brook and No. 7 Drain).

4.3.6. DIN: collaboration with Environment Canterbury is recommended to address exceedances of dissolved inorganic nitrogen found during stream health sampling, as this is outside the scope of this consent to address. Sources are likely to be from farming land use in rural areas north-west of South Brook by Townsend Road, and South Brook south-west of Johns Road / Lehmans Road.

4.3.7. Sediment sampling: for consistency, it is recommended to continue sampling as per the Boffa Miskell 2023 report sampling sites and codes.

4.3.8. 3 Waters Compliance Officer to simplify compliance reports for the 24/25 monitoring period, in preparation for simultaneous reporting with stormwater discharge consents for Rangiora, Woodend, Oxford and Kaiapoi.

4.3.9. A new process is recommended to be implemented from a planning and development perspective to report better on any developments or resource consents proposed within an Environment Canterbury DWPZ (already implemented for the 24/25 monitoring period, to be reported on with the next report).

4.3.10. Staff will look at developing tools for trend analysis and consider the benefit of externally sourcing the field sampling work in order to manage the monitoring of 4 discharge consents in further years.

4.3.11. Trialling localised street sweeping frequencies to mitigate and reduce the contaminant load in areas with recorded exceedances in dissolved zinc and copper

4.4. Although this report presents some results which are non-compliant with CRC184601 consent values for a range of contaminants, Environment Canterbury is aware that this non-compliance will take time for the Council to rectify. The Council proposed in the consent application for CRC184601 to achieve full compliance by the year 2040. The actions and details of these recommendations will be addressed with the Rangiora Stormwater Management Plan 2025-40. This will address budget requirements and define a process for prioritising stormwater water improvement projects.

4.5. The implications of addressing the non-compliances by 2040 include:

4.5.1. Site specific investigations targeting specific contaminant exceedances to further locate the source of contaminants.

4.5.2. The Stormwater Management Plan is currently being prepared to specifically target identified problem areas and exceedances. This plan includes prioritising stormwater treatment projects designed to address these issues and improve the quality of stormwater discharges and urban waterways.

4.5.3. Ensuring the next roading and drainage contract frequency requirements are aligned with the consent requirement frequencies outlined in CRC184601, and ensure they include the flexibility to increase street sweeping as necessary to mitigate the contaminant load of dissolved zinc, copper and other contaminants reaching the waterways via stormwater discharges.

Implications for Community Wellbeing

There are no implications on community wellbeing by the issues and options that are the subject matter of this report. The implementation of the recommendations and the Stormwater Management Plan will improve the water quality in waterways which will ultimately benefit and enhance community wellbeing.

4.6. 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. The report will be circulated to the hapū via MKL after presentation to this committee.

With regards the previous submission of these reports for FY 2021-23 (16th April), WDC received feedback from the Runanga meeting. The results of these monitoring report were shared with Runanga via infographics, which were presented at their next hapū meeting.

5.2. Groups and Organisations

There are groups and organisations likely to be affected by, or to have an interest in the subject matter of this report, such as the Waimakariri Water Zone Committee.

5.3. Wider Community

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

6. OTHER IMPLICATIONS AND RISK MANAGEMENT

6.1. Financial Implications

The budget for Rangiora stormwater monitoring and follow-up investigations are already included in the Long-Term Plan.

Budgets for stormwater improvements to meet consent CRC184601 conditions are already allocated in the Long-Term Plan.

Staff plan to manage the maintenance and operations activities identified within existing budgets. Staff will monitor this expenditure and use it to help inform future annual plan and LTP budgets.

6.2. Sustainability and Climate Change Impacts

The recommendations in this report do have sustainability and/or climate change impacts. Improvements in Stormwater Management will aid in the sustainable management of our catchments and waterways for uses such as mahinga kai and recreation.

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. Health and Safety risks are actively identified and managed *in situ* during stormwater monitoring fieldwork.

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

The Local Government Act 2002 sets out Council roles in managing stormwater infrastructure. The Resource Management Act 1991 sets out consenting requirements for stormwater discharges.

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**

Not applicable as this report is for information only.

Rangiora Stormwater Monitoring Programme Report 2023-24

Prepared by Waimakariri District Council
September 2024

Prepared for: Regional Leader - Monitoring and Compliance**,** Environment Canterbury and Ngāi Tūāhuriri Rūnanga

Prepared by: _____Lorena Cardenas 3 Waters Compliance Officer

Reviewed by: _____ Sophie Allen Water Environment Advisor

Approved by: _____ Jason Recker Stormwater and Waterways Manager

on behalf of 3 Waters, Waimakariri District Council

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1	Lorena Cardenas	Draft	October 2024
2	Sophie Allen	First Review	7 November 2024
3	Lorena Cardenas	Final	November 2024
4	Sophie Allen	Final Review	November 2024

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List of Abbreviations

ANZG	Australian New Zealand Guidelines
DGV	Default Guideline Value
DIN	Dissolved Inorganic Nitrogen
DRP	Dissolved Reactive Phosphorus
TAN	Total Ammoniacal Nitrogen
TMF	Toxicity modifying factor

List of Appendixes

Only the appendixes relevant to this report are included. A full list of appendixes is included with the Rangiora Annual Report.

1. Appendix 2. Trend Analyses.
2. Appendix 3. Boffa Miskell report December 2023.
3. Appendix 4. Middle Brook Investigations Lab Results.

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 2023 – 30 June 2024. Specifically, this report covers conditions 35-d, e, f and 35-g-i.

Trend analysis has been prepared using historical data from Waimakariri District Council baseline survey data from 2014-2017, analysed over time with monitoring data from 2021-2024 and adjusted for rainfall flow.

As per the monitoring programme, there are 22 visual discharge inspection outlets (6 of which are also sampled for Total Suspended Solids), 13 sites in receiving waters for urban contaminants, and 6 sites for stream health sampling.

Visual discharge inspections didn't reveal any problems with hydrocarbons, visible contaminants, odor, stream bed or bank erosion. There were some occasions where the stream was found to be more sedimented than the stormwater discharge (South Brook and Middle Brook) and one instance where a milky discharge was observed (South Brook), and subsequently addressed with follow up investigations.

The guidelines threshold for total suspended solids (TSS) was not exceeded in any of the sites. Pond C (corner of Flaxton and Fernside Roads) showed a decreasing trend for some contaminants such as dissolved copper and TSS. No definite trends were encountered for any other contaminants at pond C.

Guideline values for 'Urban Impact' (which are compliance points under the Rangiora Stormwater Monitoring Programme), were not exceeded for total ammoniacal nitrogen. They were exceeded for dissolved copper, dissolved zinc, dissolved reactive phosphorus (DRP) and *E. coli*.

Increasing trends for dissolved zinc were identified as possible in the North Brook at Lilybrook Park, in the Middle Brook at Bush Street and in the North Drain. Another increasing trend identified as possible was for dissolved copper in the Middle Brook at Bush Street.

Decreasing trends of contaminants over time were also identified as possible for dissolved zinc in the South Brook at Railway Road site, and in Pond C for total suspended solids and dissolved copper.

No other trends were identified for other contaminants. Most trends appear increasing but are uncertain from the statistical analysis.

Urban Impact sampling was undertaken during moderate wet weather rain events that met the first flush criteria, with total rainfall depths of 11.6mm and 7.6mm.

For dry weather ‘Stream Health’ sampling, guideline values were met for temperature, pH, total suspended solids, total ammoniacal nitrogen, and dissolved oxygen (with one low value in quarter 1 at Lilybrook Park (RRNB036), which is known for possible groundwater inflows). Guideline values for dissolved inorganic nitrogen (DIN), conductivity, dissolved reactive phosphorus and *E. coli* where 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. These include faecal source tracking investigation, targeted treatment in areas of high incidence of contaminants, and targeted street sweeping in upstream areas which recorded high levels of dissolved metals. It is believed that some exceedances of *E. coli*, DRP and DIN, could be due to rural inputs, beyond the scope of the consent. Collaborative work and conversations with Environment Canterbury are recommended to address these issues.

Annual stream sediment deposition sampling was undertaken by Boffa Miskell in December 2023. The same sampling contract also covered stream health ecological sampling (every 3 years) and stormwater management area sediment sampling programmes (every 5 or 10 years depending on the basin).

There were three spills recorded with no significant impacts to WDC stormwater system or waterways. The first spill at Torlesse Street, was a dual diesel spill. This did not reach the stormwater system and clean up measures were deployed immediately. Another spill occurred at Queen Street, caused by sedimented water from a renovated building. WDC followed this up and landowners deployed clean up measures. Lastly, there was an accidental spill of deck primer spilt from a tin, which was addressed and responded to immediately. None of these spills impacted the stormwater system.

2. Introduction

This report is an appendix to the FY 23/24 Annual Report for CRC184601. The present report contains all the sampling information from the Rangiora monitoring programme for FY 23/24, covering data from 1 July 2023 to 30 June 2024.

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.

In this report, there are 8 components to the Monitoring Programme, with the first three being wet weather sampling:

1. Visual Discharge Inspections, at stormwater discharge points
2. Major Network Outlets, with Total Suspended Solids analyses at stormwater discharge points
3. Urban Impact, with contaminants analyses in the receiving waterways below the stormwater discharges
4. Stormwater basin sampling, analysing soil from stormwater basins
5. Fine Sediment Deposition, undertaken as part of Ecological Surveys
6. Stream Sediment Toxicants, undertaken in the urban stream beds as part of Ecological Surveys
7. Stream Health, the dry weather sampling component, undertaken in the receiving waterways before the stormwater discharges
8. Ecological surveys, dry weather sampling, undertaken in the receiving environment

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 are a valuable component to inform WDC community boards, iwi and council on the general health of the urban streams.

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. Recently, the Cam River has also been found to be dry occasionally, for which WDC is undertaken investigations.
All the streams provide habitat for aquatic ecology. Design plans for Bellgrove subdivision have been reviewed and checked, with especial attention on the stormwater proposals which could potentially affect Taranaki Stream or Cam River. This subdivision proposes infiltration basins for the Taranaki Stream catchment and Cam River catchments. The stormwater basins are designed to treat a 1:50 year storm event. Because a stormwater discharge to both Taranaki and Cam River would be a rare event, there are no sampling points added to these streams in the stormwater monitoring programme

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 is required every 5 years for industrial basins and every 10 years for residential basins. It was undertaken in January-July 2024 for the first time.
5. **Fine Sediment Deposition & Stream Sediment Toxicants:** Fine sediment deposition sampling is required annually. Stream Sediment Toxicants required every 3 years until 2025, then every 5 years thereafter. Both analyses were undertaken this FY as part of the ecological survey work by Boffa Miskell Ltd.

"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) are sampled within the Rangiora streams.
2. **Ecological surveys in Rangiora streams:** A consultant (Boffa Miskell Ltd) was engaged to carry out this work, which is required every 3 years until 2025, with 5-yearly sampling afterwards. This sampling was undertaken in December 2023.

The latter two components are not part of the compliance grading for consent CRC184601. The above is summarized in Table 1.

2.2. Monitoring Programme Summary

	Urban Impact Monitoring (part of consent – compliance requirements will apply)						Stream Health Monitoring (part of consent – compliance requirements will NOT apply) Purpose: to provide information on urban reaches of receiving waterways	
	Discharge Point Visual Inspection	**Sediment discharges from major network outlets**	**Receiving Surface Water *Urban contaminants***	**Stormwater Basins**	**Fine Sediment Deposition (Depth and % Cover)**	**Stream Sediment Toxicants**	**Receiving Surface Water *General stream health***	**Ecological** (urban stream reaches)**
Description	Visual inspection of major discharge points into the receiving waters	TSS	Water quality testing	Soil or Sediment sampling of the Stormwater Basins	Sediment sampling of the stream beds	Sediment sampling of the stream beds	Water quality testing	Ecological surveys
Location	Receiving waterways (at major discharge points)	Selected major discharge points *(see plan of 6 recommended sites; Once compliance achieved; rotate among remainder of major discharge sites)*	Selected receiving waters sampling points	Dry and Wet Stormwater Basins	Stream beds downstream of major discharge points – selected major deposition areas	Stream beds downstream of major discharge points – selected major deposition areas	Selected receiving waters sampling points	Urban stream beds
Parameters	Oil, grease or other visible contaminants Odour Stream bed and bank erosion	TSS <50gm3 at major discharge point (Additional sample parameters apply at outlet of Pond C)	Dissolved copper Dissolved Zinc Hardness Dissolved organic carbon pH E. coli Dissolved Reactive Phosphorous Total ammoniacal nitrogen Expand programme post 2025 to include industrial source metals (e.g. arsenic, boron, chromium from known high risk sites e.g. McAlpines)	Total Copper, Lead and Zinc; PAH Total organic carbon Industrial catchments: add Arsenic, chromium, cadmium, mercury, nickel	Sediment depth and cover survey (stream bed fine sediment cover %)	Total Copper, Lead and Zinc, Polycyclic Aromatic Hydrocarbons Total organic carbon Particle size analysis (periodic) Expand programme post 2025 to include industrial source metals (e.g. arsenic, boron, chromium)- one sample round to include industrial source metals pre-2025	Dissolved Oxygen Temperature pH Specific conductance Dissolved inorganic nitrogen Total Ammoniacal Nitrogen TSS baseline DRP E. coli	Benthic Periphyton (% cover) Fish species Macrophytes QMCI
Frequency	Quarterly **And spill responses (**response to service requests as required)	Four times per annum until 2025, thereafter twice yearly	Twice yearly	5 yearly industrial 10 yearly residential	Annual	Every 3 years until 2025 (2021, 2024) Thereafter 5 yearly	Quarterly (first three years) Thereafter annually	Every 3 years until 2025 (2021, 2024) Thereafter 5 yearly
Weather Conditions	Wet Weather	Wet weather (ideally first flush)	Ideally first flush	Dry weather	Dry weather	Dry weather	Dry Weather	Dry weather

Table 1. Monitoring Programme Summary from the Rangiora Monitoring Programme, provided for context. Highlighted in yellow, is the sampling undertaken for FY 23/34.

2.3. Sampling Sites

2.3.1. Discharge Inspections

All practicable major discharge points from the WDC stormwater network into the receiving waters are visually monitored every quarter.

22 observation points for discharge inspections are presented in the following list and Figure 1.

1. RRND012: North Drain, Coldstream Road.
2. RRNB057: North Brook, at Oxford Road.
3. RRNB049: North Brook, at Geddis Street.
4. RRNB045: North Brook, at Dudley Park, White Street pipe outlet.
5. RRNB039: North Brook, at Ward Park, drain inflow from Fraser Place
6. RRNB038: North Brook, at Ward Park, drain inflow from Ward Place
7. RRNB035: North Brook, drain inflow into eastern side of Lilybrook Park
8. RRNB033: Northern branch of the North Brook, west side Kowhai Avenue
9. RRNB015: Northern branch of the North Brook pipe outlet, Cotter Lane
10. RRNB009: North Brook, outlet of the North Brook Ponds
11. RRER006: Goodwins (Horncastle) Stormwater Pond Outlet, Northbrook Road
12. RRWR013: Oxford Park East SMA basin outlet (West Rangiora) on Johns Road
13. RRMB026: Middle Brook, at King Street.
14. RRMB022: Middle Brook, at Clearbrook Lane
15. RRMB017A: Middle Brook at Gefkins Road
16. RRSB046A: South Brook, at Townsend Fields Stormwater Management Area outlet.
17. RRSB035: South Brook, pipe outlet off Coronation Street.
18. RRSB032: South Brook at Southbrook Road (west side at pipe outlet)
19. RRSB030: South Brook, pipe outlet on west side of Railway Road.
20. RRSS026: South South Brook Stormwater Pond Outlet, Lineside Road
21. RRSR026A: South Rangiora, Stormwater Pond C Outlet, Flaxton Road
22. RRSR025: South Rangiora, Outlet of Fernside/Flaxton Intersection SMA

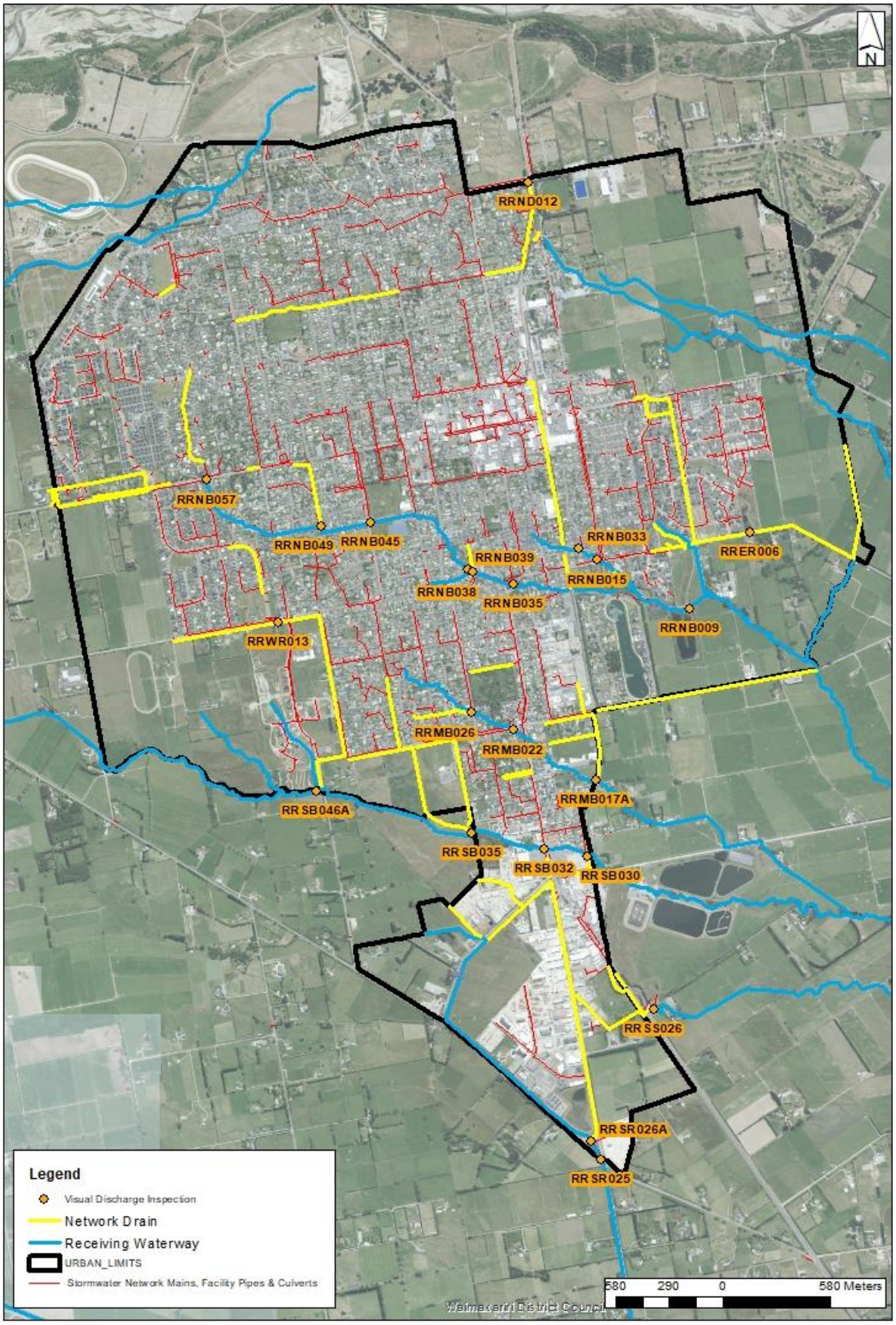

Figure 1. Discharge inspection locations

2.3.2. Major Network Outlets

Six Major Network Outlet sample locations are sampled for total suspended solids (TSS). These sites 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.

1. RRNB009: North Brook, outlet of the North Brook and East Rangiora SW Basins
2. RRNB033: Northern branch of the North Brook, west side Kowhai Avenue
3. RRNB045: North Brook, at Dudley Park, White Street (discharge from 600mm diameter pipe on White St)
4. RRMB017A: Middle Brook, Gefkins Road (sample Railway Drain discharge from Hegan Reserve bank)
5. RRSB030: South Brook, pipe outlet on west side of Railway Road (discharge from 525mm diameter pipe into stream)
6. RRSR026A: South Rangiora, Stormwater Pond C Outlet, Flaxton Road

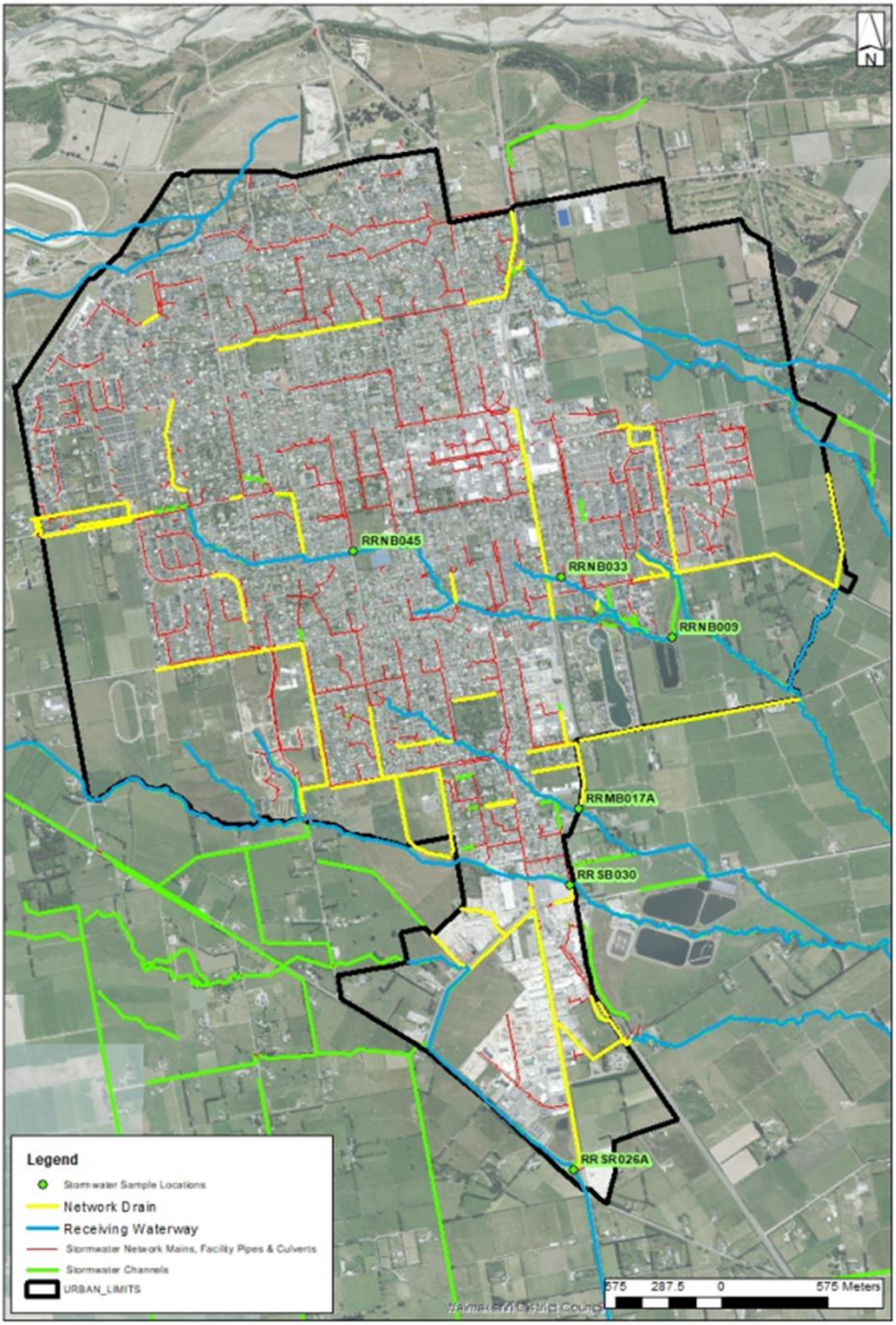

Figure 2. Sample locations for TSS and sample site RRSR026A at selected major discharge points

2.3.3. 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:

1. RRND012: North Drain, near Ashley River stop-bank
2. CRCR120: Cam River, on the southern side of Kippenberger Avenue
3. RRNB017: North Brook, on the northern side of Boys Road
4. RRNB033: North branch of the North Brook, on the western side of Kowhai Avenue
5. RRNB036: North Brook, Lilybrook Park
6. RRNB044: North Brook, on Church St across from Dudley Park
7. RRNB055: North Brook, at Aspen Street Park
8. RRMB017: Middle Brook, Gefkins Road east of the Railway, upstream side of the bridge
9. RRMB029: Middle Brook, on the western side of Bush Street
10. RRSB030: South Brook, on the west side of Railway Road
11. RRSB046: South Brook, on the east side of Townsend Road
12. RRSS026: South-South Brook, on the east side of Lineside Road
13. RRSR026: South Rangiora, No. 7 Drain immediately south of Fernside Road (allows for mixing zone).

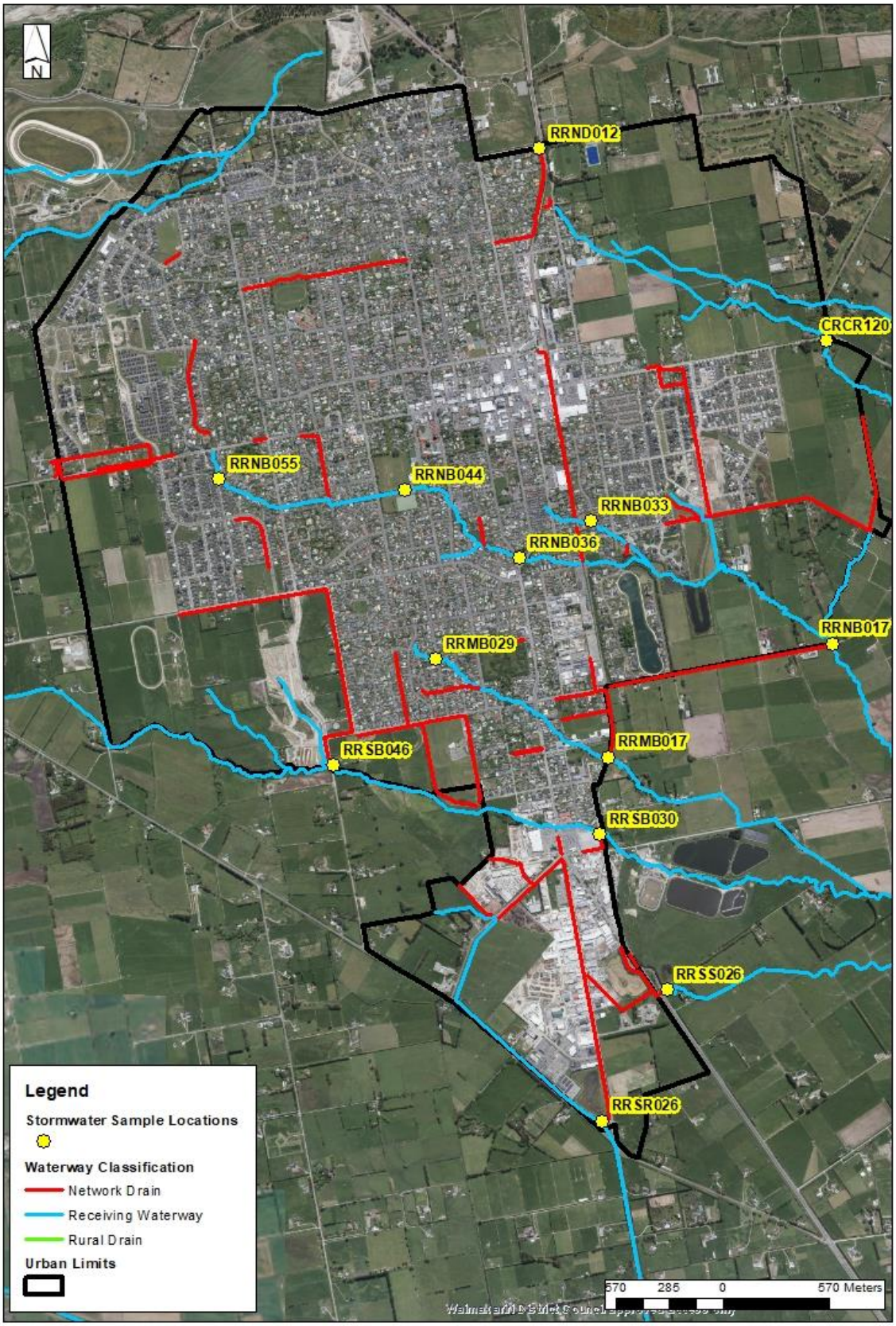

Figure 3. Sample locations for Urban Impact monitoring

2.3.4. 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:

1. RRSR025: South Rangiora, downstream of Fernside / Flaxton Intersection SMA outlet
2. RRSB030: South Brook, on the west side of Railway Road
3. RRSB046: South Brook, on the East side of Townsend Road
4. RRMB017: Middle Brook, Gefkins Road, east of the Railway Line on upstream side of bridge
5. RRNB017: North Brook, on northern side of Boys Road
6. RRNB036: North Brook, Lilybrook Park

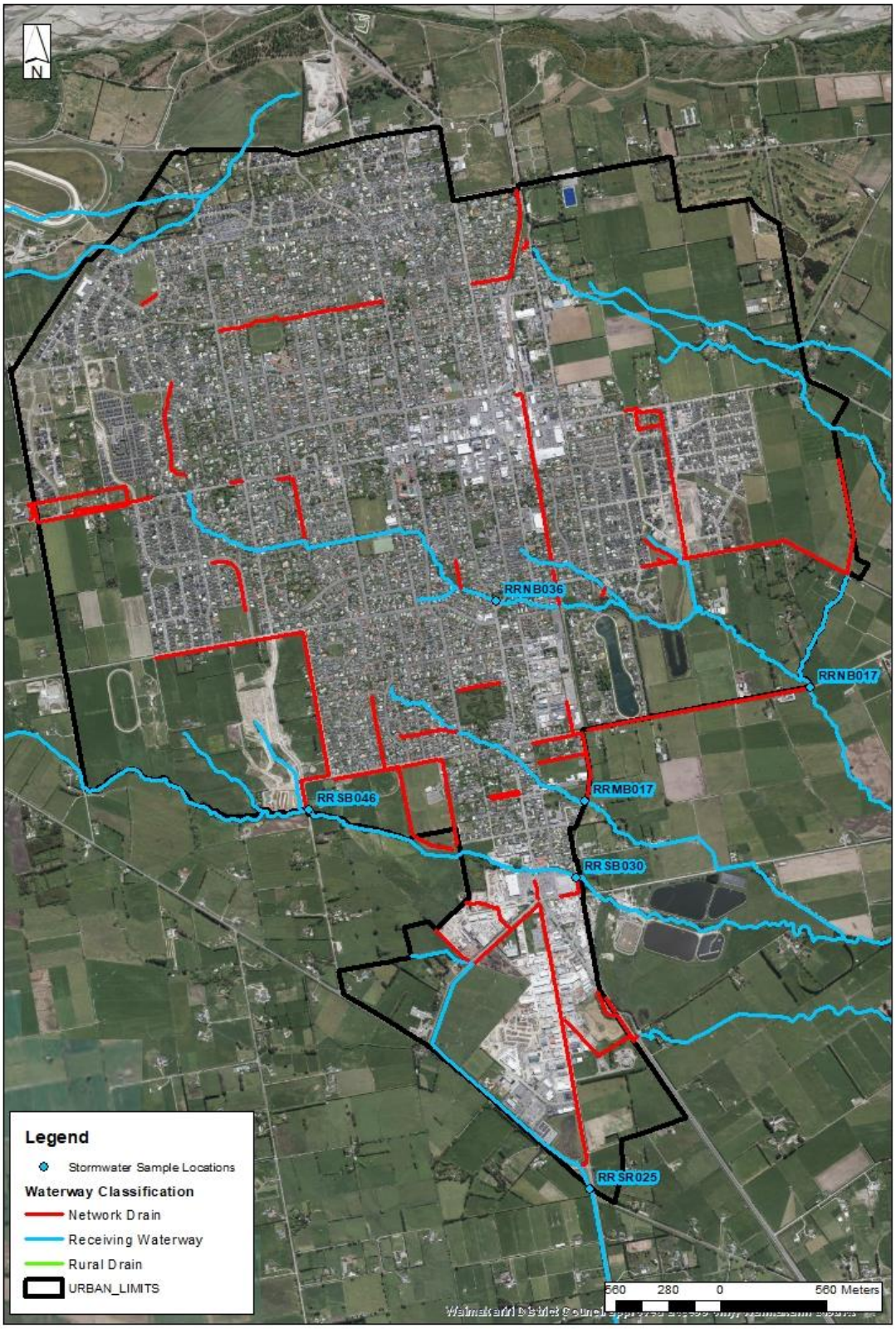

Figure 4. Sample locations for Stream Health

2.3.5. Sediment Sampling and Ecological Surveys

A) Fine sediment deposition (Depth and % Cover)

This sampling is required annually for compliance requirements. For FY 23/24 it was undertaken in December 2023 as part of the Ecological surveys commissioned to Boffa Miskell Ltd. See report attached as Appendix 3 (TRIM 240618098829).

For FY 22/23, these surveys were undertaken by WDC. Some of the locations for sampling undertaken in FY 23/24 varied from sites in FY 22/23 due to aligning with ecological survey locations. The FY 23/24 sites will be used for future monitoring.

Data from 6 sampling sites is available and equivalent for comparison with previous FY (See Table 1). Last year's sampling sites are represented in Figure 5. This present year sediment sampling is represented in Figure 6.

Figure 5. Last year's sediment sampling sites in Rangiora (FY 22/23), undertaken by WDC in June 2023, provided for comparison

Sediment Sampling Sites ID & Site names equivalents	
Sampled in FY 22/23 (WDC)	**Sampled in FY 23/24 (Boffa Miskell)**
North Brook Dudley Park	-
North Brook Ward Park	North Brook at Ward Park - RRNB8ES
North Brook Below Northbrook Ponds	North Brook near Spark Lane - RRNB7ES
Middle Brook 44 South Belt	Middle Brook beside South Belt RRMB6S
Middle Brook Gefkins Road	Middle Brook beside Gefkins Road RRMB5ES
-	South Brook sediment at Coronation Street RRSB4S
-	South Brook beside Marsh Road RRSB3ES
South South Brook Below Pond A	South South Brook beside Lineside Road RRSS2ES
No. 7 Drain Below Pond C	No. 7 Drain beside Flaxton Road RRSR1ES

Table 2. Site ID equivalents for sediment sampling from FY 22/23 vs FY 23/24. Comparison of results is possible for 6 sites (highlighted in yellow).

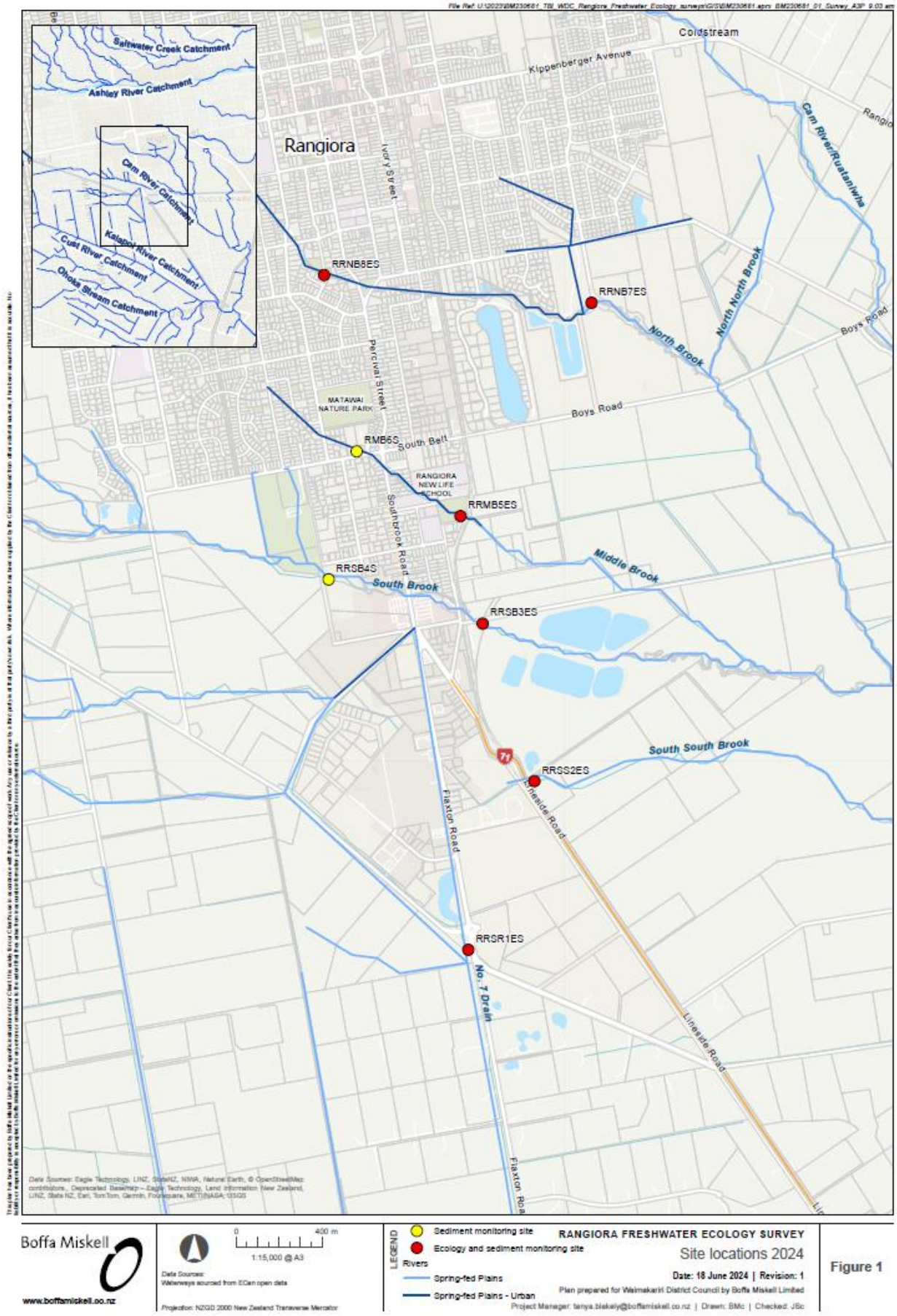

Figure 6. Boffa Miskell's sampling sites for sediment sampling and ecological surveys.

B) Stream Sediment Toxicants

This sampling is required every 3 years until 2025, with years 2021 and 2024 assigned for undertaking this sampling in the Monitoring Programme.

However, the first Stream Sediment Toxicant survey was undertaken in December 2023. Therefore, the next Stream Sediment sampling round will be due 3 years after, in 2026. After that, the frequency can drop to every 5 years as per the monitoring programme.

This sampling was undertaken by Boffa Miskell at the sample sampling locations and same dates as per Fine sediment deposition sampling. See Table 2, Figure 6, Figure 7 and Appendix 3 for full report and results.

C) Ecological surveys

This sampling is not required for compliance. However, these results inform greatly how any stormwater improvement projects translate in tangible ecological outcomes in the waterways.

These were also undertaken by Boffa Miskell at the same time as sediment sampling as above. See Table 2, Figure 6, Figure 7 and Appendix 3 for full report and results.

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 2. For FY 23/24, no sampling events were missed, except for some sites not being sampled due to lack of flow.

The date when sampling was collected, is already provided to Environment Canterbury on a regular basis as sampling occurs via lab results submission from Hill Laboratories.

3.1. Sampling summary

	2023-24			
	Q1	Q2	Q3	Q4
	Jul, Aug, Sep	*Oct, Nov, Dec*	*Jan, Feb, Mar*	*Apr, May, Jun*
Visual discharge inspections (quarterly) n=22	24/07/2023 SA	20/11/2023: sampled 3 sites, lack of flow 4/12/2023: sampled 6 sites (12 left) 12/12/2023: all remaining 12 sites sampled, plus 3 sites from 20/11 re-sampled. SA, LC	15/3/24: All sites sampled except RRND012, RRNB057, RRNB038, RRNB039, RRSB035, RRSS026 (not enough flow) SA	21/05/2024 LC, TD, AK
Major network outlet discharge (four times per year until 2025) n=6	28/07/2023 SA	4/12/2023 SA, LC	15/3/24 SA	21/05/2024 LC, TD, AK
Urban Impact (twice per year) n=13	28/09/2023 quote 125323 with DOC & Hardness SA			12/4/2024: All sites sampled except: RRNB055, RRMB027, RRND012, CRCR120 (sites were dry) LC, SA, TD
Stream Health (quarterly)	7/07/2023 SA	8/09/2023 SA, LC	8/01/2024 SA, LC	24/06/2024 LC, SA + Middle Brook E. coli investigations (6 sites)
Stream fine sediment deposition (annually) N=6		1/12/2023 SA		
Stream Sediment Toxicants (every 3 years until 2026 [2023, 2026] there after 5 yearly)		1/12/2023 SA		

Table 3. Summary of Rangiora CRC184601 sampling undertaken in FY 23/24. The shaded orange colour indicates sampling required and undertaken. Grey shading indicates, sampling not required for compliance on this quarter. Initials of people who sampled are as follows: SA = Sophie Allen, LC = Lorena Cardenas, TD = Tim Doornkamp, AK = Aaron Kibblewhite.

3.2. Rainfall data

Rainfall was monitored closely. All sampling attempts, where preparation for sampling was undertaken but not carried out, were also recorded by WDC. This year, all sampling rounds were met however first flush criteria were not always met (too much rainfall).

The challenges encountered to undertake sampling were:

- Some sites drying out quickly
- Staff availability
- Missed flushes falling outside of working hours when no staff are available or its unsafe and dark

These issues have been addressed and continue to be addressed by:

- Exploring outsourcing options with external contractors
- Regular weather watching undertaken by 3 Waters Compliance Officer and Systems Engineer, with direct access to the most instant rainfall tools available to council
- Relaxing first flush criteria with advice sought from Environment Canterbury directly

A full spreadsheet of sampling attempts and details is available on request.

Date	24/07/2023	28/07/2023	28/09/2023	20/11/2023	4/12/2023
Time	8:45am	9:10am	9:00am	9am	10am
Antecedent dry weather	11.5h	48.5h	70.25h	65h	60h
Rainfall Depth (mm) ***sampling commenced***	44mm	3mm	11.6 mm	9mm	4mm
Rainfall Depth (mm) ***sampling finished***	125mm	3.2mm	11.6 mm	9mm	6mm
First Flush criteria met? - 3mm-25mm - 72h dry period - or at least 24h	No (>25mm, dry period)	Yes	Yes	Yes	Yes
Duration	43.5h	9.75h	22.25h	Not recorded	5.25h
Event Description	Moderate - large rain event. 44mm of accumulated rainfall in last 24 hours before sampling commenced	Small rain event that meets new first flush criteria. Note that it fell in two lots, with dry in between	Break of 3 hours with no rain. Counted this still as one rain event, not two separate events. Rain started 8pm the day before and continued through to 10pm, with a pause at 7am	3 sites were sampled for visual discharge. Rain event started 1:35am and lasted until 6:28am. All sites re-sampled on 4/12/23 and 12/12/23. Lack of flow.	Moderate to small rain event. Rain started at 3am an continued raining until 1pm. A total of 3mm cumulative rainfall was reached at 8.30am. It continued raining throughout the sampling. It stopped at 1pm, then resumed at 3pm for 30mins. TSS and visual discharge for 6 sites undertaken.
Type Sampling Event	Visual Discharges	Major network outlets	Urban Impact	Visual discharges	Visual discharges, Major network outlets
Person Sampling	Sophie Allen	Sophie Allen	Sophie Allen	Sophie Allen, Lorena Cardenas	Sophie Allen, Lorena Cardenas

Table 4. Part 1. Summary of Rangiora CRC184601 rain events 2023-24. Rainfall data for previous financial years is available from previously submitted stormwater monitoring reports.

** 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).*

Date	12/12/2023	15/03/2024	12/04/2024	21/05/2024
Time	11:30am	2:35pm	9am	9am
Antecedent dry weather	48.5h	75.5h	8 days	47 hours
Rainfall Depth (mm) ***sampling commenced***	5.6mm	5mm (from 2:35pm)	7.2mm	12.8mm
Rainfall Depth (mm) ***sampling finished***	10.4mm	10.4mm (at 4:55pm)	7.2mm	21mm
First Flush criteria met? - 3mm-25mm - 72h dry period - or at least 24h	Yes	Yes	Yes	Yes
Duration	3.5h	4.70h (2:35pm to 7:15pm)	4h	7h
Event Description	Overnight it rained 3.8mm. Rain started 10:35am. Re-sampled from visual discharges. Sampled the rest of visual discharges sites left from 4/12/23 sampling.	Met revised first flush criteria of 3mm, and dry period of at least 24 hours	Light shower at time of sampling then it stopped raining. Rainfall event started 20:25h the day before, lasted overnight. Total Rainfall on the evening before was 18.4mm. Cumulative rainfall including previous evening rain and morning rain, 25.6mm	Dry weather leading to sampling for two days. Minimal 0.8mm of rain on Sunday 19/5/24 10am. Proper flush. Rain started at 5:35am and didn't stop until 4.30-5pm. All water sampling finished by 12:30pm. All visual discharges finished by 2:30pm.
Type Sampling Event	Visual discharges	Visual Discharges, Major Network Outlets	Urban Impact	Visual Discharges, Major Network Outlets
Person Sampling	Sophie Allen, Lorena Cardenas	Sophie Allen	Lorena Cardenas, Sophie Allen, Tim Doornkamp	Lorena Cardenas, Tim Doornkamp, Aaron Kibblewhite

Table 5. Part 2. Summary of Rangiora CRC184601 rain events 2023-24. Rainfall data for previous financial years is available from previously submitted stormwater monitoring reports.

** 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).*

3.3. Guideline values

Results for FY 23/24 reporting year have been compared to the CLWRP guidelines and for trends over time within each waterway. This is the third 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.

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.

Contaminant	Guideline	Guideline Source
Total Suspended Solids	<50 gm3	CLWRP
Dissolved Copper	< 0.0018 mg/L	CLWRP *spring fed – plains – Urban* Water 90% of the **ANZECC guideline**
Dissolved Zinc	< 0.015 mg/L	CLWRP *spring fed – plains – Urban* Water
pH	Shall be between 6.5 - 8.5	CLWRP, *section 16, schedule 5*
Dissolved Reactive Phosphorus	< 0.016mg /L	CLWRP, *section 16, schedule 5*
E. coli	95% of the samples should have less than 550 E. coli per 100 mL	CLWRP, *section 16, schedule 5*
Total Ammoniacal Nitrogen	Depends on pH level	CLWRP, *Table S5C, Schedule 5*
Hardness	5 yearly adjustment of Guideline Value	
Dissolved Organic Carbon	To characterise the waterway – adjust Guideline Value	

Table 6. Urban Impact monitoring surface water guideline values

3.4. Adjusted Guideline Values

Based on NIWA's most recent report and brief (Gadd et al. 2023), ANZG Default Guideline Values (DGV) were checked and corrected where appropriate. Conversion tables were searched for guideline values at 90% species protection.

Corrections for zinc and copper based on hardness and DOC were only applied for Urban Impact results of such heavy metals, where the sampling occurs in the receiving waters.

Compliance guidelines do not apply for Pond C from the consent conditions. As per the Rangiora monitoring programme, WDC seeks a decreasing trend. DGVs do not apply for Pond C.

Since the receiving environment objectives for compliance are only a guide for Pond C, heavy metals were not corrected for results from Pond C.

3.4.1. Adjusted Zinc DGV for Urban Impact

The draft for adjusted DGV for Zinc is available from the ANZG website at time of writing the report (September 2024).

These DGV are bioavailability-based and are adjusted for Dissolved Organic Carbon (DOC), Hardness and pH, to reflect bioavailability of Dissolved Zinc based on a more accurate understanding of water chemistry.

Field Data was available for FY 23/24 specific to each sampling site including pH, Hardness and DOC. This data was collected as a one off on 28/9/2023. In 2024, WDC reviewed and updated the lab quotes to include analyses for DOC and Hardness at each sampling site with Urban Impact. There was another round of Urban Impact with data available on 12/4/2024. For simplicity, for the present report only field data from 28/9/2023 was used. More data will be used for the next report due in FY 24/25.

The following steps were taken to search for the equivalent Default Guideline Values (DGV) for Zinc.

WDC's receiving environment objectives are set for the protection of 90% of species from the CLWRP. Following the guidelines from the document ANZG (2024) "Toxicant default guideline values for aquatic ecosystem protection: Zinc in Freshwater", the correct Guideline Values were found for each site, depending on its recorded Hardness, pH and DOC.

This was searched for using ANZG (2024) Appendix C: look-up tables for zinc default guideline values for differing pH, hardness and DOC. Particularly, Table C3 "Guideline values (µg/L Zn) for protection of 90% of species was used. Field data specifically recorded for each site on 28/9/2024, for pH, DOC and Hardness, was used to find each associated modified DGV.

Where the exact value for pH, DOC or Hardness was not available on the table, it was estimated and rounded up to the closest available number with the lowest order of magnitude between the sampled value for the TMF and the value available from the Table. This means that the estimated DGV are approximate to the best available data, and mostly conservative where possible, with only a few occasions where Hardness was rounded down a few orders of magnitude, as the next highest available number was too far apart in orders of magnitude.

The outcome result for the Urban Impact adjusted Zinc Guideline Values is presented below in Table 7.

Zinc: Adjusted Default Guidelines Values							
	Waterway	**pH**	**DOC (mg/L)**	**Hardness (mg/L)**	**approximate values selected from Appendix C, Table C3, estimated (pH, DOC, Hardness) (mg/L)**	**Adjusted DGV (µg/L)**	**DGV mg/L**
CRCR120	Cam River	6.91	0.5	48	**7.0**, 0.5, **60**	12	0.012
RRND012	North Drain	7.41	1.8	8.1	**7.5**, 2, **20**	9.8	0.0098
RRNB017	North Brook	7.33	0.5	41	7, 0.5, 30	9.4	0.0094
RRNB033	North Brook	6.92	0.5	39	**7**, 0.5, 30	9.4	0.0094
RRNB036	North Brook	6.85	0.5	44	**7**, 0.5, 30	9.4	0.0094
RRNB044	North Brook	7.93	2.7	10.7	**8**, 5, **20**	12	0.012
RRNB055	North Brook	7.4	5	16.5	**7.5**, 5, **20**	14	0.014
RRMB017	Middle Brook	7.21	1.7	51	7.0, **2**, **60**	15	0.015
RRMB029	Middle Brook	7.48	6.9	67	**7.5**, **10**, 60	27	0.027
RRSB030	South Brook	7.41	4.3	55	**7.5**, **5**, **60**	21	0.021
RRSB046	South Brook	7.37	10.2	63	**7.5**, 10, 60	27	0.027
RRSS026	South South Brook	7.19	8.2	44	7, **10**, 30	22	0.022
RRSR026	No. 7 Drain	8.14	5.1	60	8, 5, 60	18	0.018

Table 7. DGV for Zinc per each site, calculated based on pH, DOC and Hardness as TMF. Note: conservative estimates which were rounded up from the field value are showed in bold; estimates which were rounded down from the field value are shown in orange.

3.4.2. Adjusted Copper DGV for Urban Impact

At time of writing there were no new draft guidelines published on ANZG website. For this, the latest information available from NIWA The bioavailability of copper is affected by the concentration of DOC in water.

DGVs for Copper were calculated using the following formula:

$$DOC\ adjusted\ DGV = DGV_{0.5} \times \left(\frac{DOC}{0.5}\right)^{0.977}$$ **Equation 1**

In the above equation, DGV0.5 is the DGV (at a selected level of protection, e.g., 90%, in µg/L) at 0.5 mg/L of DOC; and DOC is the concentration of DOC in the water, measured in mg/L, the DOC adjusted DGV is in µg/L. Source: NIWA (2023).

The outcome from these calculations is presented below in Table 8.

Copper: Adjusted Default Guideline Values					
	Waterway	**DOC (mg/L)**	**DOC adjusted DGV (µg/L)**	**$DGV_{0.5}$ at 90% level protection (µg/L)** *from table 1-1 ANZG 2024*	**DGVs adjusted for DOC (mg/L)**
CRCR120	Cam River	0.5	0.73	0.73	0.0007
RRND012	North Drain	1.8	2.55	0.73	0.0026
RRNB017	North Brook	0.5	0.73	0.73	0.0007
RRNB033	North Brook	0.5	0.73	0.73	0.0007
RRNB036	North Brook	0.5	0.73	0.73	0.0007
RRNB044	North Brook	2.7	3.79	0.73	0.0038
RRNB055	North Brook	5	6.92	0.73	0.0069
RRMB017	Middle Brook	1.7	2.41	0.73	0.0024
RRMB029	Middle Brook	6.9	9.48	0.73	0.0095
RRSB030	South Brook	4.3	5.97	0.73	0.0060
RRSB046	South Brook	10.2	13.89	0.73	0.0139
RRSS026	South-South Brook	8.2	11.23	0.73	0.0112
RRSR026	No. 7 Drain	5.1	7.06	0.73	0.0071

Table 8. DGV for Copper for each site, calculated based on Equation 1 adjusting for DOC as a Toxicity Modified Factor.

4. Trend Analysis methodology

The software Trend Analysis by NIWA was used to analyse for long-term or site-specific trends. Data available was from 2014-2017 (historical/baseline sampling), FY 21/22, FY 22/23 and FY 23/24. Overall, this data covers a time period of 6 years, with a gap between 2017 and 2021. Consent CRC184601 was issued in May 2021 hence consent monitoring commenced. Historical data was the baseline sampling data available in preparation for applying to this consent.

Statistical advice and recommendations from NIWA available within Trend Analysis were followed to understand the data and assist with decision making.

Due to the nature of rainfall affecting the concentration of contaminants found in the waterways during sampling, our environmental data does not follow a normal distribution, but rather the contaminants found increase or decrease depending on the amount of rainfall. This means our environmental data follows a non-parametric distribution. Hence, non-parametric tests and analyses were undertaken.

It would be ideal to have flow data available for each waterway to adjust trend analysis based on flow data. However at a practical level, with 13 sampling points for urban impact this is not feasible to implement.

Trend analyses were analysed by catchment and site by site (see sections 4.1 and 4.2). To prioritise accuracy, all conclusions and recommendations are drawn from site-specific trend analysis only.

Seasonality was assessed with 4 seasons per year, falling within each financial year quarter.

With regards to rainfall, the rainfall depth used for data from 2021-2024 was the total rainfall when sampling finished. For baseline data from 2014-2017, the rainfall data available was recorded 24h prior sampling. These values were used as a covariable when undertaking trend analyses.

The following parameters which presented exceedances from a compliance perspective were analysed for trends against data from 2014:

- Dissolved Copper
- Dissolved Zinc
- Dissolved Reactive Phosphorus (wet weather sampling and stream health sampling)
- E. coli (wet weather sampling and stream health sampling)
- Total Suspended Solids (wet weather sampling and stream health sampling)
- Dissolved Inorganic Nitrogen (stream health sampling)
- Conductivity (stream health sampling)

All other parameters met all guideline values and have not been analysed for trends this financial year. These are: pH, Temperature, Dissolved Oxygen, Total Ammoniacal Nitrogen.

Dissolved Inorganic Nitrogen Data

Historical Data available did not include data for DIN, but only for Nitrate-N, and Nitrate-N + Nitrite-N. DIN is the sum of nitrate, nitrite and ammonia. For this analysis, only data from 2021-2024 was available.

Conductivity Data

This data is retrieved from the field, measuring each sampling at in the waterways with the conductivity probe. Historical values for conductivity were not available. The data available for this trend analysis therefore ranged from 2021-2023.

Results for adjusted conductivity in Quarter 1 for FY 23/24, were calculated manually from the non-adjusted conductivity measured at the site, and using the temperature recorded at the site, following the formula:

Specific Conductance = Conductivity / (1 + 0.02 * (temp(C) - 25))

Data availability

Note that data available was not always sufficient to detect the direction of the trends with confidence. 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.

4.1. Site specific trend

For trend direction assessments, observations must be independent and not serially correlated.

Prior to site specific trend analysis, a catchment-by-catchment trend analysis was undertaken. The grouping of data by catchment is correlated and as such can produce biased results in trends where there are data gaps. As a result, this can magnify the direction of the trends observed. However, it can also inform and provide a general overview about what's happening on the waterway itself. A better understanding on how to account for these limitations is needed for an accurate catchment-based trend analysis.

In view of these limitations, the catchment-by-catchment data analysis is only reliable for waterways that only have one sampling site, such as North Drain, Cam River, South-South Brook and No. 7 Drain. The analyses by waterway has been kept in Appendix 2-C, D and E, to inform at a general level on whether there's a problem with the contaminant or not. Where there were problems, a more reliable site-by-site analyses was undertaken.

All conclusions and recommendations are drawn from site-specific trend analysis. A full breakdown of the analysis is provided in Appendix 2-F, G and H.

Each parameter was analysed separately, with rainfall as a covariate and grouped by site. This approach accounts for spatial heterogeneity and does not lose on site specific information when sampling upstream and downstream of the same waterway. A site-by-site trend analyses also provides trends that could be used for targeted action.

4.2. Limitations

All contaminant data was analysed for trends over time, per each waterway and adjusted for rainfall as a covariable. This means data was grouped as follows: North Drain (1 site), Cam River (1 site), North Brook (5 sites), Middle Brook (2 sites), South Brook (2 sites), No. 7 Drain (1 site), South South Brook (1 site).

By the end of the reporting process, it was discussed that an approach of analysing trends per sampling site would have been more appropriate in this instance. It was too late in the process to adjust for all the analysis however this has been addressed and mitigated in the following manner.

For the waterways with only one sampling site, such as North Drain, Cam River, No. 7 Drain and South South Brook, the results from trend analysis per waterway are accurate and valid.

For the waterways with more than 1 site, such as North Brook, Middle Brook and South Brook, there is the possibility for these results to be slightly biased. This is because, in sampling more than 1 site within the same stream, the analysis still considers that all the data is coming from the same site. This is not accurate, as some sites are further upstream than others. The implications of this in data trends is that the results can be biased where there is a data gap. There are a few data gaps due to sampling and rainfall limitations (as displayed in their individual graphs for the Urban Contaminants Zinc and Copper). This translates into trend analysis not having the full picture of what's really happening in the entire waterway. This is not a problem for waterways with only one sampling site.

To eliminate this uncertainty and bias when there is data missing, an additional site-by-site analysis was undertaken. In doing this, data is compared over time within the same sampling site, and therefore it is more likely to inform us of a true trend.

In conclusion, where significant trends were encountered (Zinc, Copper) for contaminants in those waterways with more than 1 site sampled (North Brook, Middle Brook, South Brook), trend analysis was run again individually per each site.

This second run of analysis helped clarify what the actual trends are without the interference of missing data.

Even when the analysis was run site by site, it was discovered that most sites didn't meet the minimum data sample required to provide certainty on the trends (data set below n = 10). This shows that there are still limitations to being able to undertake trend analysis. For some sites, there is enough data available to reach solid conclusions, while for other sites, there is not.

Additionally, historical data for all sites was sampled in the same locations as per the monitoring programme. The implications of this, is that the data is still comparable, even though it might be biased, but it is still comparable over time.

Full details on all the above analysis are summarised and presented in Appendix 2, in both graph and statistical form.

It is recommended to seek independent advice to help inform data planning approach for FY 24/25.

5. Results

5.1. 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, were 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 to increase the size of the dataset, however it is not a true baseline.

Where practicable possible, historical data and data from previous financial years is graphically represented with the results from this FY 23/24, either within the same graph or with a separate graph.

5.2. Trend Analysis

Preliminary data analyses helped inform understanding of the data and decision making. Preliminary analyses are available on request.

To undertake a Mann-Kendall and seasonal Kendall Trend tests, the following steps were taken for each variable/contaminant:

1. Examine the seasonal variation with a seasonality test.
    a. Kruskal-Wallis one way analysis of variance, for each waterway
        i. Null Hypothesis: no seasonality of data.
        ii. Alternative hypothesis: assume seasonality of data.
    b. The Mann-Kendall test can be used when there is no seasonal variation in the observations, as this is based on comparisons more than a seasonal test.
    c. Where the alternative hypothesis was accepted, an adjusted Seasonal Kendall trend test was undertaken

2. Is the variable likely to be affected by a covariate? Yes, in this case, rainfall

3. Is there a trend in the covariate (rainfall)?
    a. It was assumed that there was not a trend in the rainfall data itself.
    b. Limitation: the software came back with a warning that in some instances, the rainfall presented a trend. This may affect the outcome of the trend analyses itself.
    c. Recommendation: to use more customizable and powerful analyses next financial year, using R studio, to adjust for possible seasonal trends in rainfall instead of assuming it.

4. Plot variable against covariate and decide what best form explains the relationship between rainfall and contaminant data, to decide on an adjustment: Linear, log-log, LOWESS or GAM.

5. Carry out trend test.

Limitations

The limitations expressed above are acknowledged in this analysis. For this reason, more potent and customizable analyses are recommended for next financial year, using R studio. Alternatively, a different statistical approach and more time spent understanding the data would allow for this.

5.2.1. Seasonal test results: non-seasonal data confirmed.

A seasonality test was undertaken to assess whether to undertake a Mann-Kendall test or a Seasonal Kendall test (adjusted), to test for the following hypothesis:

- Null hypothesis (H_0): no seasonality in the data
- Alternative hypothesis (H_1): significant seasonal effect

If a significant p-value was found ($p < 0.05$), the null hypothesis was rejected, and it was accepted that there is strong seasonality in the associated data from those analyses (alternative hypothesis).

All results presented a p-value higher than 0.05 after Kruskal Wallis X^2 (chi-square) test, except for the following cases below. This means that in general there is weak evidence to support the seasonality of results seen across the data. It is noted, the data is likely seasonal however a seasonal trend is unlikely to be identified due to a lack of data.

The only instances where seasonal data was identified across catchments and parameters were:

- DRP in South Brook
- E. coli in North Brook
- Conductivity in North Brook

For analysing the above parameters in the specified catchments, a Seasonal Kendall test was conducted separately. This is an adjusted Mann-Kendall test which is more appropriate for this type of data.

The analyses for conductivity in North Brook were not possible. This is due to a small sampling size (3 sampling seasons). Data for at least 5 years is necessary for trend analysis.

5.2.2. Results Summary: Mann-Kendall trend test

A summary of the trends encountered is presented below. Please note, as expressed in section 5.1.1, where seasonal data applies, data has been excluded and deleted for this report. Those sites where analysed separately with the appropriate Seasonal Kendall Trend test.

All graphs and data analyses were reviewed catchment by catchment and contaminant by contaminant.

Preliminary trends were observed in the plotted data (Appendix 2-C, G & H), checked against statistical analysis (Appendix 2-D) and summarized in Table 9.

A summary of where the problems are is presented after the second run of analysis to confirm the likelihood of these problems with a non-biased analysis (Figures 7, 8 and 9).

For a full breakdown and compilation of graphs and stats, go to Appendix 2, sections C, D, G and H.

Table 9. Informative summary of trends by waterway, not reliable for issuing conclusions for sites in grey. Undertaken with data from 2014 – 2024. Each waterway is classified based on the trend direction and confidence, per each contaminant. In grey, results are not reliable due to methodology and bias. In color, the analysis is reliable enough. No trends were detected for all other sites not included below.

*** Note: the below are informative general trends only and do not reflect on specific information*

	Increasing			Decreasing				
	Increasing trend about as likely as not	**Increasing trend possible**	**Increasing trend very likely**	**Decreasing trend possible**	**Decreasing trend likely**	**Decreasing trend very likely**	**Decreasing trend about as likely as not**	**Trend extremely or exceptionally unlikely**
Dissolved Cu		North Brook Middle Brook South Brook			No. 7 Drain			
Dissolved Zinc		Middle Brook North Drain	North Brook	South Brook				
DRP Analysis is unsure. Lowess flow adjustment not applied.	No. 7 Drain						Middle Brook North Brook	Cam River
E. coli				North Drain (trend possible but uncertain due to low samples)			Middle Brook South Brook No. 7 Drain South-South Brook	Cam River
TSS				Middle Brook		No. 7 Drain		North Brook
DIN Decreasing trends uncertain for all sites.								

From the above results, we observe it points out to a very likely increasing trend of dissolved zinc in the North Brook.

This was investigated in detail to confirm its reliability with site-by-site trend analysis over time. The results of this second analysis are summarised on Table 10.

Additionally, by site trends were also checked for dissolved zinc in the Middle Brook and North Drain, and for dissolved copper in the North Brook, Middle Brook and South Brook. All of these are categorized as

increasing trend possible in the waterway analysis. With further exploration we seek to bring clarity on these results and where the problems are located specifically.

Table 10. Summary of Site-specific trends, with data from 2014 – 2024, issued to draw recommendations and conclusions in this report. Refer to Appendix 2-G and H.

*** Note: only results with significant trends are presented here.*

	Increase	Decrease	No trend
Dissolved Zinc	North Brook (Lilybrook Park, RRNB036) Middle Brook (Bush Street, RRMB029) North Drain (RRND012)	South Brook (Railway Road, RRSB030)	No. 7 Drain (RRSR026)
Dissolved Copper	Middle Brook (Bush Street, RRMB029)		

All other trends for contaminants and sites not listed on Table 10, showed uncertainty on the confidence of the increase or decrease trend due to a lack of samples.

The associated graphs for the above results are presented below with additional notes from the analyses.

North Brook

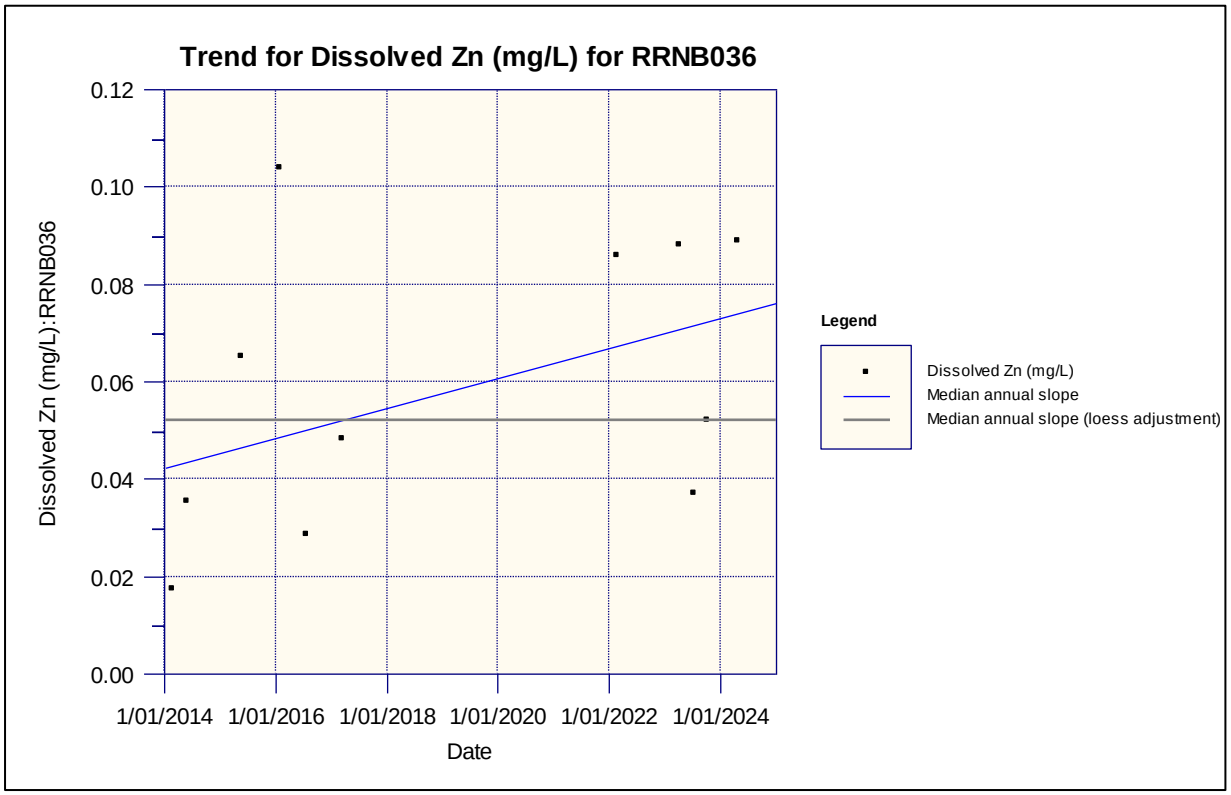

Figure 7. Dissolved zinc trend in the North Brook, Lilybrook Park RRNB036: Increase trend possible (from stats, see Appendix 2-G)

- the analyses encountered a very likely increase trend on dissolved zinc for RRNB055 (Aspen Street Park), however the data set was too low to be certain on the slope of the trend.

- The above was also the case for RRNB044 (Church St across Dudley Park).
- This could be pointing out to a potential significant increase in dissolved zinc for the above sites within 1 year, once more data is collected over time.

Middle Brook

- Increase trend possible for dissolved zinc and copper

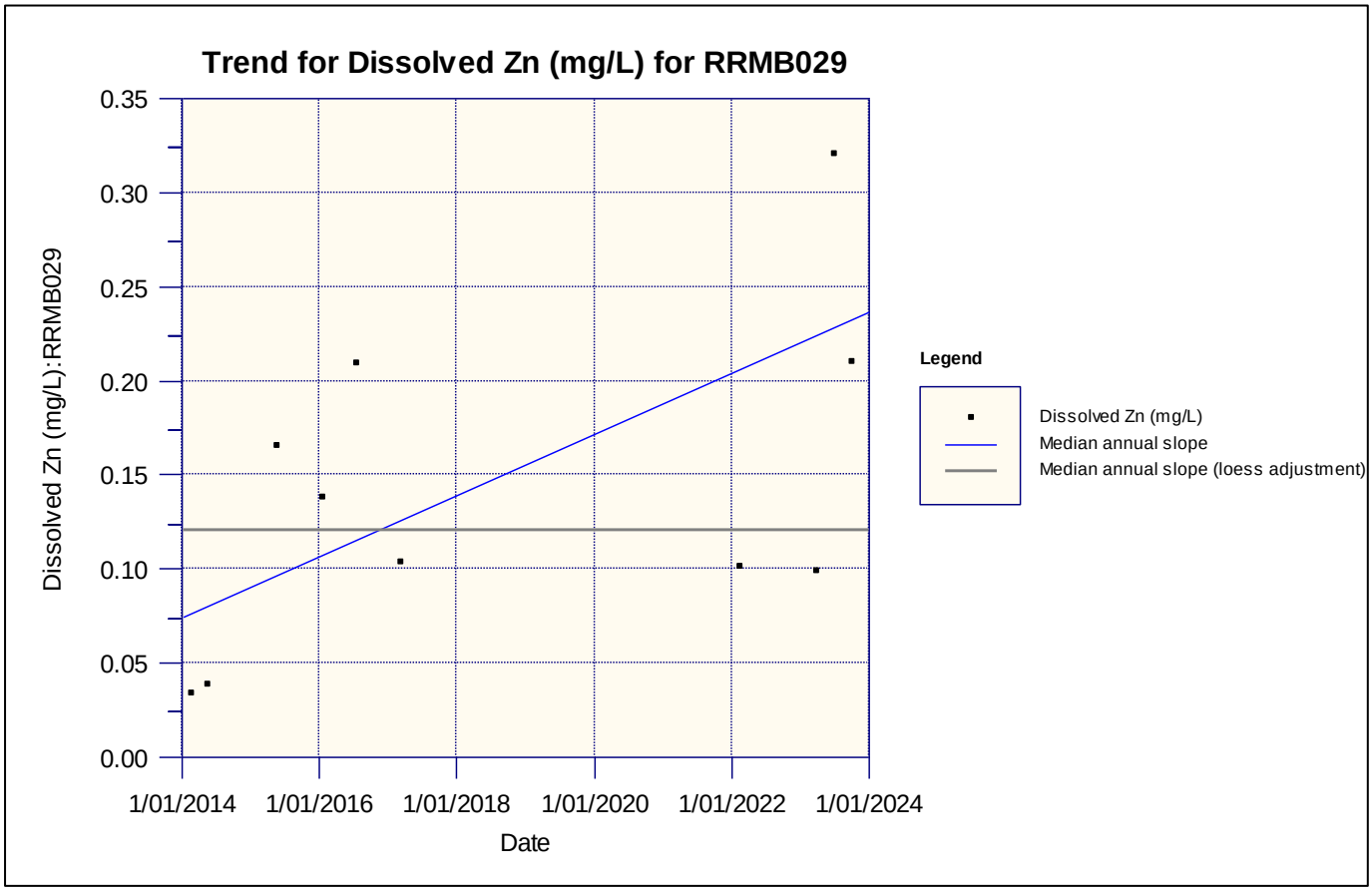

Figure 8. Dissolved Zinc trend in the Middle Brook, Bush Street RRMB019: Increase trend possible (from stats, see Appendix 2-G)

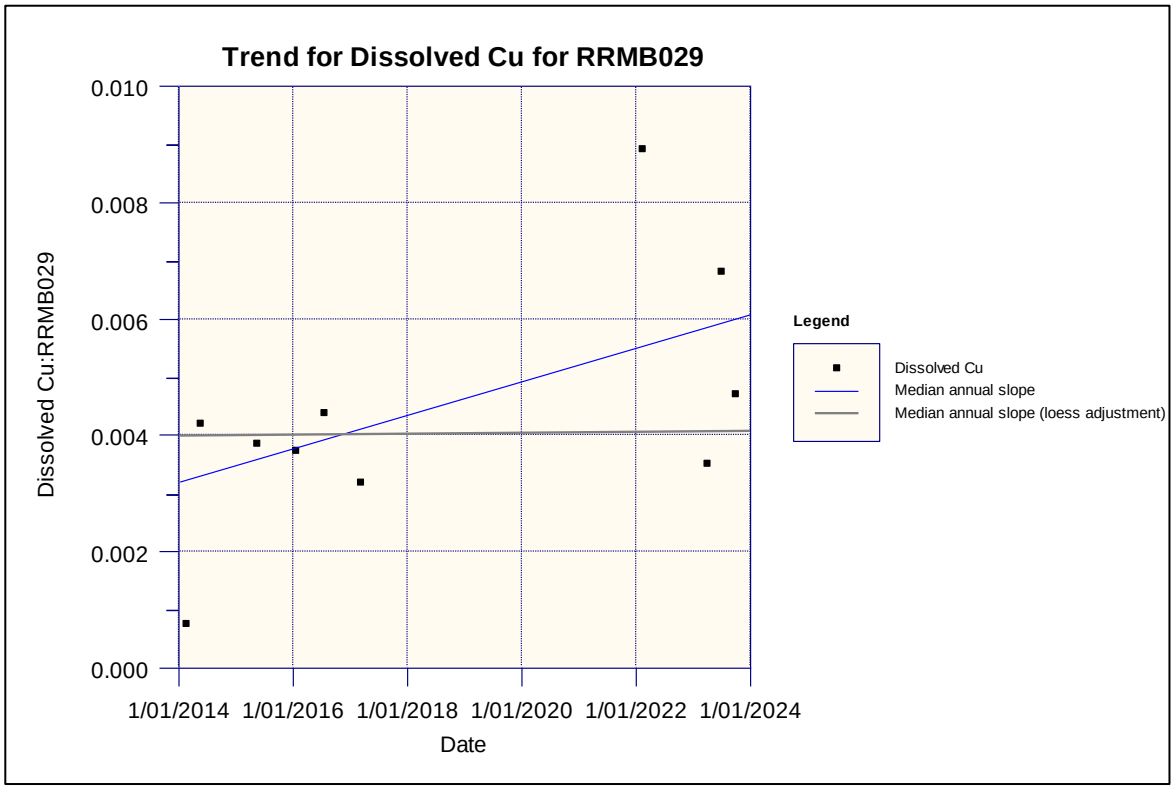

Figure 9. Dissolved Copper trend in the Middle Brook, Bush Street western side, with data from 2014-2024. Increase trend possible.

All other analyses in the Middle Brook (site RRMB017) and for other contaminants, identified no trend.

5.2.3. Adjusting data with Rainfall as a covariate: choosing the relationship between contaminants and rainfall

To successfully adjust the contaminant data against rainfall data when analysing for trends, first we need to understand what's the best relationship between the contaminant results registered against the associated rainfall. This could follow a linear distribution, log-log or GAM.

To understand this relationship, data for each contaminant was plotted against rainfall data for each sampling event.

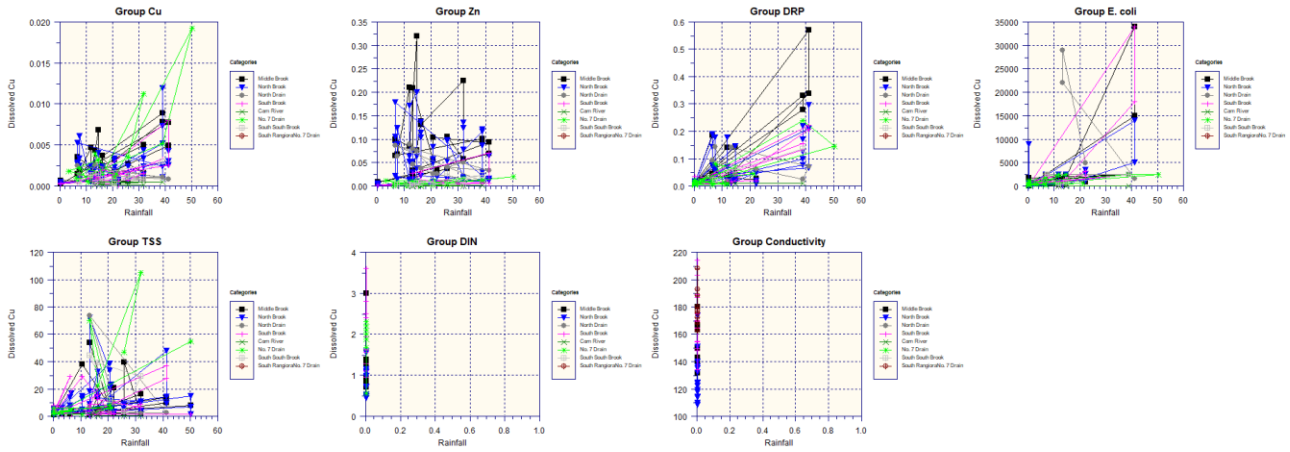

Figure 10. Contaminant data plotted against rainfall. Go to Appendix 2-B for a higher resolution of these graphs.

It is noted, if there is a significant trend in the covariate (rainfall) then using this may cause a trend in the variable. Some analyses presented a warning where rainfall showed a trend. This has been recorded for reference, but it was chosen to still proceed with the analysis. For the next Annual Report, WDC will explore options on how to better adjust for these scenarios to obtain the most reliable analyses with the data that we have.

The above was the case in the following instances:

- Dissolved copper trend analysis (P=0.001)
- DRP trend analyses (P=0.008)
- E. coli (P = 0.008)

From the plotted results (Appendix 2 – B), it was observed that data only follows a straight-line distribution against rainfall data in some specific instances, but not always.

Log-log adjustments are not fit for purpose if the covariable (rainfall data) is zero or less. This is the case for stream health data, where associated rainfall is 0mm.

LOWESS adjustments (referred to as Loess in the software), is best for non-linear relationships with some noise or outliers. It also captures subtle patterns without assuming a specific functional form. LOWESS stands for Locally Weighted Scatterplot Smoothing). It does not offer a formal statistical model for inference, but it is simple and suited to observe local trends or patterns without having to build a strong model around the relationship between parameters and covariable.

GAM (Generalised Additive Model) is best when there are non-linear relationships between the parameter and the covariable, and multiple covariates are possible. This adjustment allows for more complex, non-linear relationships in the data, were multiple covariates are involved. On the other hand, it requires tuning.

For simplicity and given that this the first comprehensive trend analyses undertaken with WDC environmental data, a LOWESS adjustment was prioritised in this instance.

WDC is open to hear feedback from Environment Canterbury science team on what adjustment is more appropriate in this instance.

5.2.4. Seasonal Kendall Trend test

As per the results from section 5.1.1 Separate analyses were undertaken to analyse with an adjusted Seasonal Kendall Trend test for the following:

- DRP in South Brook
- E. coli in North Brook
- Conductance in North Brook (data from 3 years): Seasonal Trend test not possible due to data size below 5 years.

4 seasons were selected for this type of trend analysis, and results adjusted with LOWESS model for rainfall.

DRP in South Brook

Seasonal Mann Kendall Analyses shown the trend for DRP in the South Brook could be decreasing. However, once adjusted, this decreasing trend is deemed to be as likely as not.

There is no confidence of a decreasing trend of Dissolved Reactive Phosphorus in the South Brook.

E. coli in North Brook

The high values of E. coli found for 2024 (with maximum results of 5000 cfu/100mL and 14000 cfu/100mL), meant there was a decreasing trend shown with the first analyses. This is due to the lab changing its reporting method in 2021, with a maximum reporting result of 2420 MPN/100mL. This mean that, before this adjustment, historical results acted as an outlier.

Extreme values from 2014 were adjusted to a maximum of 2420 MPN/100mL, to allow a standardized comparison with data from 2021-2024 so that trend analysis could show a true trend.

After data corrections, E. coli showed a possible decreasing trend in the graphs, however after Seasonal Kendall Test no trend was detected.

5.2.5. Pond C Trends

Historical data available for Pond C was collected at RRSR026 (below the discharge outlet). Once consent was obtained, sampling started at RRRSR026A (at the discharge outlet).

Data was tested for seasonality before undertaking Mann-Kendall trend test. Mann-Kendall trend tests were undertaken for Pond C for each contaminant: dissolved Copper, dissolved Zinc, DRP, E. coli and TSS.

All contaminants came back as decreasing or no trend. See Table 11.

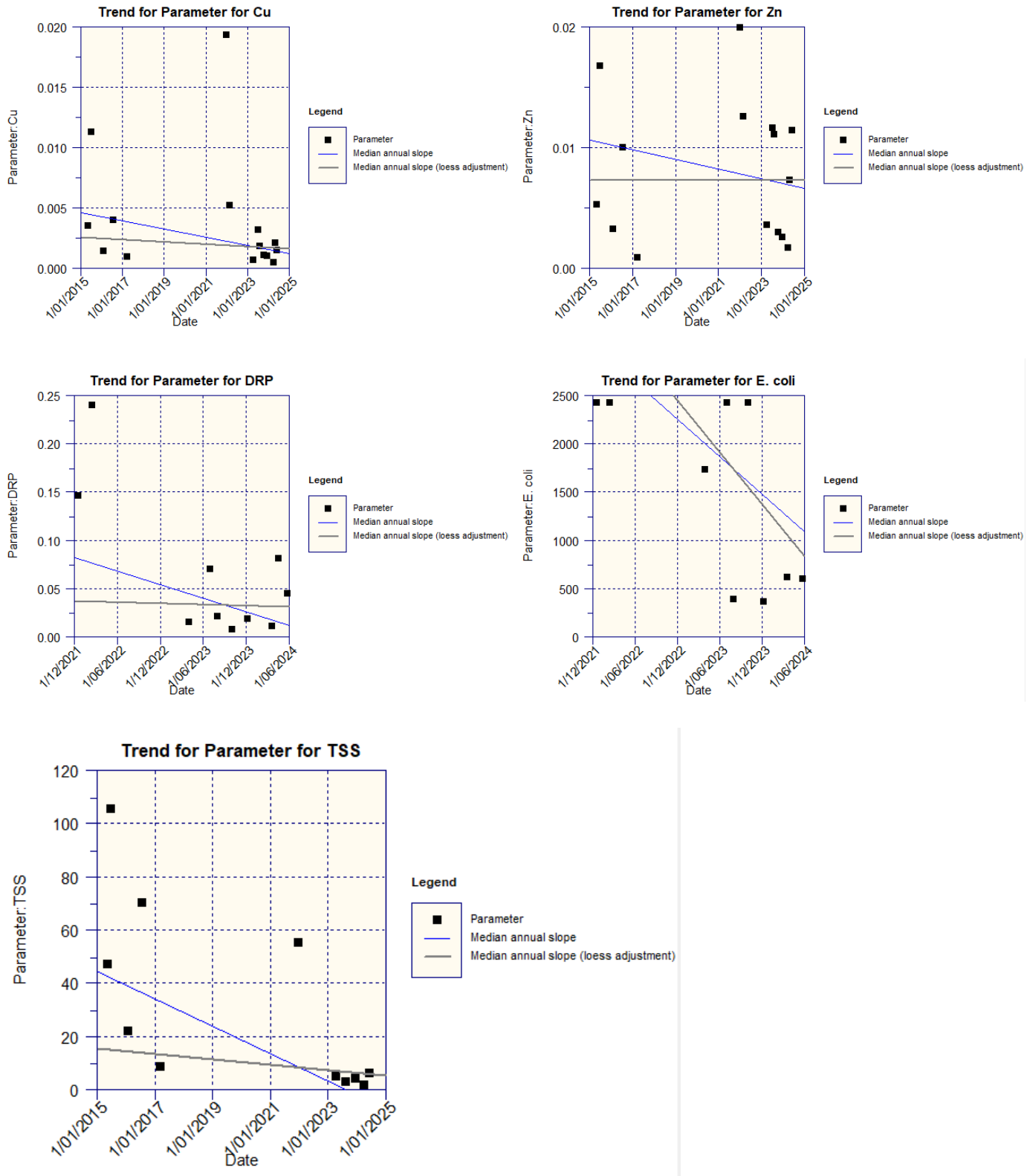

Figure 11. Graphs from trend analysis at Pond C with data from 2015-2024. All contaminants are showing a decreasing trend or no trend (grey line). Refer to Appendix 2-F.

Pond C Trends			
	Increasing	**Decreasing**	**Other**
Dissolved Cu		Decreasing trend likely	
Dissolved Zinc		Decreasing trend about as likely as not	
DRP		Decreasing trend about as likely as not	
E. coli			Decreasing slope uncertain (not enough data). Trend likely.
TSS		Decreasing trend very likely	

Table 11. Summary of statistical trend analysis from Pond C. Refer to Appendix 2-F for a full break down.

Discussion

- No increasing trends are observed at Pond C
- A decreasing trend is likely for dissolved copper at Pond C (Kendall S = -35, p = 0.09)
- A decreasing trend is very likely for TSS at Pond C (Kendall S = -33, p = 0.01)
- No trends are certain for dissolved Zinc, DRP and E. coli, although a decreasing trend is indicated for all from visual graph results (Figure 11, grey line) except for dissolved zinc (no trend)

5.3. Visual discharge inspections

These visual inspections aim to check for water clarity, oil, grease films, scums, foams, suspended materials, odour and erosion at the major discharge points. It is a qualitative measure that, while based on the same guidelines, it can vary based on individual judgement.

All sites were sampled every quarter with no sampling rounds missed. The only exception was in two occasions where there was not enough flow to visually check the following sites. Refer to table 2 for full details:

Quarter 3 - 15/3/24
All sites inspected except 6 sites: RRND012, RRNB057, RRNB038, RRNB039, RRSB035, RRSS026

Quarter 4 - 12/4/2024
All sites inspected except 3 sites: RRNB055, RRMB027, RRND012, CRCR120

Results of visual discharge inspections are presented in Tables 12, 13, 14 and 15 for each quarter.

Date	Sampling Point	Recent Weather Conditions ** (mm rainfall)	Colour and Suspended Settlement	Rubbish	Hydrocarbons	Odours	Vegetation and Debris	Additional Site Observation of Stream Bed or Bank Erosion
24/07/2023	RRNB057	44	Nil	Nil	Bubbles on surface - detergents or natural?	Nil	Nil	---
24/07/2023	RRER006	44	Nil	Nil	Nil	Nil	Nil	Bank erosion 30m upstream of outlet on drain
24/07/2023	RRMB017A	44	Nil	Nil	Nil	Nil	Nil	Nil
24/07/2023	RRMB022	44	Nil	Nil	Nil	Nil	Nil	Nil
24/07/2023	RRMB026	44	Nil	Nil	Nil	Nil	Nil	Nil
24/07/2023	RRNB009	44	Nil	Nil	Nil	Nil	Nil	Nil
24/07/2023	RRNB015	44	Nil	Nil	Nil	Nil	Nil	Nil
24/07/2023	RRNB033	44	Nil	Grill has been cleaned but still some rubbish	Nil	Nil	Nil	Nil
24/07/2023	RRNB035	44	Nil	Nil	Nil	Nil	Nil	Carex obscuring outlet- could trim back
24/07/2023	RRNB038	44	Nil	Nil	Nil, bubbles thought to be from the small drop	Nil	Nil	Nil
24/07/2023	RRNB039	44	Nil	Nil	Nil	Nil	Nil	Nil
24/07/2023	RRNB045	44	Nil	Minimal	Nil	Nil	Nil	Nil
24/07/2023	RRNB049	44	Nil	Nil	Nil	Nil	Grill needs cleaning	Nil
24/07/2023	RRND012	44	Nil	Nil	Light scum and bubbles from small side outlet (origin?)	Nil	Nil	Nil
24/07/2023	RRSB030	44	Nil- sediment in the South Brook, not at discharge outlet	Nil	Nil	Nil	Nil	Nil
24/07/2023	RRSB032	44	Nil	Nil	Nil	Nil	Nil	Hard to see outlet, prune harakeke back
24/07/2023	RRSB035	44	Sediment discharge. Slightly less sediment than in the South Brook.	Nil	Nil	Nil	Nil	Nil
24/07/2023	RRSB046A	44	Some sediment, but less than the South Brook	Nil	Nil	Nil	Nil	Nil
24/07/2023	RRSR025	44	Nil	Nil	Nil	Nil	Nil	Nil
24/07/2023	RRSR026A	44	Sediment plume visible from outlet	Nil	Nil	Nil	Nil	Nil
24/07/2023	RRSS026	44	Some sediment but same as South South Brook	Nil	Nil	Nil	Cabbage tree leaves- minimal	Nil
24/07/2023	RRWR013	44	Nil	Nil	Nil	Nil	Nil	Outlet obscured, photo of the downstream chamber

Table 12. Quarter 1. Visual Discharge Inspections in Rangiora for FY 23/24. Note: ** this recorded rainfall is an estimate from when sampling commenced, not real time mm of rainfall

Date	Sampling Point	Recent Weather Conditions ** (mm rainfall)	Colour and Suspended Settlement	Rubbish	Hydrocarbons	Odours	Vegetation and Debris	Additional Site Observation of Sream Bed or Bank Erosion
20/11/2023	RRNB049	8.8	Nil	Nil	Nil	Nil	Nil	Nil
20/11/2023	RRSB032	8.8	Nil	Nil	Nil	Nil	Nil	Nil
20/11/2023	RRWR013	8.8	Nil	Nil	Nil	Nil	Cut grass	Nil
4/12/2023	RRMB017A	4	Nil	Nil	Nil	Nil	Nil	The MB is milkier (white) than the discharge
4/12/2023	RRNB009	4	Nil	Nil	Nil	Nil	Nil	Nil
4/12/2023	RRNB033	4	Bit discoloured	On bank, has been removed needs to be taken away	Nil	Nil	Nil	Debris has been cleaned on side of blank and needs to be removed
4/12/2023	RRNB045	3.2	---	Nil	Nil	Nil	Nil	Nil
4/12/2023	RRSB030	4	Slightly discoloured, grey sediment.	Nil	Nil a bit of scum, brown colours also looks like it's been there for a while	Nil	Nil	Discharge on south side needs to be investigated, Grey coloured sediment coming out
4/12/2023	RRSR026A	4	Nil	Nil	Nil	Nil	Nil	---
12/12/2023	RRER006	5	Nil	Nil	Nil	Nil	Nil	Looks fantastic
12/12/2023	RRMB022	5	Nil	Nil	Nil	Yes earthy smell	Nil	Slow flow Stream more sedimented than discharge
12/12/2023	RRMB026	5	Nil	Nil	Nil	Nil	Nil	Pipe discharges under road, not visible, mb stream is clear
12/12/2023	RRNB015	5	Nil	Nil	Nil	Nil	Nil	Nil
12/12/2023	RRNB035	5	nil	Nil	Nil	Nil	Nil	It's clear and hidden under the carex bush
12/12/2023	RRNB038	5	Sediment grey	Nil	Nil	Nil	Some leaves	Stream level too high, above pipe. Stream already sedimented before discharge
12/12/2023	RRNB039	5	Sedimented upstream before discharge Pipe, flooded	Nil	Nil	Nil	Nil	Stream level too high, above pipe. Stream already sedimented before discharge
12/12/2023	RRNB049	4	Brown and sedimented	Nil	Nil	Nil	Nil	nil
12/12/2023	RRNB057	4	Nil	Nil	Nil	Nil	Leaves	Nil
12/12/2023	RRND012	4	Nil	Yes minimal	Nil	Nil	Some grass, not obstructing.	Debris it's been cleaned from grid but not taken from site yet until it dries.
12/12/2023	RRSB032	5	---	nil	Small amount of foam	Nil	Nil	Nil
12/12/2023	RRSB035	5	Low sediment	Nil	Nil	Nil	Nil	High flow and amount of discharge
12/12/2023	RRSB046A	6	Nil	Nil	Nil	Nil	Nil	Not discharging SMA pond not full enough to discharge at Towns and Fields subdivision. The problem is the other SW drain/channel discharging further down in SB.
12/12/2023	RRSR025	5	Nil	Nil	Nil	Nil	Nil	Not discharging
12/12/2023	RRSS026	5	Natural tannins	Nil	Nil	Nil	Nil	Not discharging, SMA pond level not high enough for discharge
12/12/2023	RRWR013	4	Natural tannins	Nil	Nil	Nil	Nil	It's been driven over to create flow, flowing well surface water, some grass from retention pond but still great flow

Table 13. Quarter 2. Visual Discharge Inspections in Rangiora for FY 23/24. Note: ** this recorded rainfall is an estimate from when sampling commenced, not real time mm of rainfall

Date	Sampling Point	Recent Weather Conditions ** (mm rainfall)	Colour and Suspended Settlement	Rubbish	Hydrocarbons	Odours	Vegetation and Debris	Additional Site Observation of Sream Bed or Bank Erosion
15/03/2024	RRER006	3	Nil	Nil	Nil	Nil	Nil	---
15/03/2024	RRMB017A	3	Not visible	nil	Not visible	Nil	Watercress covering drain	---
15/03/2024	RRMB022	3	Nil	Nil	Nil	Nil	Nil	---
15/03/2024	RRMB026	3	Slightly milky	Nil	Nil	Nil	Nil	---
15/03/2024	RRNB009	3	Nil	Nil	Nil	Nil	Nil	---
15/03/2024	RRNB015	3	Nil	Nil	Nil	Nil	Nil	---
15/03/2024	RRNB033	3	Slightly milky	Grill needs cleaning	Nil	Nil	Leaves and stalks	---
15/03/2024	RRNB035	3	Nil	Nil	Nil	Nil	Nil	---
15/03/2024	RRNB045	3	Nil	Nil	Nil- some seen on White St itself	Nil	Nil	---
15/03/2024	RRNB049	3	Slightly milky	Nil	Nil	Nil	Nil	---
15/03/2024	RRSB030	3	Slightly milky	Nil	Nil	Nil	Nil	---
15/03/2024	RRSB032	3	Nil	Nil	Nil	Nil	Nil	Hard to see- remove site?
15/03/2024	RRSB046A	3	No flow	Nil	Nil	Nil	Grill covered in grass	---
15/03/2024	RRSR025	3	No flow	No flow	No flow	Nil	Willow weed and veronica	---
15/03/2024	RRSR026A	3	Nil	Nil	Nil	Nil	Nil	---
15/03/2024	RRWR013	3	No flow	No flow	No flow	Nil	Nil	---

Table 14. Quarter 3. Visual Discharge Inspections in Rangiora for FY 23/24. Note: ** this recorded rainfall is an estimate from when sampling commenced, not real time mm of rainfall

Date	Sampling Point	Recent Weather Conditions ** (mm rainfall)	Colour and Suspended Settlement	Rubbish	Hydrocarbons	Odours	Vegetation and Debris	Additional Site Observation of Sream Bed or Bank Erosion
21/05/2024	RRER006	12.5	Generally clear, slightly colored with few suspended solids	Nil	Nil	Nil	Well vegetated but water flowing well	Nil
21/05/2024	RRMB017A	12.5	Clear	Nil	Nil	Nil	Nil	Nil
21/05/2024	RRMB022	12.5	Nil	Nil	Nil	Nil	Nil	---
21/05/2024	RRMB026	12.5	Nil	Nil	Nil	Nil	Nil	Nil
21/05/2024	RRNB009	12.5	Clear but tannin coloured. Some foam most likely natural	Nil	Nil	Nil	Nil	Nil
21/05/2024	RRNB015	12.5	Discharge clear	Nil	Nil	Nil	Normal	Nil
21/05/2024	RRNB033	12.5	Grey still clear	Yes	Nil	Nil	Yes	Rubbish collected by delta
21/05/2024	RRNB035	12.5	Grey coloured	Nil	Nil	Nil	Nil	Nil
21/05/2024	RRNB038	12.5	No discharge murky water	Nil	Nil	Nil	Nil	---
21/05/2024	RRNB039	12.5	Coloured stream and milky discharge	Nil	Nil	Nil	Nil	Milky discharge
21/05/2024	RRNB045	12.5	Very murky, grey dark	Nil	Nil	Nill	Nil	No erosion. Potential road sediment running?
21/05/2024	RRNB049	12.5	Grey coloured, murky	No rubbish or suspended materials	Nil	Nil	No	---
21/05/2024	RRNB057	12.5	Dark, bubbles, clear water	Plastic wrap	Nil	Nil	Leaves	Nil
21/05/2024	RRND012	12.5	Slightly coloured generally clear	Nil	Nil	Nil	Yes, not obstructing	Nil
21/05/2024	RRSB030	12.5	Nil	Can	Nil	Nil	Nil	Nil
21/05/2024	RRSB032	12.5	Murky	---	Nil	Nil	Nil	Nil
21/05/2024	RRSB035	12.5	Clear, mixing w Southbrook murky	Nil	---	Nil	Nil	Nil
21/05/2024	RRSB046A	12.5	No flow	Nil	Nil	Nil	Nil	SB flowing dirty with rain. No problems from discharge
21/05/2024	RRSR025	12.5	Not worse than main flow (slightly murky)	Nil	Nil	Nil	Nil	---
21/05/2024	RRSR026A	12.5	Grey, can't see bottom	Nil	Nil	Nil	Nil	Nil
21/05/2024	RRSS026	12.5	Clear	Nil	Nil	Nil	Nil	Nil
21/05/2024	RRWR013	12.5	Nil grass clippings	Nil	Nil	Nil	Yes, grass clippings and leaves, still flowing	---

Table 15. Quarter 4. Visual Discharge Inspections in Rangiora for FY 23/24. Note: ** this recorded rainfall is an estimate from when sampling commenced, not real time mm of rainfall

5.3.1. Colour and Suspended Sediment

Most sites came out with clear discharges, except for some sediment encountered in the instances below. Interestingly, South Brook and Middle Brook streams were found to be already sedimented before the stormwater discharges in some occasions, with the stream being more sedimented than the discharge.

In the first quarter, from a total of 21 inspections, two South Brook sites RRSB035 and RRSB046A presented some sediment on their discharges but not higher than in the stream itself. Two sites in South Rangiora RRSR026A, and South-South Brook RRSS026 also showed sediment on their discharges.

On the second quarter, discharges at 4 sites were slightly milky, in the Middle Brook (RRMB026), North Brook (RRNB033, RRNB049) and South Brook (RRSB030).

For the third quarter, 4 discharges were observed to be slightly milky at Middle Brook (RRMB026), North Brook (RRNB033, RRNB049) and South Brook (RRSB030).

In the last quarter, some suspended discharges were observed at 7 sites, located in the North Brook (RRNB035, RRNB039, RRNB045, RRNB049), South Brook (RRSB032) and South Rangiora (RRSR025, RRSR026A).

5.3.2. Hydrocarbons

There were no instances in FY 23/24 were hydrocarbons (oil, grease or other) were observed during the discharge inspections.

Only some occasional foam and bubbles were recorded at some sites as per Tables 6, 7, 8 and 9. It is not possible to determine whether these were a natural or contaminant occurrence.

5.3.3. Visible contaminants

There were minor instances in FY 23/24 were 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.

5.3.4. Odour

There were no instances in FY 23/24 that odour from outlets was identified as unusual during the discharge inspections.

5.3.5. Stream bed and bank erosion

There was no bank erosion observed caused by stormwater discharges. At one instance only, bank Erosion was observed 30m upstream of the stormwater outlet on the drain at East Rangiora (RRER006). This is not thought to be erosion caused by the stormwater outlet and was not significant enough to require remediation.

WDC 3 Waters has compiled a list of sites from service requests with possible bank erosion. These sites are yet to be investigated and looked at in detail, to assess whether the cause is related to stormwater or not and whether remediation is required. No actions have been undertaken on this at this stage. Any potential resulting actions would be reported for the next FY 24/25.

5.3.6. Investigations

On one occasion, a milky discharge was observed during rain at one of the discharge outlets in the South Brook near to site RRSB030. This discharge was investigated further, with a possible source pointing out to a closed concrete-batching planted owned by Allied Concrete Ltd on Station Road, Rangiora. No sediment-laden discharge was identified leaving this site on a follow-up visit, however the next-door truck garage was using the site for truck storage and potentially truck washes. WDC engaged with the site owners to discuss if there could be a source of sediment from the site. No other problems were encountered at this discharge point throughout the FY 23/24.

5.4. Major network outlets

5.4.1. Total Suspended Solids (TSS)

All required sampling rounds were completed. There were no exceedances in TSS for FY 23/24.

All major network outlets sampled 2023-2024 were below the guideline value of 50 g/m^3. Historically, there was only one exceedance in 2021 at South Rangiora, No. 7 Drain (RRSR026A) as previously reported.

This indicates that TSS concentrations are not generally elevated at these locations. TSS levels are not thought to be impacting negatively on aquatic life.

Figure 12 shows the TSS results for FY 23/24.

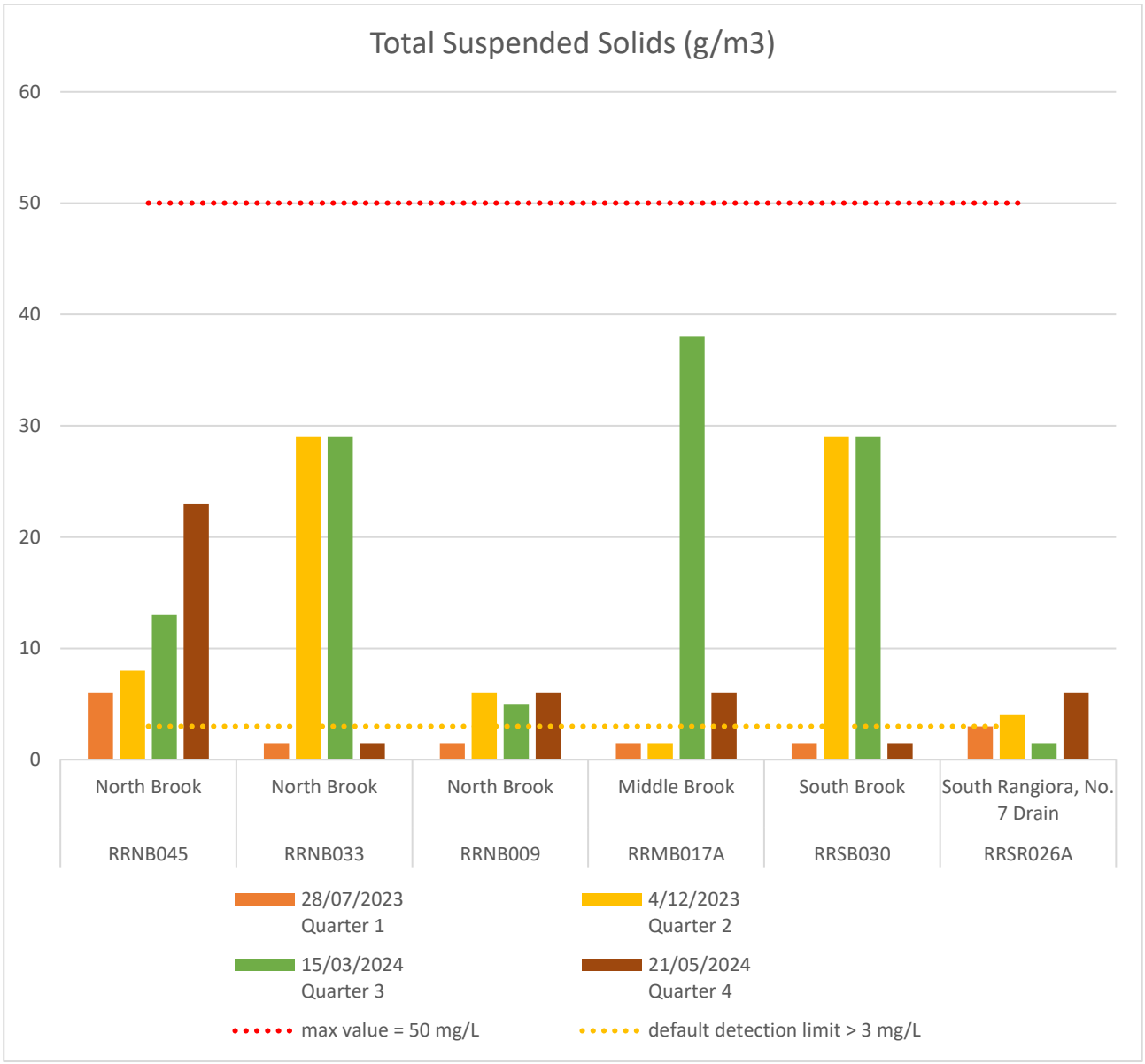

Figure 12. Total suspended solids for Major Network Outlets sampling FY 23/24. Values below the default detection limit, are represented as half the detection limit (1.5 mg/L).

Trends

As reported on section 5.2.3, there were decreasing trends identified for TSS in the Middle Brook (possible trend) and No. 7 Drain (very likely). No other trends were identified.

5.4.2. Comparison to previous TSS data

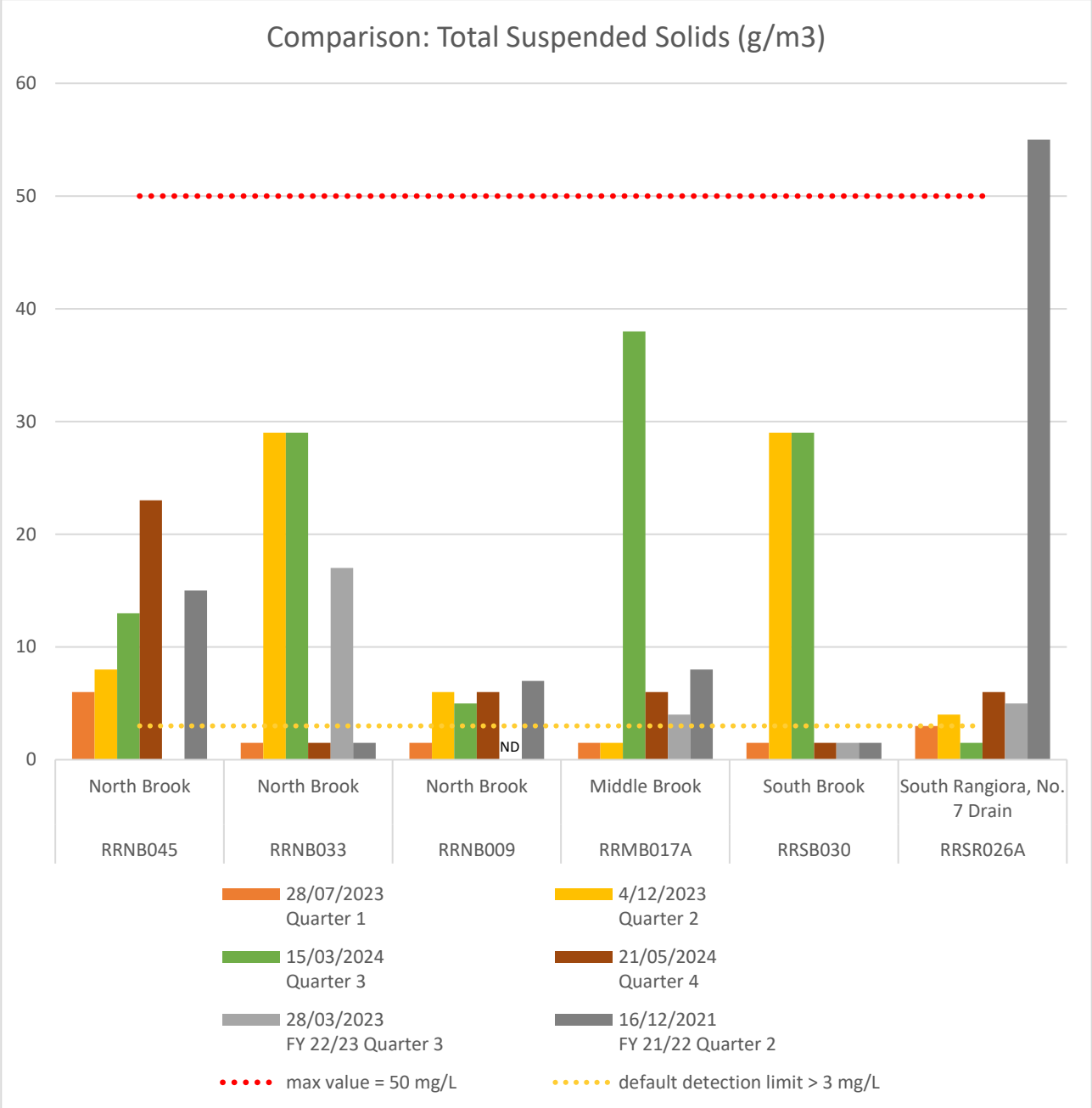

Figure 13. Comparison of total suspended solids results for Major Network Outlets, of sampling from FY 23/24 (in colour) and previous financial years (in grey). Values below the default detection limit, are represented as half the detection limit (1.5 mg/L). ND = No Data (round missed).

Figure 13 above shows how TSS values have varied this FY 23/24 (coloured bars) and compared to previous sampling (grey).

Some sampling sites in the North Brook, Middle Brook and South Brook, however, show an increase in total suspended solids compared to previous financial year, despite not exceeding the guideline values.

The TSS values in No. 7 Drain, South Rangiora, seem to have improved this FY 23/24 compared to previous years. Here (RRSR026A), the highest TSS value measured 6 g/m^3 in Quarter 4 of FY 23/24, as opposed to 55 g/m^3 in FY 21-22. These results show that TSS were lower at Pond C, in comparison to 2021-22 and previous years.

Historically, 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, downstream of the current site with a mixing zone (RRSR026). During this time, it exceeded the guideline for three of those events.

Sediment discharge from the Pond C outlet has previously been identified to regularly exceed the guideline value. This was not found for the present financial year, which suggests an improvement in the functioning of Pond C.

5.4.3. Pond C Outlet: RRSR026A

Sampling for this site is at the Discharge outlet itself from Pond C. The guideline values presented are as a reference and for information only. There are no compliance limits for Pond C to be met for because we are sampling directly at the outlet. Instead, for compliance WDC is seeking a decreasing trend for these results over time.

Discharges coming from Pond C originate from the industrial area above, between Flaxton Road and Todds Road. These are zoned as Business 2 in WDC's District Plan Zones. Some businesses discharge on to Flaxton Drain directly, which then joins onto Pond C, but also continues downstream and mixes further down.

Historical sampling for Pond C outlet was undertaken below a mixing zone with the No. 7 Drain (RRSR026). This sampling site can therefore only be used as an indication of historical levels, but it is not a true baseline.

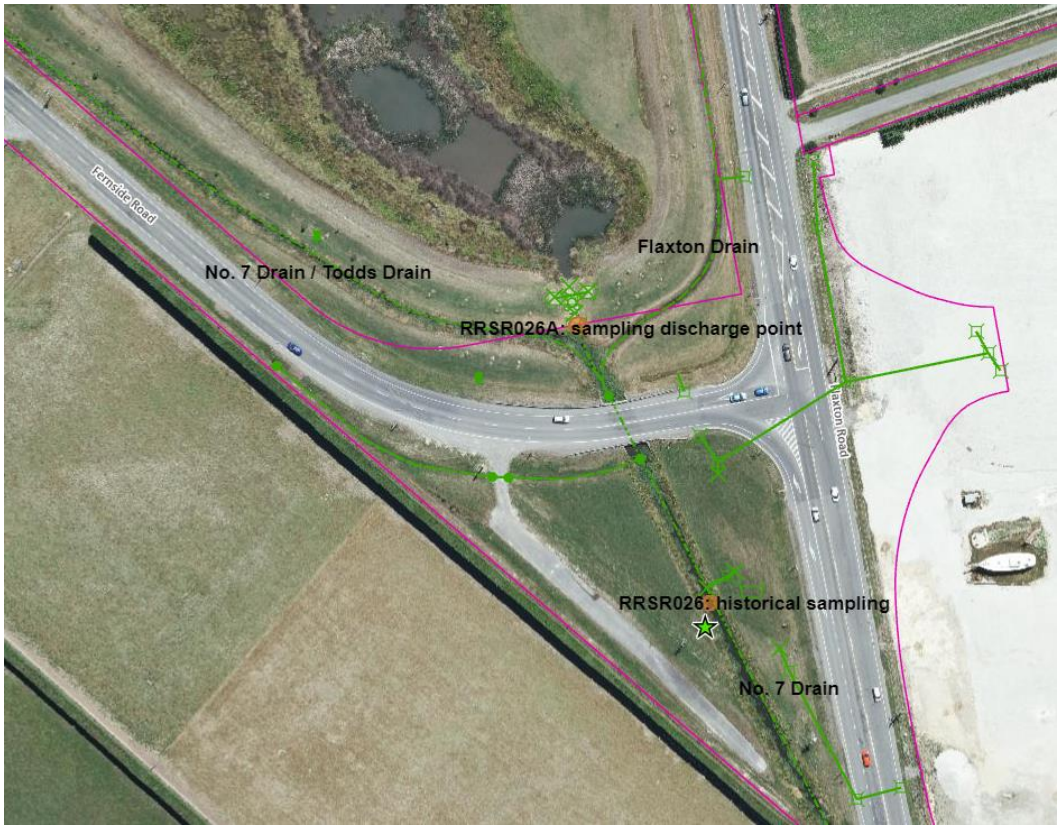

Figure 14. Discharge sampling points and baseline (historical sampling) sites shown in relationship to Pond C and the receiving environment.

5.4.4. Pond C: Total Suspended Solids

Trends

A decreasing trend was identified as very likely for TSS (section 5.2.5)

5.4.5. Pond C: Dissolved Copper

Levels of Dissolved Copper in FY 23/24 were at or below the guideline value of 0.0018 mg/L. As explained above, these values are not conditions for compliance or guidelines to be met.

Previously, in FY 21/22 Pond C had higher levels of Dissolved Copper at 0.019 mg/L. In FY 22/23, sampling at pond C recorded low values of 0.00072 mg/L. Historical levels of Dissolved Copper at Pond C, were recorded at an average value of 0.004 mg/L.

All the above results are presented in Figure 15 for comparison.

Trends

A decreasing trend for dissolved copper was identified as likely (5.2.5). This is an improvement from last year, and meets compliance requirements for a decreasing trend over time.

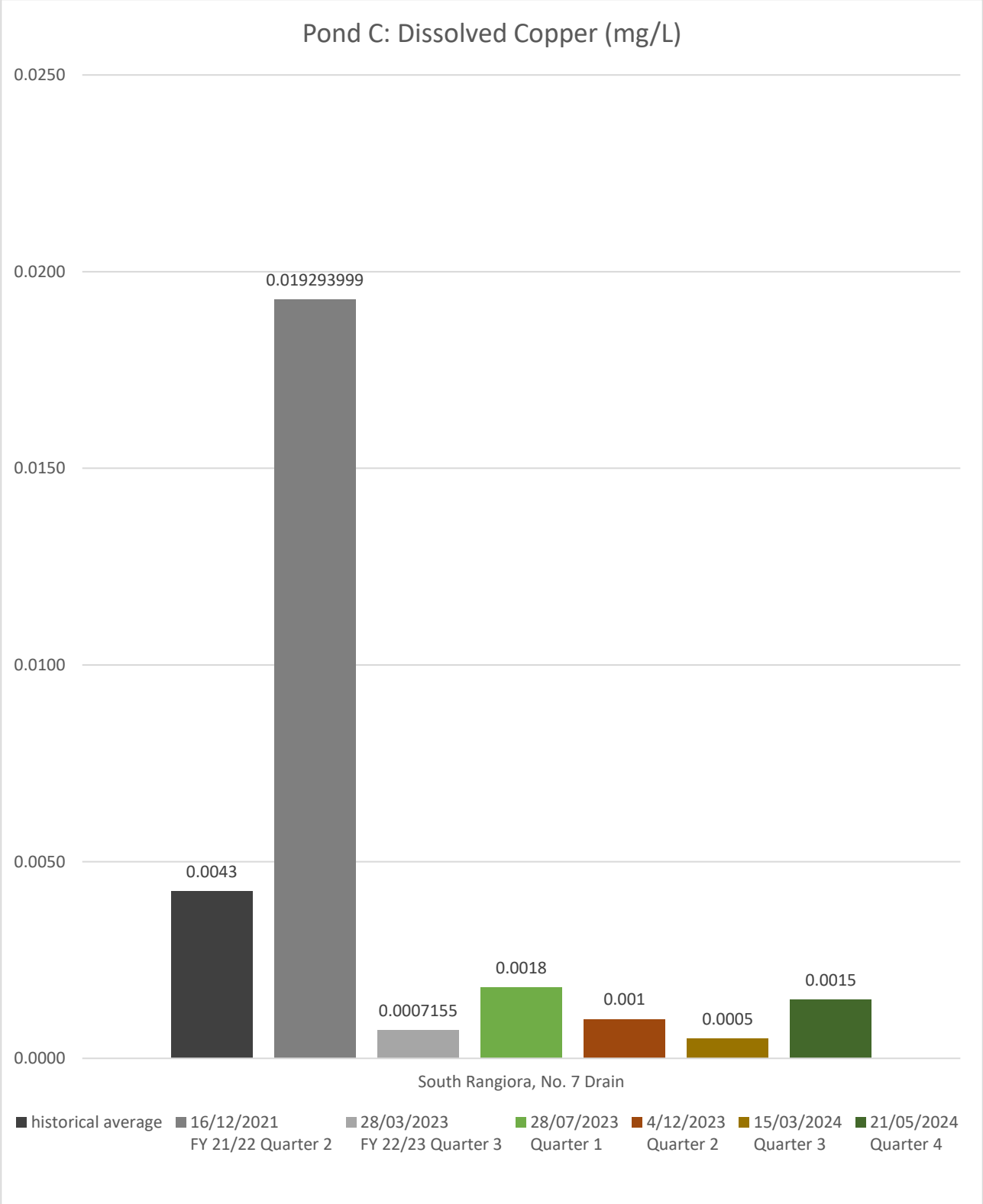

Figure 15. Dissolved Copper results from Pond C discharge outlet in FY 23/24 compared to previous financial years and average historical values of dissolved copper (grey).

Discussion

From the data available, it appears that the levels of Dissolved Copper at Pond C have decreased in FY 23/24 compared to previous financial years and historical levels. It is also noted, there is a slight increase of dissolved copper in Quarter 1 and 4, compared to the other two quarters. More quarterly data will provide more information on whether this is a seasonal trend over the years to adjust for.

Sources of copper in the pond could be originating from old vehicles brake pads from Flaxton Road onto Flaxton Drain and from industrial activities above pond C.

5.4.6. Pond C: Dissolved Zinc

All values of dissolved Zinc at Pond C were below the recommended guideline of 0.015 mg/L for FY 23/24.

Maximum values of dissolved Zinc were found to be 0.0114 mg/L in Quarter 4, whereas the lowest values were encountered in Quarter 3 with 0.0017 mg/L. See Figure 16 for details.

The average value of dissolved zinc found in FY 23/24 is 0.0012 mg/L. When compared to the average historical average of 0.0048 mg/L of dissolved Zinc at this location (allowing for a mixing zone), the average value of dissolved zinc at the discharge point from Pond C is still lower than it has been further downstream historically.

On average, levels of dissolved zinc from the Pond C discharge point were lower than data from FY 21/22 but higher than data available from FY 22/23.

Exploratory analyses of all data available provided insight when comparing data from FY 23/24 to previous financial years. A Boxes and Whisker plot showed high variability in the levels of dissolved zinc at Pond C from 2021 to date, with the lowest value being 0.0017 mg/L and the highest being 0.02 mg/L, with most sampling undertaken showing results below the guideline of 0.015 mg/L, between 0.002-0.013 mg/L.

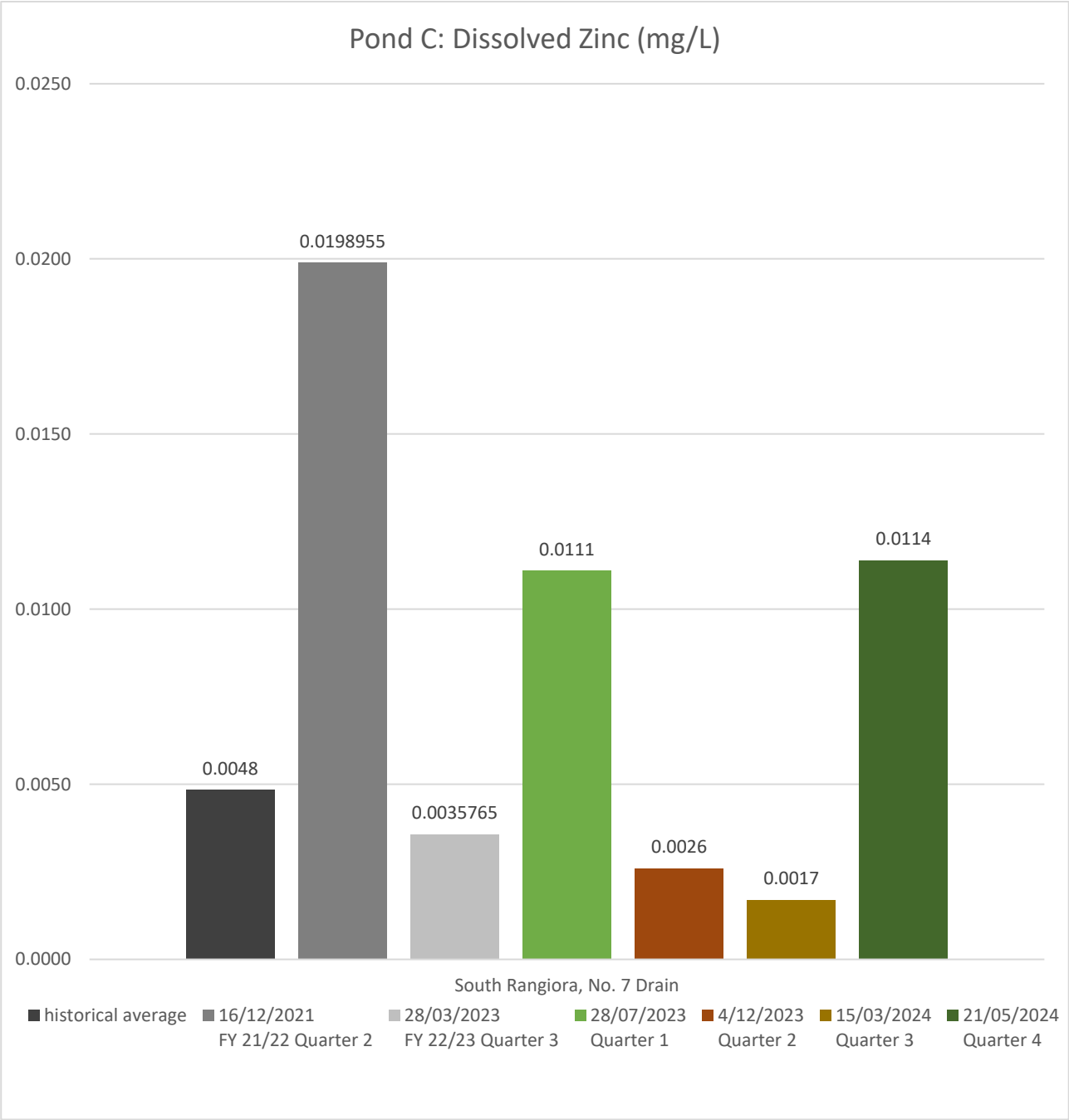

Figure 16. Dissolved Zinc results from Pond C discharge outlet in FY 23/24 compared to previous financial years and average historical values of dissolved copper (grey). Note: guideline value added for reference, not for compliance.

Trends

No trends were identified.

Discussion

From the data available, it is observed that the levels of dissolved Zinc at Pond C increase and decrease over time. Further quarterly data will determine whether these results are a cyclical and repetitive phenomenon.

Sources of dissolved zinc in pond C could be originating from galvanised steel roofs from the industrial area above pond C among other sources.

5.4.7. Pond C: Total Ammoniacal Nitrogen (TAN)

The Total Ammoniacal Nitrogen value of the Pond C outlet (RRSR026A) varied between quarters, ranging from 0.021 mg/L at its lower to 0.0612 mg/L at its maximum value. See Figure 17.

The average value of TAN for FY 23/24 is 0.037 mg/L. This is lower than the concentrations of TAN found at Pond C on FY 21/22 and FY 22/23.

Historical baseline sampling results for TAN are not available for comparison.

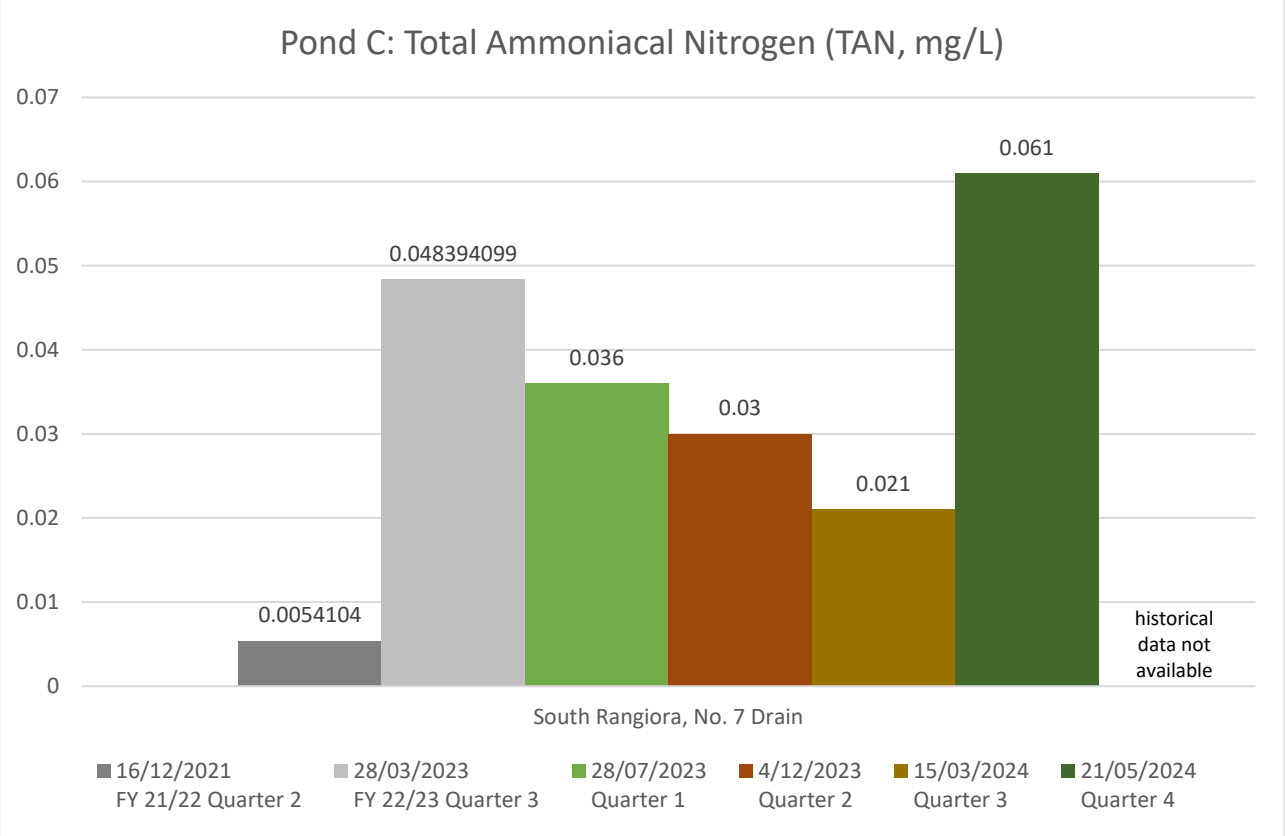

Figure 17. Total Ammoniacal Nitrogen levels found at Pond C in FY 23/24 (colours), in comparison to previous financial years (grey). There is no historical data associated with this site.

Trends

No trends were identified.

Discussion

From looking at data from the previous financial year, it was thought that concentrations of TAN increased significantly compared to FY 21/22. However, the present sampling results show how concentrations of TAN decreased gradually this financial year from Quarter 1 through to Quarter 3, only to increase again by the end of the FY in Quarter 4.

This points to a potential seasonal decrease and increase of ammonia levels based on land use and activities occurring in the surrounding land.

It is noted, being the average pH found at Pond C of 7.45, based on the CLWRP the maximum allowed guideline value for this waterway on this financial year would be 1.75 mg/L. All results are well below this indicative guideline.

Concentrations of TAN at Pond C are not thought to be causing a problem for aquatic life. It will be interesting to continue observing the trends over the financial years.

Ammoniacal Nitrogen is the concentration of nitrogen present as ammonia (NH3) or ammonium (NH3), which in soil can be transformed to other forms of nitrogen and are important plant fertilisers. It can enter waterways through discharges. Ammonia is toxic to aquatic life at high concentrations.

The most common sources of ammoniacal forms of nitrogen in waterways are agriculture run-off, wastewater treatment plants, fertilised lawns, leaky septic systems and industrial discharges.

5.4.8. Pond C: Dissolved Reactive Phosphorus (DRP)

Similarly to the pattern found for concentrations of TAN, concentration levels of DRP at Pond C decreased from Quarter 1, 2 and through to Quarter 3, only to increase again in Quarter 4. See Figure 18.

The average concentration value of DRP this FY 23/24 was 0.024 mg/L. On average, this value is slightly higher than concentrations recorded for FY 22/23, but lower than recorded levels of DRP in FY 21/22.

The historical levels of DRP recorded in 2015, 2016, and 2017 for Pond C outlet below a mixing zone (RRSR026) were below the detection level.

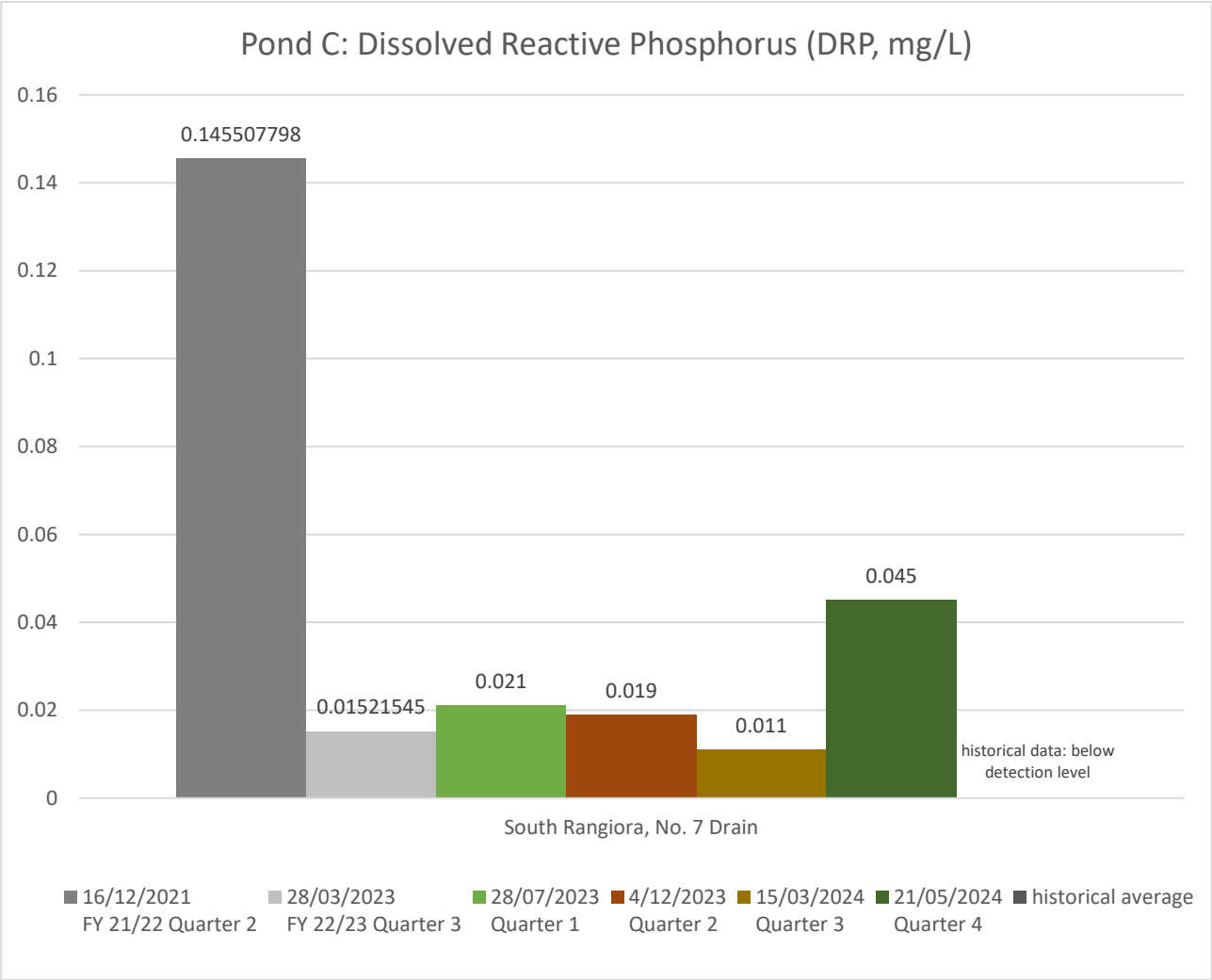

Figure 18. Dissolved Reactive Phosphorus results found at Pond C in FY 23/24 (colours) compared to data from previous financial years (grey). Historical values are not shown as they were close to 0.

Trends

No trends were identified.

Discussion

In general, it seems that DRP values are gradually increasing despite the decrease/increase cycle described over the FY. It is recommended to follow up and investigate potential sources of DRP in Pond C to reduce DRP levels on the discharge and improve ecosystem health in No. 7 Drain.

DRP concentrations are an indication of a waterbody's ability to support algae and plant growth. High phosphorus concentrations in a stream are likely to cause algal blooms or rapid weed growth which can choke aquatic life.

The above is supported by field observations of green algal growth in No. 7 Drain and the results from the Ecological Assessment by Boffa Miskell (Appendix 3).

In general, reduction of DRP levels is likely required to provide ecosystem health in the No. 7 Drain.

5.4.9. Pond C: *Escherichia coli*

In FY 23/24, E. coli levels reduced significantly compared to previous financial years. See Figure 19.

There is no historical data available for Pond C to compare on *E. coli* levels.

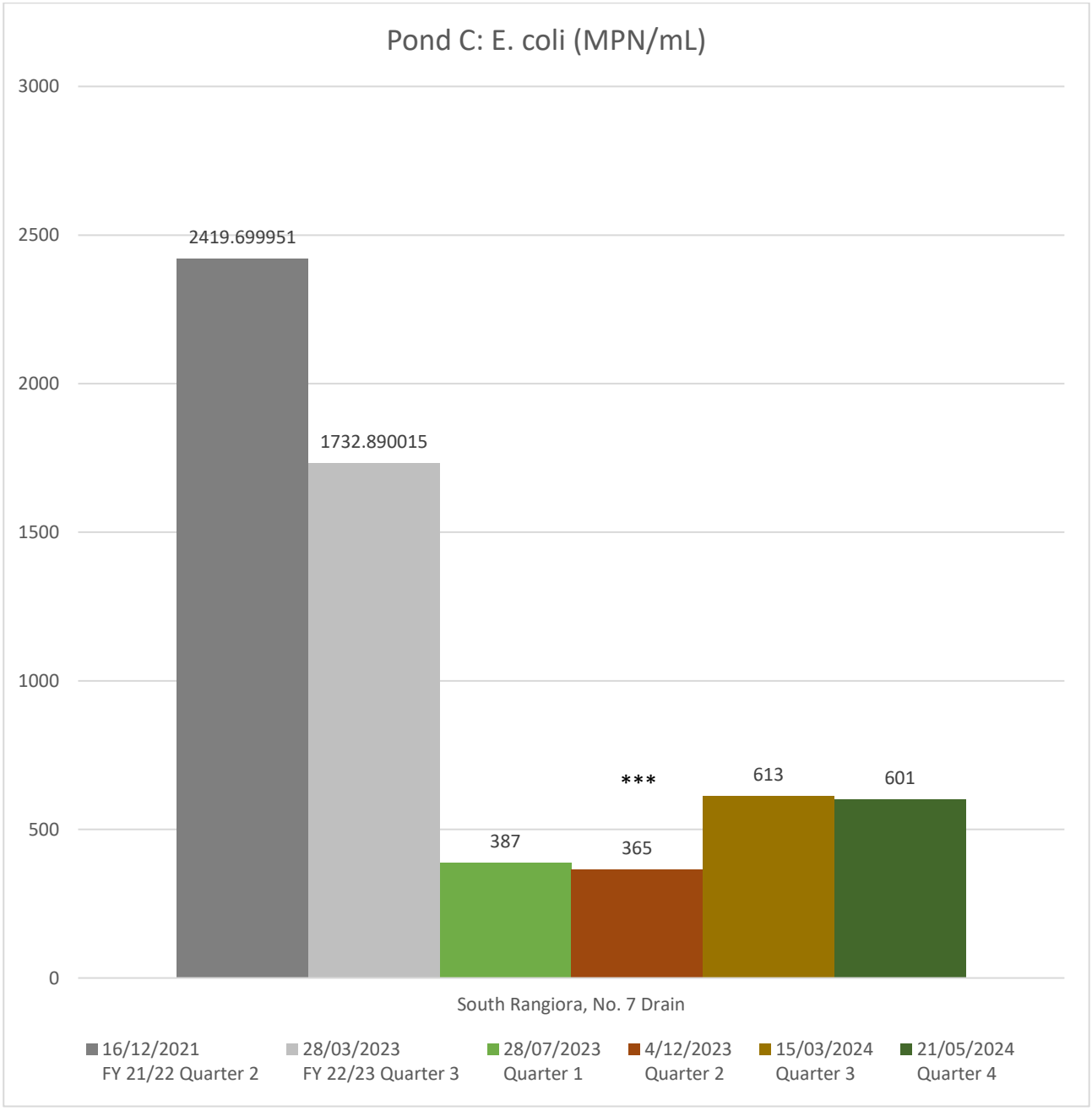

Figure 19. *E. coli* levels found at Pond C in FY 23/24 (colours), in comparison to previous financial years (grey). The result marked with (***) is advised to be treated with caution by the lab (this sample arrived to the lab above the recommended temperature of 10°)

Trends

No trends were identified.

Discussion

Reduction of *E.coli* levels are still required and recommended to provide ecosystem health in the No. 7 Drain.

5.5. Urban impact

To allow with interpretation of the monitoring results, all graphs are organised to display sampling sites on the X horizontal axis from upstream to downstream of each catchment, as follows: North Drain, Cam River, North Brook, Middle Brook, South Brook, No. 7 Drain and South-South Brook.

Within the same waterway, the sampling sites have also been organised starting on the left side in the X axis, from further upstream to downstream. For example, within North Brook, sites are organised RRNB045, RRNB030, RRNB033. The higher the number of the code of the site, the further upstream the site is.

Each contaminant has its own section. Within each section, the highlights of the data are presented, compared to previous financial years. Following this, the discussion section addresses any interpretation and recommendations for the results found on each contaminant.

There were two rounds of Urban Impact sampling as required from the Rangiora Monitoring Programme:

- Round 1 of sampling undertaken in Quarter 1, on 28/9/2023
    - All sites were sampled
- Round 2 of sampling undertaken in Quarter 4, on 4/12/2024.
    - 4 sites were not sampled due to being dry. The following sites have no data available for comparison:
        - CRCR120, Cam River, on the southern side of Kippenberger Avenue
        - RRND012, North Drain, near Ashley River stop-bank
        - RRNB055, North Brook, at Aspen Street Park
        - RRMB029, Middle Brook, on the western side of Bush Street

5.5.1. Dissolved Copper

This contaminant is likely to enter waterways from urban sources, such as old car brake pads and copper roofing. The limit for this contaminant in the receiving environment is 0.018 mg/L. This guideline value was adjusted based on Dissolved Organic Carbon, with adjusted DGVs presented in Table 8 (section 3.4.2).

Figure 20 shows the Dissolved Copper sampling results for the Urban Impact Sampling in FY 23/24 (colour), compared to previous financial years and historical levels (grey).

Based on the DGVs corrected for Dissolved Organic Oxygen, and looking at the data catchment by catchment, it is observed that:

- Only 4 out of 13 sites exceeded the guideline values, with 9 sites meeting the adjusted limits in FY 23/24.
- Dissolved copper limits are met in the North Drain, Cam River, Middle Brook, South Brook, South-South Brook and No. 7 Drain
- 4 out of 13 sites were not sampled on the second round as they were dry, thus there is no data available for comparison
- Levels of Dissolved Copper are reduced by the end of North Brook catchment, at North Brook Ponds
- Some areas in the Middle Brook require copper treatment, while another site has reduced its levels in comparison to historical sampling
- The South Brook catchment has reduced its levels of dissolved copper compared to previous financial years and historical sampling
- The No. 7 Drain shows a slight increase in dissolved copper levels by the end of FY 23/24, but in general these levels have improved compared to previous financial years and baseline sampling

- Data available from South-South Brook suggests that this site has improved slightly the concentration levels of dissolved copper, in comparison to previous financial years and historical sampling. Further sampling will determine whether this is a cyclical increase/decrease

Discussion

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. This was also recommended in previous FY 2022/23 annual report.

While it is not easy to track down the source of these contaminants, a few specific recommendations are proposed as follows to be considered for inclusion with WDC Capital Works Programme and for Rangiora's Stormwater Management Plan (SMP) in the coming years.

From results presented in Figure 20, focusing on the sampling sites from the North Brook catchment, it is clear that levels of dissolved copper are reduced downstream at the North Brook Ponds (RRNB017). This indicates the North Brook ponds are functioning as expected and/or there is dilution in groundwater.

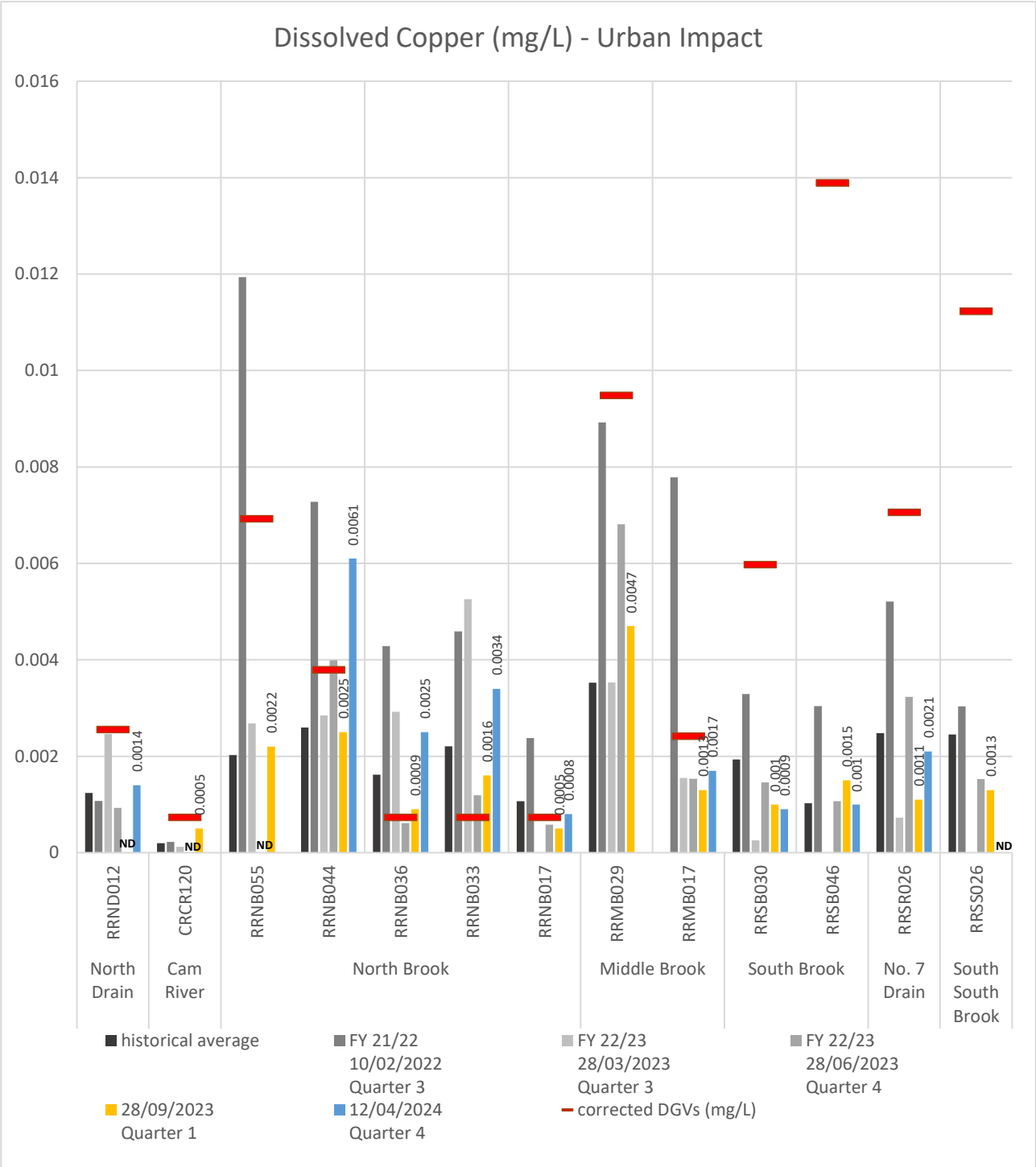

Figure 20. Urban Impact - Dissolved Copper sample results for FY 23/24 (colours) compared to previous financial years and historical levels (grey). ND = no data available (no sampling undertaken, dry site). Data gaps from previous financial years are explained in the previous annual report.

If WDC wanted to address those exceedances higher up the catchment and improve the levels of dissolved copper in the North Brook closer to the source, it is recommended:

- To explore specific copper treatment options for stormwater at RRNB044, North Brook, on Church St across from Dudley Park. In terms of space, this could be achieved before or after Dudley Park. The North Brook is an open waterway on the west side of Dudley Park, however, is piped on the east side of Dudley Park by Church Street. See Figure 21.

- To explore specific copper treatment at RRNB033 Northern branch of the North Brook, west side of Kowhai Avenue. This stormwater channel connects with the box drain to the northeast via the existing railway and receives stormwater from the town centre of Rangiora. It is noted, there is a project already underway to address this (refer to the Annual Report 23/24, TRIM 240805128819, section 14.6, Table 16, Railway Drain Treatment). See Figure 22.

The railway itself, which connects to the Kowhai Ave sampling site in the North Brook via the stormwater channel and associated Box Drain stormwater channel, is highly likely an existing source of contaminants such as copper due to the nature of the activity.

There is well documented research where associated railways were found to contaminate the directly adjacent soil due to its proximity with heavy metals, including copper (Cu), zinc (Zn), niquel (Ni) and lead (Pb) (Brtnický et. al 2022). See Figure 23. Therefore, it is no surprise to be finding fluctuating levels of copper in Kowhai Ave/north Brook site (RRNB033), with up to 0.0034 mg/L on Quarter 4 of FY 23/24.

Figure 21. Dudley Park: Proposed area for stormwater improvements to address dissolved copper exceedances in the North Brook higher up the catchment (RRNB044). Note: these exceedances are currently addressed further down the catchment with North Brook Ponds, with recorded reduced levels of dissolved Copper.

Figure 22. Kowhai Ave: Suggested area for stormwater improvements to address dissolved copper exceedances in the north book higher up the catchment (RRNB033). Note: there is another project underway looking at addressing these exceedances upstream. They are also addressed further down the catchment with North Brook Ponds, with recorded reduced levels of dissolved Copper.

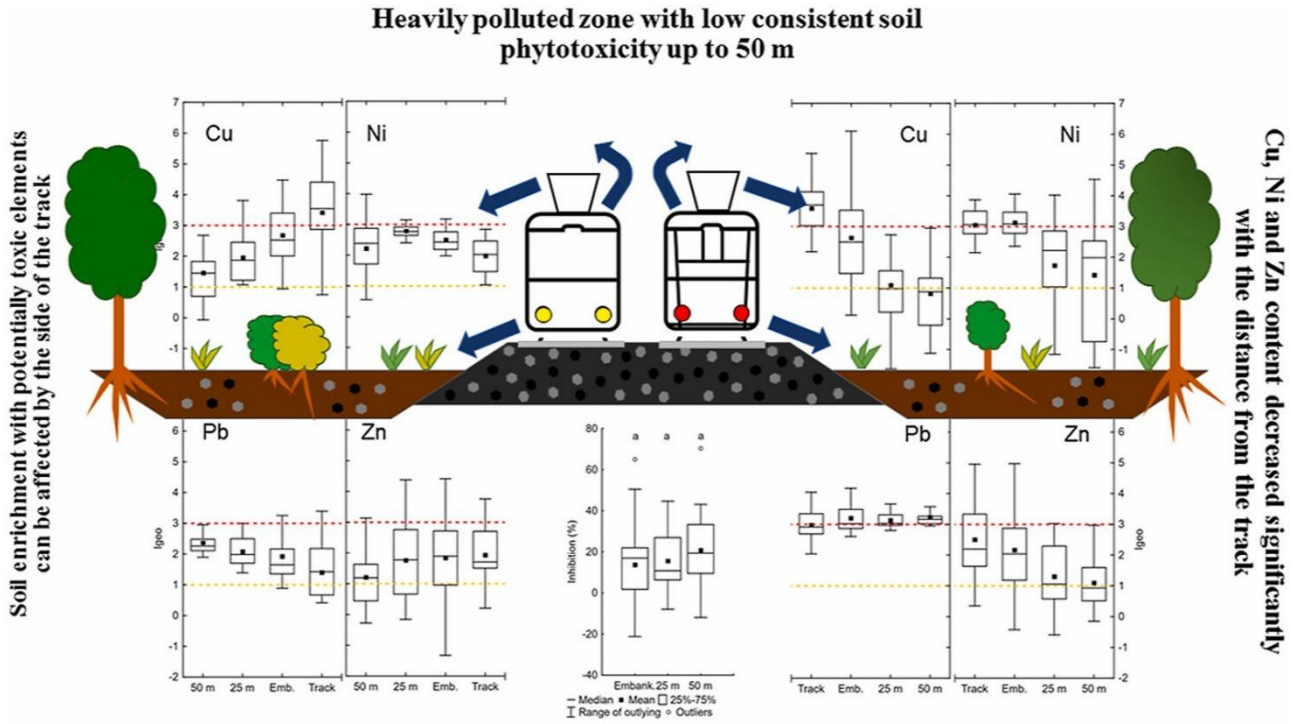

Figure 23. Extract of research results on contaminated land adjacent to a railway. Source: Brtnický et. al 2022.

With regards to results from the Middle Brook catchment, there was one exceedance in dissolved copper at RRMB029, Middle Brook on the Western side of Bush Street. With this site being located inside the Bush Street reserve, there is potential and space to rectify with specific stormwater treatment in the Bush Reserve Area. It is recommended to include treatment before the stormwater discharge reaches the stream (Figure 24).

Further testing downstream of this catchment at RRMB017, Middle Brook by Gefkins Road east of the Railway (upstream side of the bridge), reveals that the waterway at this site presents diluted levels of dissolved copper which also meet compliance requirements. This shows sampling at this site is further away from the source of contamination from copper.

The above presents evidence that any potential projects addressing stormwater treatment and exceedances by the Bush Street Reserve would likely be closer to the source of copper contamination.

Figure 24. Bush Street Reserve: Suggested potential stormwater treatment area to address exceedances in the Middle Brook. Treatment at the discharge before entering the stream is recommended.

South Brook and South-South brook did not present exceedances for this FY 23/24 monitoring. Therefore, no measures are prioritised for discussion in this report. However, this could change in the future as more monitoring results become available throughout the financial years.

Finally, with regards No. 7 Drain, where was one instance of exceedances in Quarter 4 for FY 23/24, while in Quarter 1 the guideline levels were met. This indicates that contamination of copper in the receiving environment decreases and increases through the quarters. When we look at what's further upstream of this sampling site (RRSR026), we encounter Pond C. Based on the dissolved copper results recorded for Pond C, it is thought Pond C is functioning as expected when it comes to addressing levels of dissolved copper.

Based on the above, contamination of copper in the No. 7 Drain is thought of to be coming directly from Flaxton Drain Road. WDC records show that Flaxton Drain flows parallel to Flaxton Road, with some of its discharge entering Pond C for treatment, with the rest carrying on downstream, to meet again at the confluence of Pond C outlet and No. 7 Drain. Additionally, this drain also meets with the flow from Fernside Rd Drain further downstream after the bridge, and discharges coming from the development on 240 Flaxton Road, with its own discharge consent (CRC241228).

It is recommended to follow up on the above statements with specific investigations on dissolved copper, to test the idea of copper sources coming from Flaxton Drain itself. If these results were to come back positive, then actions would be recommended to follow this up with landowners and request further treatment for stormwater discharges from the industrial activities above Pond C. This includes businesses in the industrial area contained between Flaxton Rd and Fernside Road corner, above Pond C.

Trends

- Significant trends over time were identified for dissolved copper at Bush Street sampling site (RRMB029).
- See section 5.5.2 and Table 10.
- Refer to Appendix 2 – H for full graphs and statistical trend analyses results, which recorded the following: Kendall S = 15, p = 0.21, likelihood = 0.9.

5.5.2. Dissolved Zinc

Zinc is an urban contaminant, from sources such as vehicle brake pads, tyres and galvanised roofs. Compliance is assessed for 90% protection of species for concentrations of dissolved zinc below 0.015 mg/L.

Figure 25 shows the Dissolved Zinc sampling results for the Urban Impact sampling in FY 23/24, presented in comparison to results from previous financial years and baseline sampling.

Looking at the results catchment by catchment, it is observed:

- The North Drain catchment continues to present exceeding levels of dissolved zinc this FY 23/24, with levels similar to previous financial years.
- Dissolved Zinc levels reduced below the guideline this financial year for two sites in the Northbrook, with 3 more sites still exceeding the guideline of 0.015 mg/L.
- In the Middle Brook, the two sampling sites continue to exceed the guideline value concentration levels
- There were no exceedances recorded for dissolved zinc in the South Brook, No. 7 Drain and South-South Brook, with the later being an improvement compared to FY 21/22.
- Overall, 7 out of 13 sites exceeded the guideline in FY 23/24, with meeting the corrected guideline values.

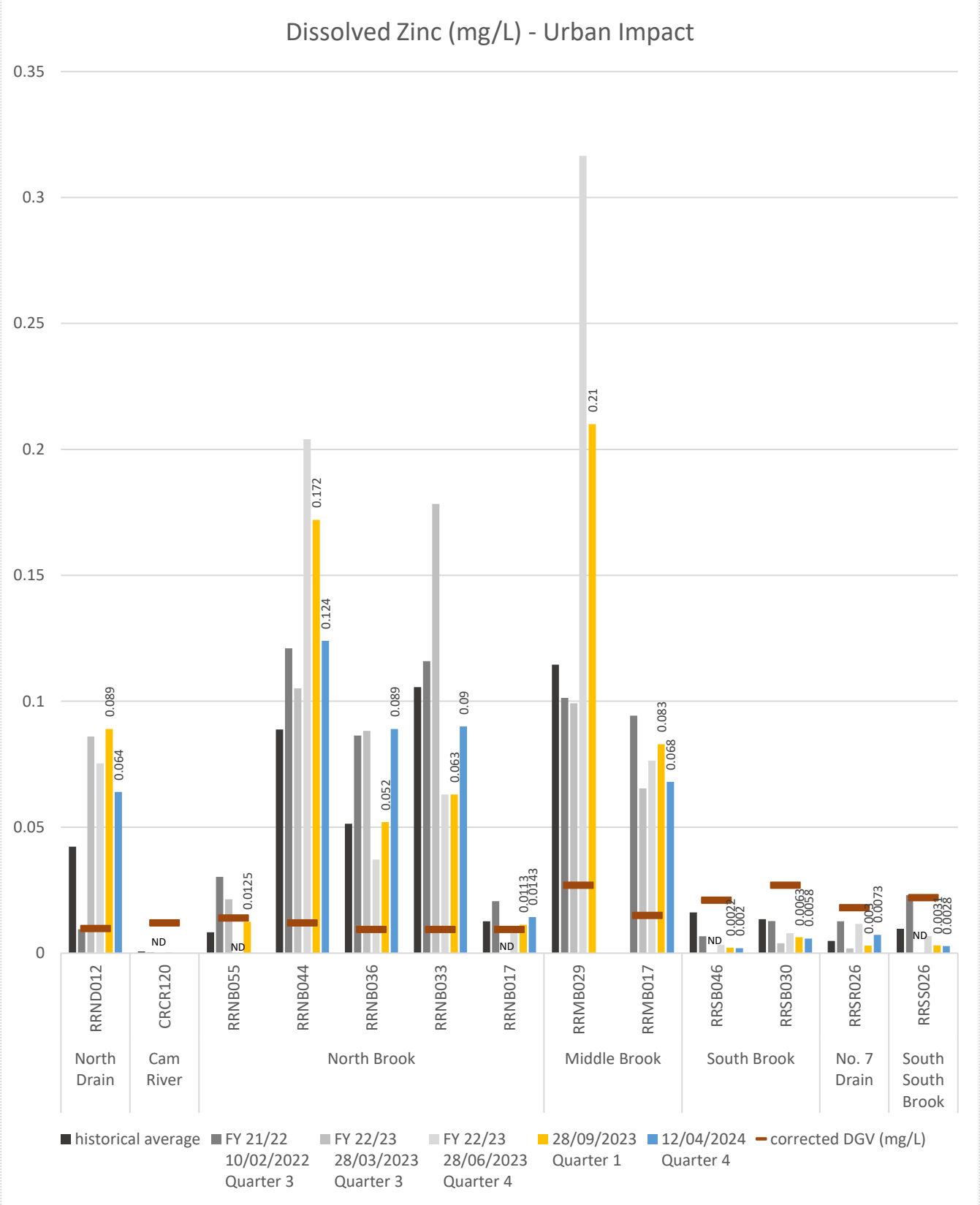

Figure 25. Urban Impact - Dissolved Zinc sampling results for FY 23/24 (colour) and previous financial years and baseline sampling (grey). ND = no data (data gaps where sampling was not undertaken). Note: Cam River site presented values below the detection limit, with only data missing for 2022/23 Q3.

Discussion

Looking at the results catchment by catchment, it is noted that concentrations of dissolved zinc in the North Drain exceed the DGVs and the receiving environment objective of 0.015 mg/L. The site RRND012 North Drain at Coldstream Road, is on the boundary of Rangiora urban limits, the source of Zinc is therefore urban.

The North Drain discharge point RRND012 receives stormwater from residential areas to the east of Coldstream Road, including Ashley Street and residential areas East of Bellgrave Drive, Ambrose Place and Hampstead Close. This stormwater infiltrates to ground or drains to the Ashley Rakahuri River.

Further investigations and actions in the North Drain to reduce levels of dissolved Zinc are recommended for WDC to test whether the dissolved Zinc is coming from which of the subcatchments mentioned above.

Data from Cam River, South Brook, No. 7 Drain and South-South Brook catchments suggest dissolved zinc is not a problem in these catchments.

In the North Brook, it is observed again this year how the levels of dissolved zinc are higher upstream (at RRNB044, Church Street across from Dudley Park) and then reduced by the time they reach the most eastern boundary of Rangiora Urban limit at RRNB017, Northern side of Boys Road. This lowering in the concentration of zinc further downstream could be either due to dilution or due to the North Brook ponds stormwater management area retaining this heavy metal. Despite this, the levels of dissolved zinc are still exceeding the guideline value at the Boys Road RRNB017 site.

In contrast, sampling results from the most upstream site in the North Brook (RRNB055, at Aspen Street Park) show that the concentration of dissolved zinc is substantially lower at the beginning of the North Brook, compared to the next downstream site only 11km further downstream. This means that after Aspen Street Park site, with levels of dissolved zinc of 0.0125 mg/L, the next site increases its concentration of zinc to 0.172 mg/L in the same quarter at Church St sampling site across Dudley Park (RRNB044).

The above provides evidence that contamination sources from zinc are likely originating before the North Brook flows through Dudley Park, with Aspen Street Park site as a very low source of contamination but also very close to exceeding the compliance limit.

In conjunction with the proposed treatment in the North Brook to the west of Dudley Park to address copper exceedances, the same hypothetical stormwater treatment project could be proposed in this area to also address zinc exceedances. This would ensure that dissolved Zinc levels are not exceeded in the receiving environment after treatment from the North Brook ponds.

It is noted from this sampling, that sources of dissolved zinc have potentially originated from discharges occurring somewhere between Aspen Street and Dudley Park (Figure 26). The exceedances shown for Kowhai Ave site (RRNB033) comes from a different catchment, so there's potentially more zinc contamination occurring from the surrounding areas. The exceedances occurring at RRNB036, Lilybrook Park, could still be originating from contamination upstream. Specific sampling investigations in these areas or further stormwater treatment could help provide further clarity on testing the above observations. These results make sense, given that the area between Aspen Street and Dudley Park is one of the oldest in Rangiora (i. e. predominantly galvanized, zinc-coated roofs that have paint coats wearing off).

From a compliance perspective, it is recommended to address the non-compliances for zinc in this area.

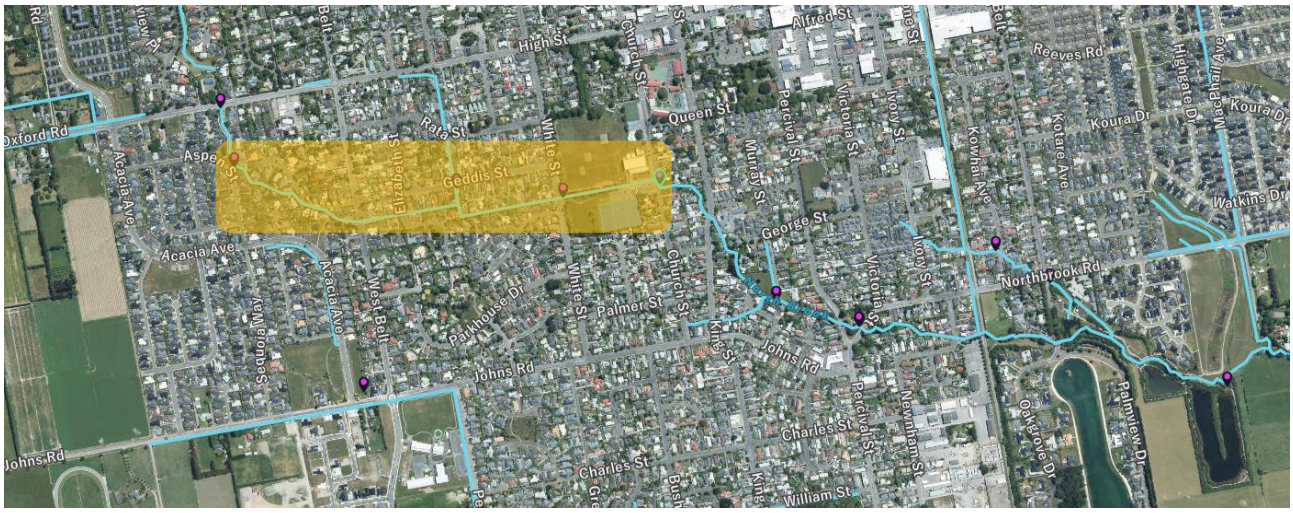

Figure 26. Suspected area of highest incidence of dissolved zinc contamination in the North Brook (yellow). Location: between Aspen Street and Dudley Park.

With regards the Middle Brook, it is clear dissolved zinc is also a problem on the western side of Bush Street (RRMB029) and even by the time the waterway exits the town by Gefkins Road site (east of the railway, RRMB017).

In conjunction with the possibility of treatment at Bush Street for dissolved copper (Figure 24), this is also recommended to treat dissolved zinc at the most upstream site of the Middle Brook (RRMB029, Bush Street) by Bush Street reserve, where the levels of dissolved zinc are the highest, not only for Quarter 1 of FY 23/24, but also historically, with a maximum recorded peak of 0.32 mg/L of dissolved zinc in Quarter 4 of FY 22/23. Specifically, treatment at the stormwater discharge point before it enters the Middle Brook is recommended.

Actions and treatment projects are recommended in the Middle Brook around the most upstream treatment site in Bush Street, with possibility to utilise Bush Street Reserve as a space for potential stormwater treatment for Zinc and Copper.

Trends

This is a summary of the highlights from section 5.2.2 and Table 10. Significant increase trends were identified for dissolved zinc in the following sites:

- North Brook, Lilybrook Park (RRNB036): Kendall S = 21, p = 0.15, likelihood = 0.93.
- Middle Brook, western side of Bush Street (RRMB029): Kendall S = 17, p = 0.12, likelihood = 0.92.
- North Drain (RRND012): Kendall S = 15, p = 0.28, likelihood = 0.86.

A decreasing trend was also identified for dissolved zinc in the South Brook, at Railway road (RRSB030): Kendall S = -15, p = 0.28, likelihood = 0.89.

Refer to Appendix 2 – H for full statistical and visual data representation details.

5.5.3. Hardness and Dissolved Organic Carbon

Hardness samples were recorded with Urban Sampling round in Quarter 1 (28/9/2023). These values were used to adjust for the DGVs for Zinc. Results are presented in section 3.4.

Likewise, Dissolved Organic Carbon sampling was also undertaken in conjunction with Hardness above. These results were used as per section 3.4 to adjust the DGVs for Copper.

WDC's budgets and lab quotes with Hill Laboratories have been adjusted to allow for this sampling with each round of Urban Impact moving forward for FY 24/25, as per Environment Canterbury's request and the conditions from the SNDC.

5.5.4. pH

The guideline for pH is set between 6.5-8.5. All sites were found to be between these guidelines for pH. For clarity, results for FY 23/24 are presented separately in Figure 27. A comparison with previous years is presented in Figure 28.

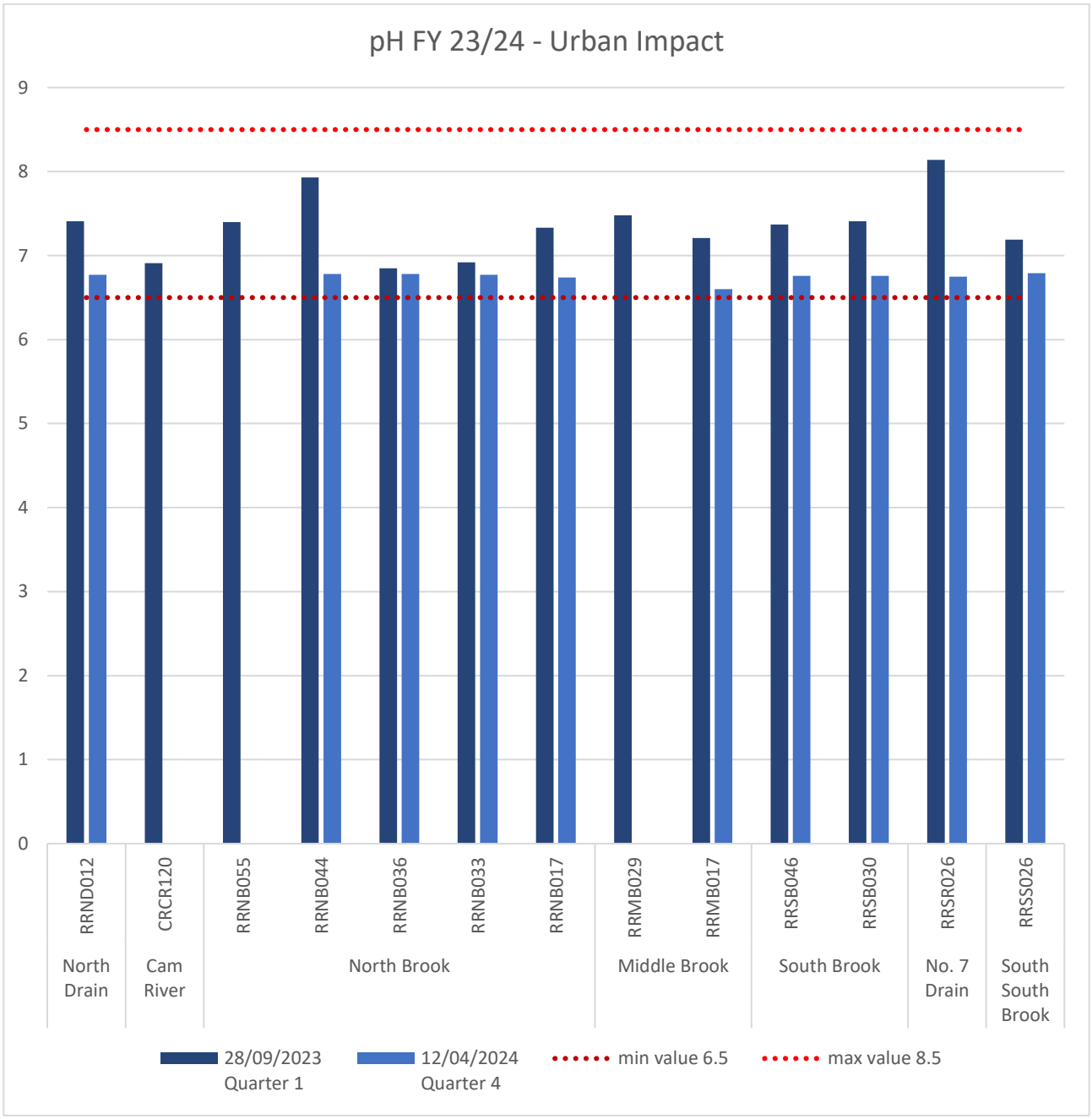

Figure 27. pH values from Urban Impact sampling FY 23/24.

Discussion

Compared to last year, this is an improvement, although the sporadic low pH results report for on previous annual report are thought to be due to equipment failure (pH probe taking longer to stabilise and reading low).

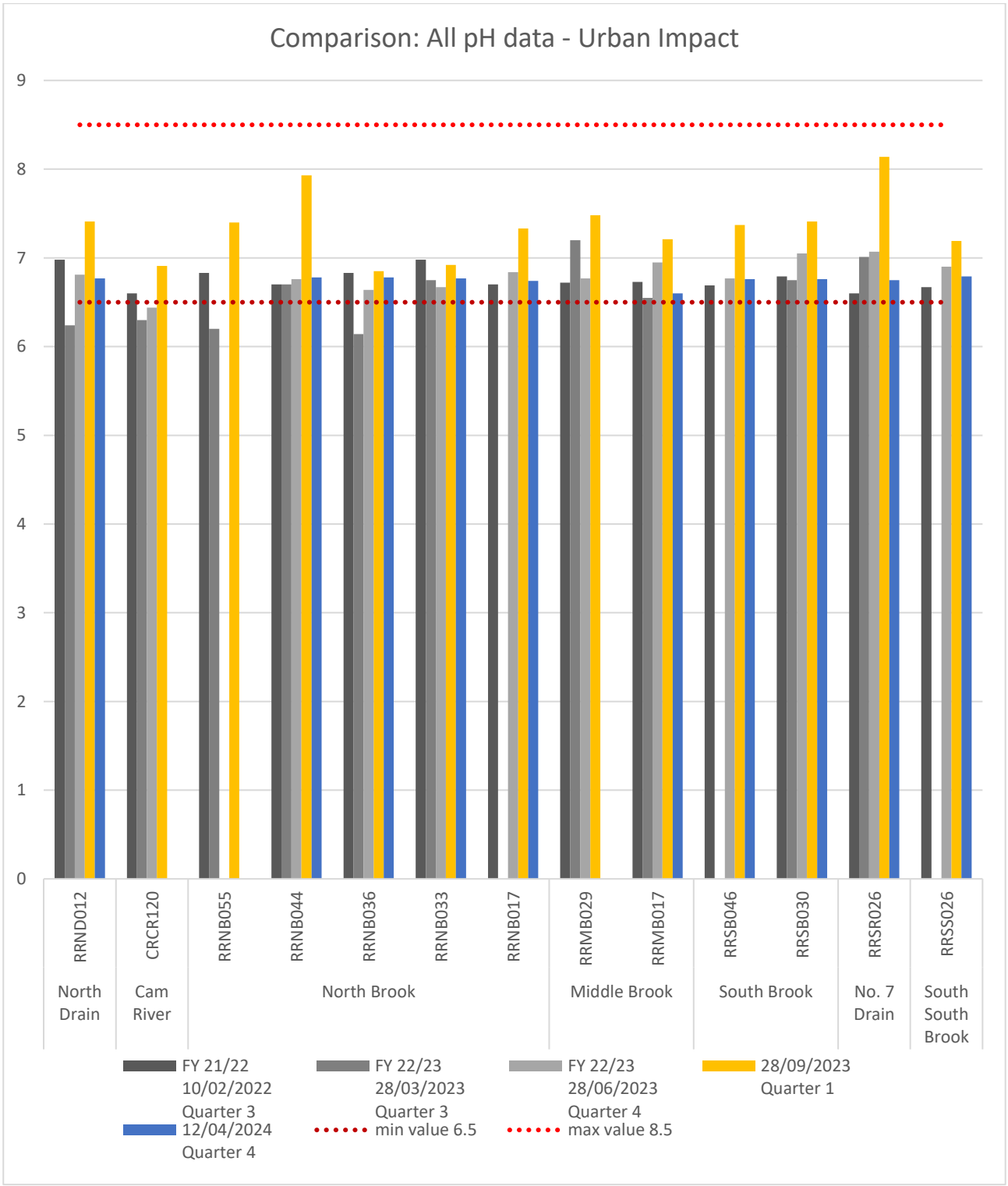

Figure 28. pH values from Urban Impact sampling from 2021 to current, per financial year and quarters.

5.5.5. *Escherichia coli*

Figure 29 shows the E. coli results for the Urban Impact sampling in FY 23/24, in comparison to previous financial years.

The guideline value derived from the CLWRP for E. coli is < 550 MPN / 100 mL.

- Overall, all sites, except Cam River (CRCR120) and Middle Brook (RRMB029) exceeded the guideline value for E. coli.
- The counting protocol for E. coli from Hill Labs changed in 2021. This means a full count stopped being provided over values of 2240 MPN/100mL.
- 4 sampling sites did not exceed the guideline value on Quarter 1 of sampling.
- In Quarter 4, all sites except Cam River and one Middle Brook site were at or above 240 MPN/100ml.
- These results suggest faecal contamination of waterways during rain events is a prevalent problem
- Actions to reduce sources of faecal contamination are required in all Rangiora catchments except the Cam River.

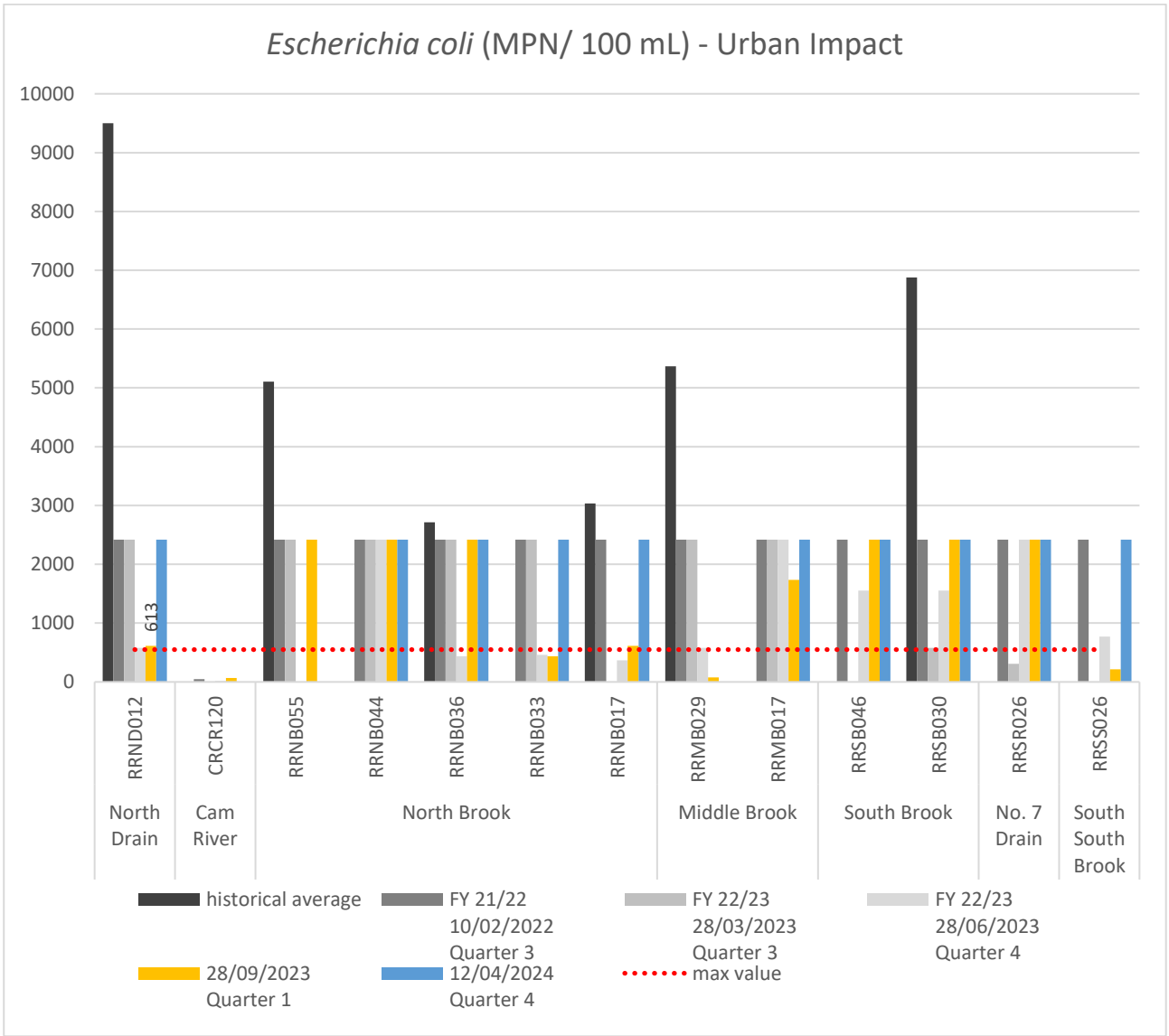

Figure 29. E. coli levels found for FY 23/24 (colour) in comparison to previous financial years and historical (grey).

Discussion

Sources of faecal contamination could be rural as well as urban in catchments with headwaters in rural areas, such as South Brook and No. 7 Drain. This means that elevated levels of E. coli could be originating from further upstream of the catchment, outside of the urban limits applicable to this consent. On the other hand, North Brook and Middle Brook originate within the Rangiora township with no rural inputs until downstream of the urban limits.

Internal conversations were undertaken within WDC to check if there had been any wastewater overflows during FY 23/24. No wastewater overflows were recorded by WDC.

When the data is compared to the Stream Health data for E. coli, it is noted that exceedances for E. coli during dry weather remain only in South Brook (RRSB030 Railway Road, RRBS046 Townsend Road) and South Rangiora (RRSR025 downstream of Fernside / Flaxton Intersection SMA outlet). This points out to the detection of E. coli in all other waterways as a result of heavy rain.

WDC's CCTV pipe inspection contract work in 2024, noted there were some cases of pipe cracks for both stormwater and sewer pipes. Specifically, a 225mm wastewater main on Flaxton Road showed cracks and was subsequently repaired (30 August 2024). This could have been a potential source of E. coli contamination at RRSR025 on Flaxton Road. Further sampling for FY 24/25 will determine if this continues to be a problem in this area.

Another possible source of E. coli is urban, from existing birdlife occurring in the streams and ponds, and from domestic animals such as dogs, and poor management practices by the public.

To address exceedances of E. coli in the Middle Brook as reported on previous annual report, a specific E. coli investigation was undertaken in the Middle Brook to try and locate a possible source of E. coli contamination. The results came back with levels of E. coli below the consent limit. This points to any E. coli exceedances in dry weather as being occasional, and not recurrent.

Faecal Source sampling is recommended for FY 24/25 to try and locate the source of E. coli contamination. This sampling will only be able to determine the presence/absence on the origin of E. coli, for example bovine Yes/No, domestic dogs Yes/No, human present Yes/No.

Trends

No significant increase or decrease trends were identified for E. coli in any stormwater sampling sites or waterways.

A general decrease trends was identified as possible but uncertain in the North Drain (RRND012) due to low samples (n = 8, where at least 10 are required for a confident analyses).

See section 5.5.2, Table 10 and refer to Appendix 2 – D / E. Coli for full details on statistical trend analyses and Appendix 2 – C / E. coli for graphs and visual data, with the limitation that results from North Brook, Middle Brook and South Brook require a site-by-site analyses for reliability.

5.5.6. Dissolved Reactive Phosphorus

Figure 30 shows the Urban Impact Dissolved Reactive Phosphorus (DRP) sample results for FY 23/24.

The guideline value for DRP is 0.016 mg/L. DRP is a measure of soluble phosphorus that are readily available to use by plants and algae. The presence of high concentrations of DRP are an indication of a waterbody's

ability to support algal growth (blooms) and plant growth. With high concentrations of DRP, algae and weeds can proliferate quickly.

Sources of DRP could be attributed to the use of residential garden fertilisers, or from agricultural use from higher up the catchment, which could be transported via groundwater inflows to the spring fed brooks. Phosphorus from fertilizer sources binds strongly to the soil, however once its capacity it's saturated it leaches downstream and downward into groundwater. If a phosphorus saturated soil suffers erosion, it will also move with surface water runoff onto rivers.

Other sources of DRP are wastewater overflows, and 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.

All sites except Cam River presented exceedances of DRP. It is noted, values of DRP were generally higher during Quarter 4 than in Quarter 1.

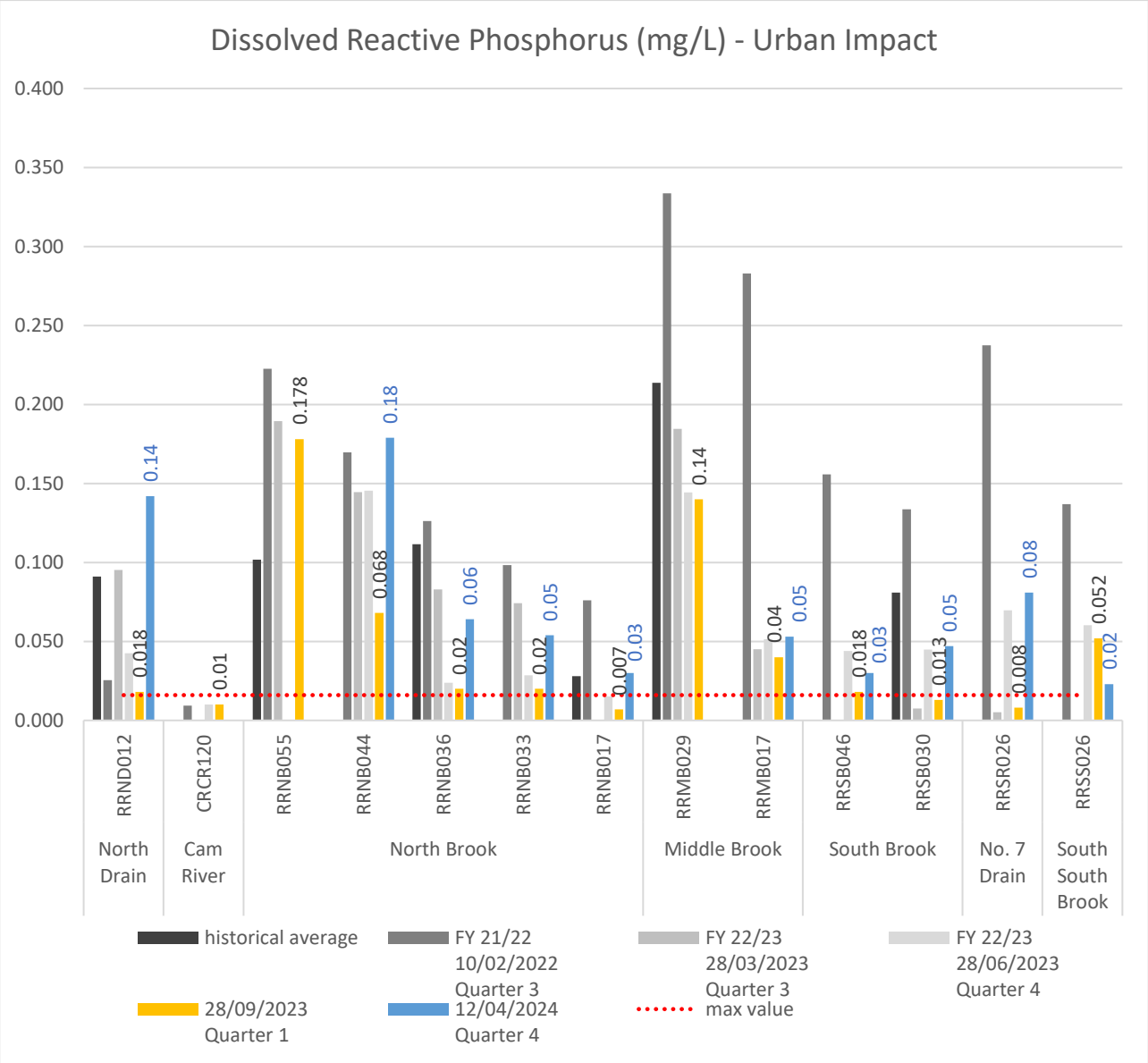

Figure 30. Urban Impact Dissolved Reactive Phosphorus sample results for FY 23/24 (colour) compared to previous financial years and historical results (grey).

Discussion

The highest values of DRP were recorded in the North Brook at sites RRNB055 (Aspen Street Park) and RRNB044 (Church Street, across from Dudley Park), at concentrations of 0.178 mg/L and 0.179 mg/L, respectively.

It is observed, levels of DRP are reduced further down the North Brook stream, possibly due to dilution. It is likely that DRP sources of contamination are located around the headwaters of the North Brook.

The same pattern of higher concentration of DRP upstream is also observed for the Middle Brook. It is noted, North Drain presented the third highest level of DRP at 0.142 mg/L. This catchment is urban, coming from northeast Rangiora with no groundwater baseflow. All of this could be pointing out to sources of Dissolved Reactive Phosphorus entering these three waterways from urban sources, or potentially groundwater for the Middle Brook and North Brook.

With regards the South Brook, higher levels of DRP are found at the most downstream site, RRBS030 (Railway Road). This data suggests that this site received further additional contamination of DRP from within the urban limits. Site RRSB030 is adjacent to rural areas to the east, both inside and outside the urban limit. Thus, the DRP contamination from rural runoff is possible for the South Brook.

When it comes to No. 7 Drain and South-South brook, results are also non-compliant, with the highest concentrations found at No. 7 Drain site RRSR026 at 0.081 mg/L.

In alignment with the discussion for E. coli regarding a wastewater pipe needing repairs at Flaxton Road, DRP results at site RRSR025 are also in alignment with this event. Further sampling for FY 24/25 after pipe repairs undertaken in August 2024, will determine if sources of DRP for FY 23/24 were from wastewater origin or other.

Actions to reduce DRP levels are required for all streams, except Cam River. These could focus in further investigating the inputs of fertilisers from rural areas outside the urban limits and having a better understanding of any potential phosphorus inputs occurring in Rangiora during wet weather onto the stormwater system.

5.5.7. Total Ammoniacal Nitrogen

The guideline values for Total Ammoniacal Nitrogen (TAN) are pH dependant. To retrieve a guideline for each site, an average pH was calculated per site from pH measurements undertaken during Urban Impact sampling. Then, each pH value was found for each site following the guide provided in Table S5C Maximum total ammonia concentrations for 95% species protection at different pH, from the CLWRP. A table for the protection of 90% species as per our consent requirements was not available.

The results are shown in Table 16.

The guideline value for TAN ranged from 2.09 mg/L at the lowest, to 2.33 mg/L. In all instances, all sampling results for TAN recorded in all waterways in Rangiora for FY 23/24 were well below these guidelines (Figure 31).

Site	**Receiving Waterway**	**average pH FY 23/24**	**guideline ammonia (mg/L)**	**guideline ammonia pH dependant (mg/L)**	TAN results: **28/09/2023 Quarter 1**	TAN results: **12/04/2024 Quarter 4**
North Drain	RRND012	7.09	2.26	2.18	0.005*	0.005*
Cam River	CRCR120	6.91	2.18	2.18	0.005*	
North Brook	RRNB055	*6.95*		2.26	0.036	
	RRNB044	7.355	1.88	2.26	0.068	0.005*
	RRNB036	6.815	2.33	2.26	0.011	0.005*
	RRNB033	6.845	2.33	2.26	0.005*	0.005*
	RRNB017	7.035	2.18	2.09	0.012	0.005*
Middle Brook	RRMB029	6.84		2.33	0.041	
	RRMB017	6.905	2.26	2.33	0.02	0.021
South Brook	RRSB046	7.065	2.18	2.18	0.024	0.005*
	RRSB030	7.085	2.18	2.09	0.014	0.021
Pond C	RRSR026	7.445	1.75	2.09	0.005*	0.005*
South South Brook	RRSS026	6.99	2.26	2.09	0.015	0.02

Table 16. Ammonia guidelines equivalents per site depending on pH. Results for TAN found at each site are also included for comparison against the guideline values. Note*: sites marked in orange were below the detection limit and are represented as half the detection limit.

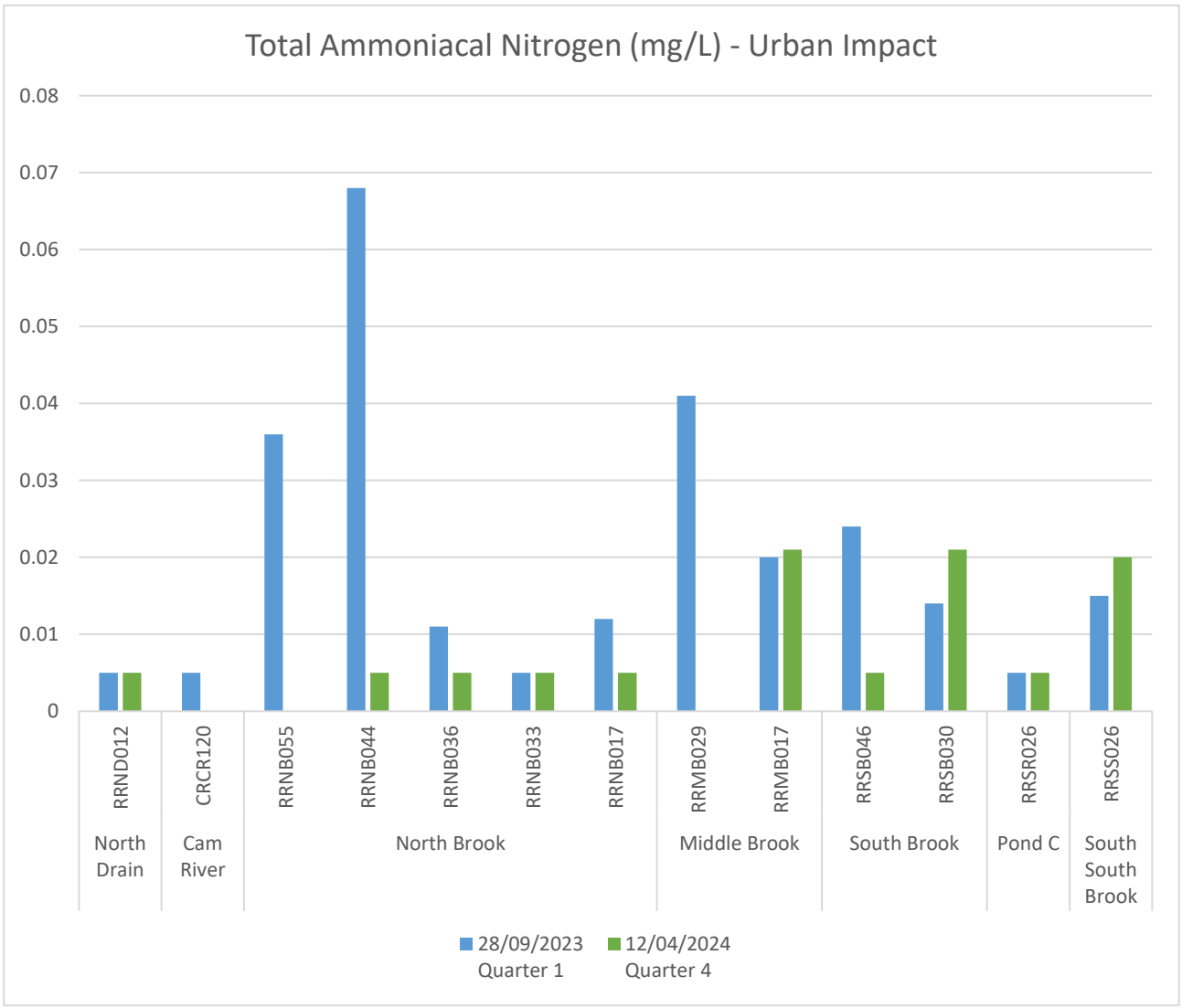

Figure 31. Urban Impact - Total Ammoniacal Nitrogen sample results for FY 23/24. The guideline values are not shown for simplicity. All results were well below the guideline limits. Historical and previous financial year results are not shown for simplicity. Note: the following sites recorded levels of TAN below the detection limit of <0.01 mg/L, and so are represented with half the detection limit of 0.005 mg/L: RRND012, CRCR120, RRNB044, RRNB036, RRNB033, RRNB017, RRSB046, RRSB030, RRSR026, RRSS026.

Because all sampling was compliant Total Ammoniacal Nitrogen is not thought to be causing a problem to the ecology and water quality of the receiving environment in Rangiora. A discussion of results is not offered.

5.6. Stream Health

This is the dry weather sampling component. It is sampled in the waterways and receiving environment, before WDC stormwater discharges reach the waterway.

It provides a good comparison against data from wet weather sampling (major network outlets & urban impact sampling). If a problem highlighted from wet weather sampling results persists for dry weather sampling results, further actions are required beyond the potential impacts of stormwater.

It also provides good context on what the state of the waterway is prior to any stormwater discharges occurring, as it doesn't include information from a mixing zone below like with Urban Impact sampling.

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 17).

For this financial year 23/24, the only values higher than the guidelines referenced below, were encountered for some sites on Dissolved Inorganic Nitrogen (DIN), E. coli (2 sites) and Dissolved Reactive Phosphorus (DRP, 2 sites).

All results are reported fully in the following sections.

Table 17. Stream Health monitoring surface water guideline values

Contaminant	Guideline	Guideline Source
Dissolved Oxygen	>70%	CLWRP, *Spring-fed-Plains (Urban)*
pH	Shall be between 6.5 - 8.5	CLWRP, *section 16, schedule 5*
Temperature	<20ºC	*CLWRP, Table 1A, Spring-fed-Plains (Urban)*
Specific Conductance	< 175 µS cm^{-1}	Biggs (1988, 2000)
Dissolved Inorganic Nitrogen	< 1.5 mg/L	CLWRP, *section 16, schedule 5*
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 gm3	CLWRP

5.6.1. Dissolved Oxygen (DO)

Dissolved Oxygen (DO) is a measure of the amount of oxygen that is dissolved in water. The percentage of oxygen saturation in water is important for fish and aquatic organisms to be able to breath. This is measured in the field with specific handheld probes, which return a value for dissolved oxygen in mg/L and convert it to a percentage. The guideline value for Dissolved Oxygen in the CLWRP is set to be at least 70% DO (for Spring-fed-Plains, Urban waterways).

No sampling rounds were missed.

Results for dissolved oxygen (DO) sample results FY 23/24, are presented in Figure 32 and highlights are as follows.

- Only one site in the North Brook (RRNB036, Lilybrook Park) showed low DO (%) levels for one quarter only. This site is known from previous financials years to have low DO, thought to be due to spring water flows. Further sampling of this site in the financial year, shows how DO levels are at 70%. These DO levels results are not thought to be a problem for aquatic life at this site.
- The North Brook at Lilybrook (RRNB036) was also below 70% DO in the 2014 baseline sampling in dry weather but was above 70% DO during a moderate rain event.
- Results from quarter 2 are reasonably higher in all sites. Compared to sampling undertaken for the during the other quarters, it appears that on 8/9/2023 the DO probe could have been reading results higher than usual.
- DO results are not showing any problems. No actions are required.

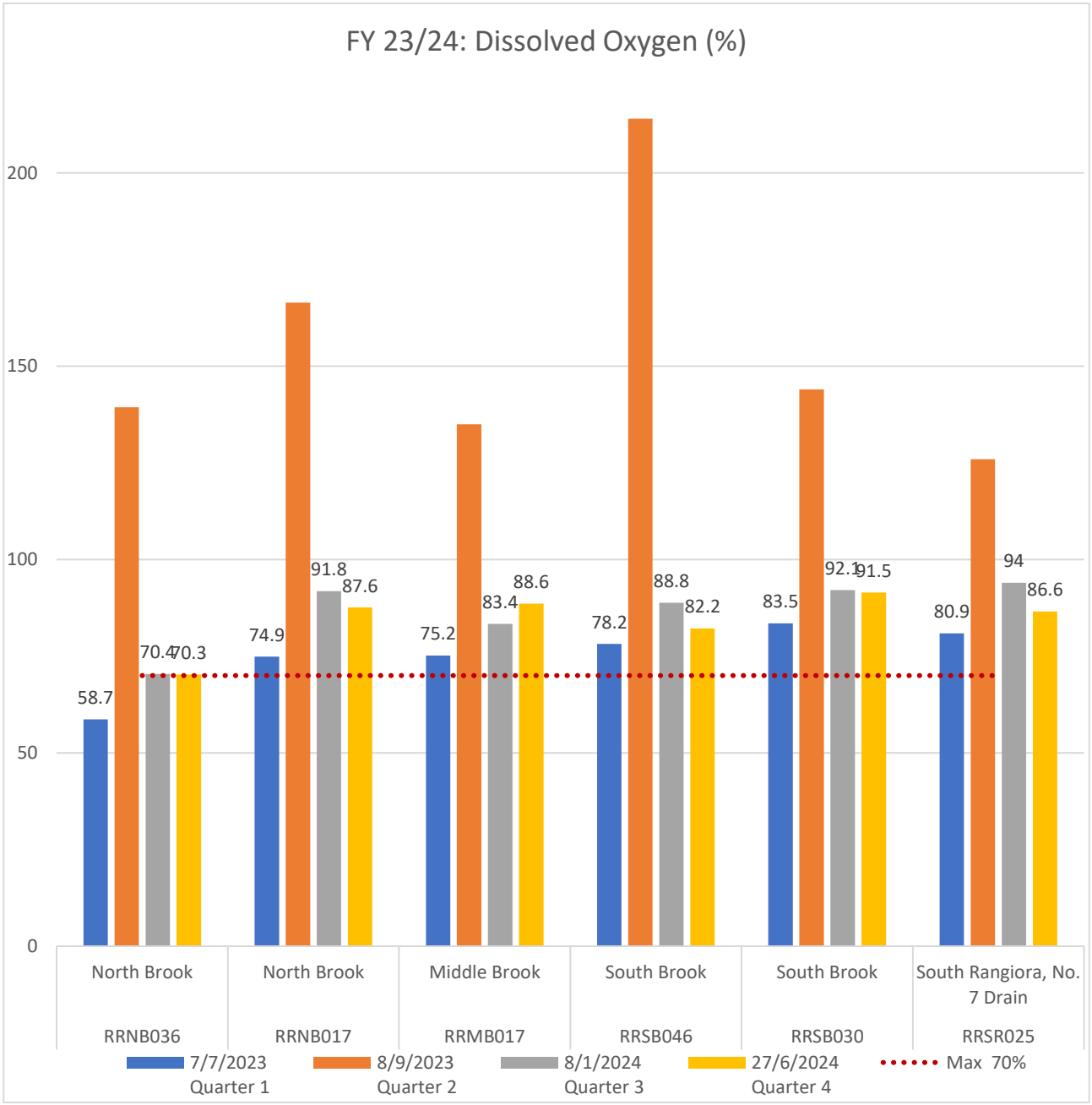

Figure 32. Stream Health - Dissolved Oxygen sample results for FY 23/24

For comparison, results from FY 22/23 are offered separately (Figure 33).

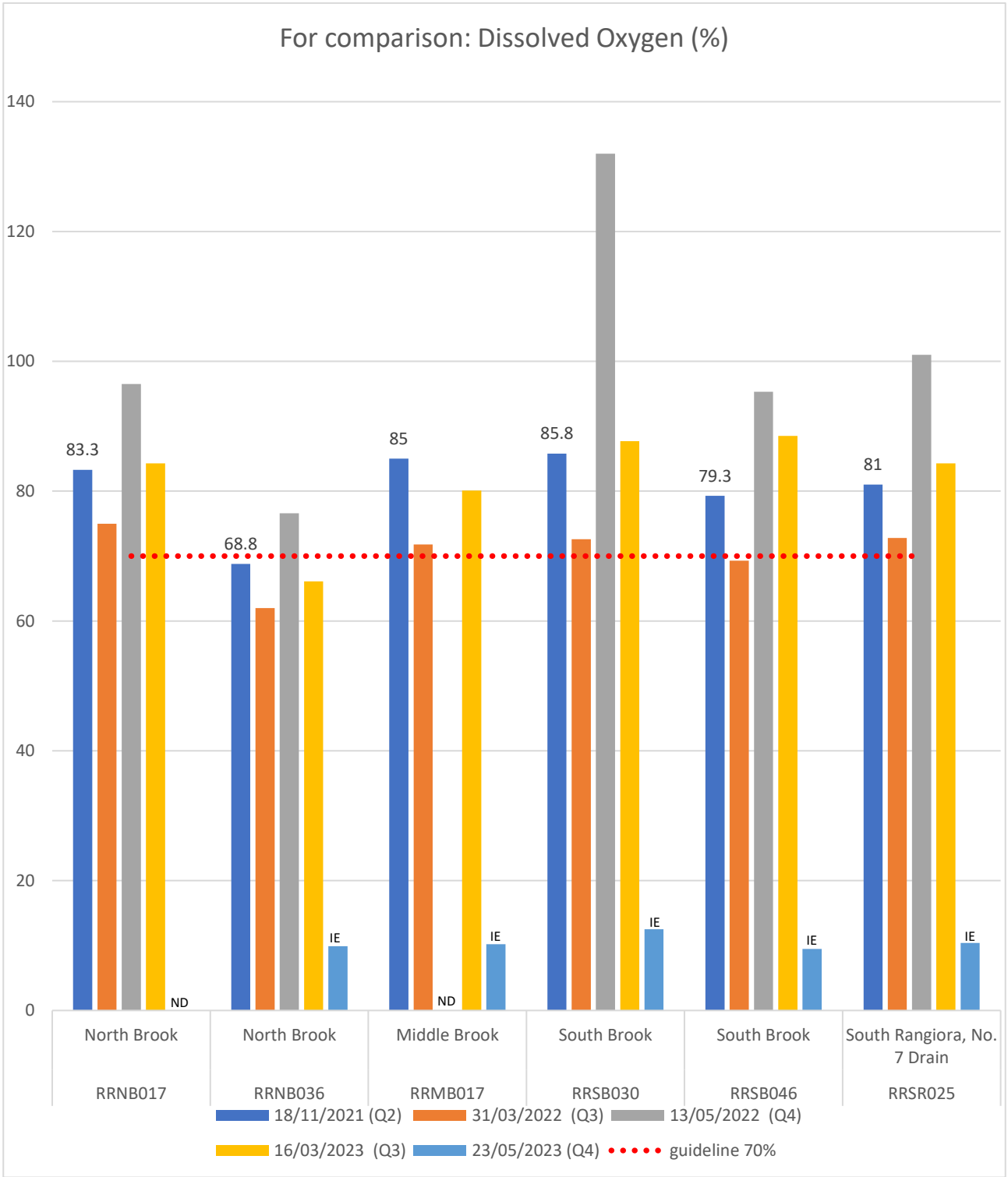

Figure 33. Comparison: Stream Health dissolved oxygen sample results from previous years 2021-2023. Low DO levels are explained for instrumental error. IE = Instrumental Error. ND = No Data.

5.6.2. Temperature

The temperature sample results are presented in Figure 34. All samples were below the CLWRP guideline limit of 20°C. Temperature results for all urban waterways are normal. No actions are required.

For comparison, results from previous year are offered separately in Figure 35.

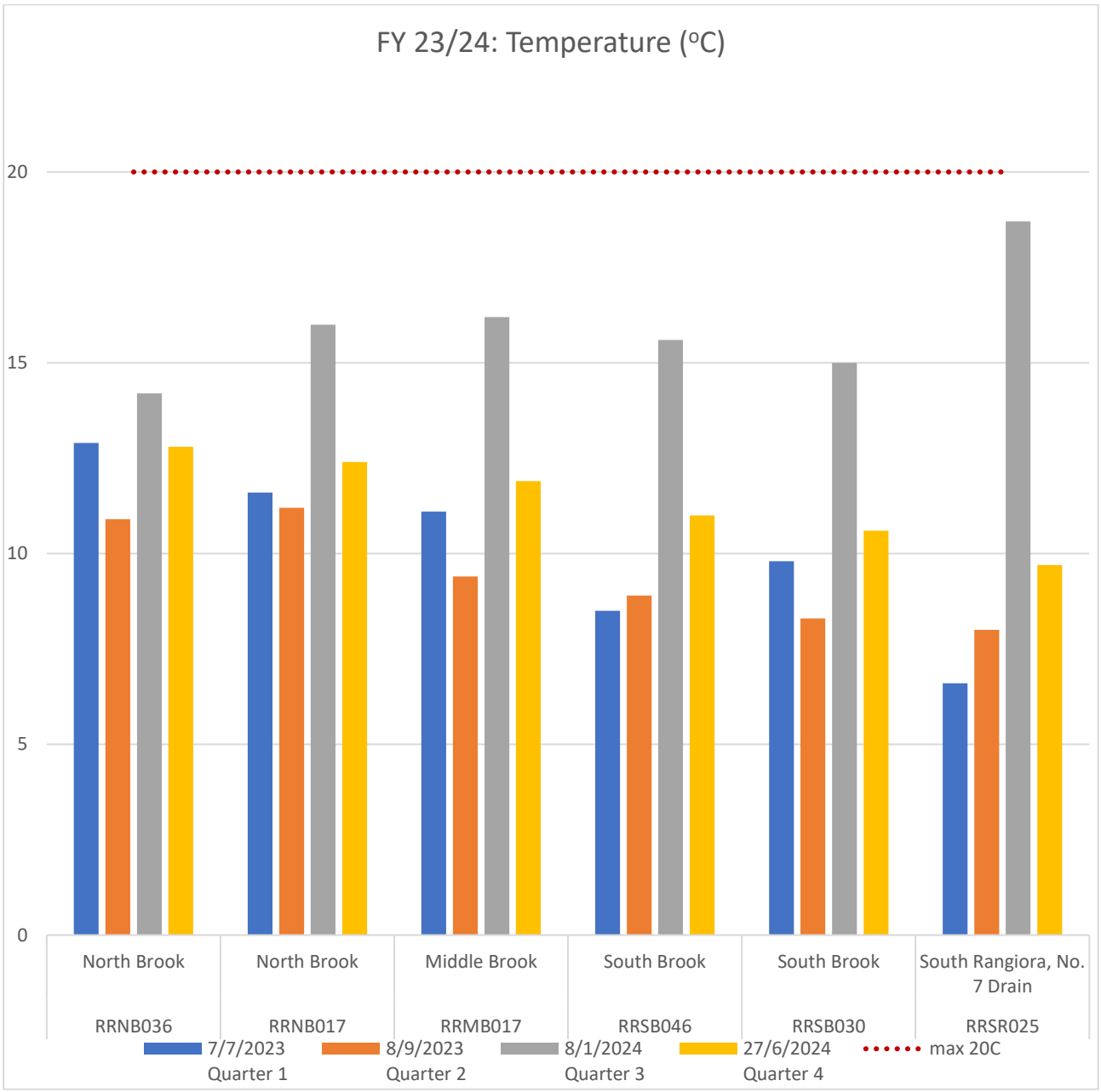

Figure 34. Stream Health - Temperature results for FY 23/24.

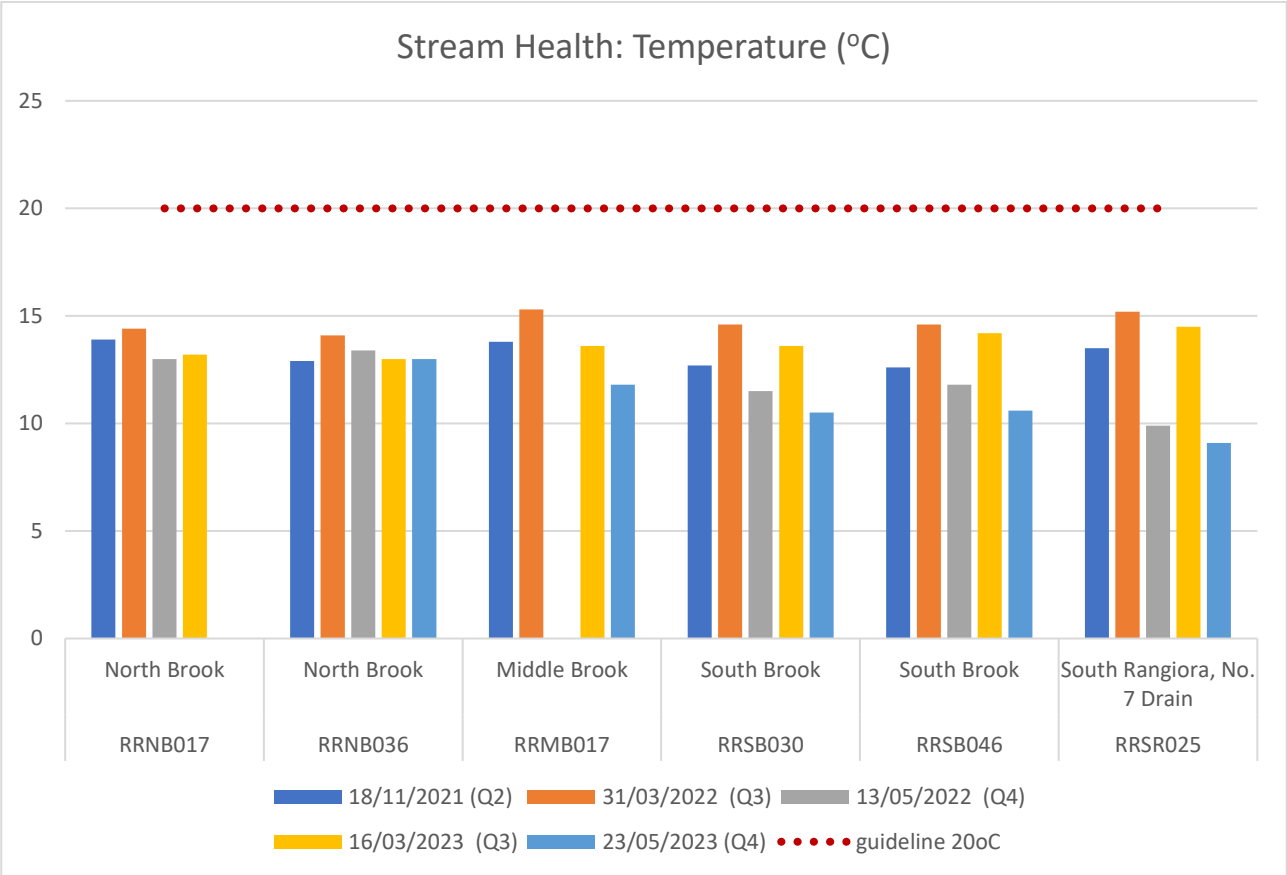

Figure 35. Stream Health - Temperature results for the 2022/2023 reporting year, with 2021-22 for comparison.

5.6.3. pH

All pH results were found to be within the recommended range of 6.5 – 8.5. Results are presented in Figure 36. Compared to previous FY 22/23 this is an improvement.

There is no evidence of negative effects of stormwater discharges on pH levels. No actions are required.

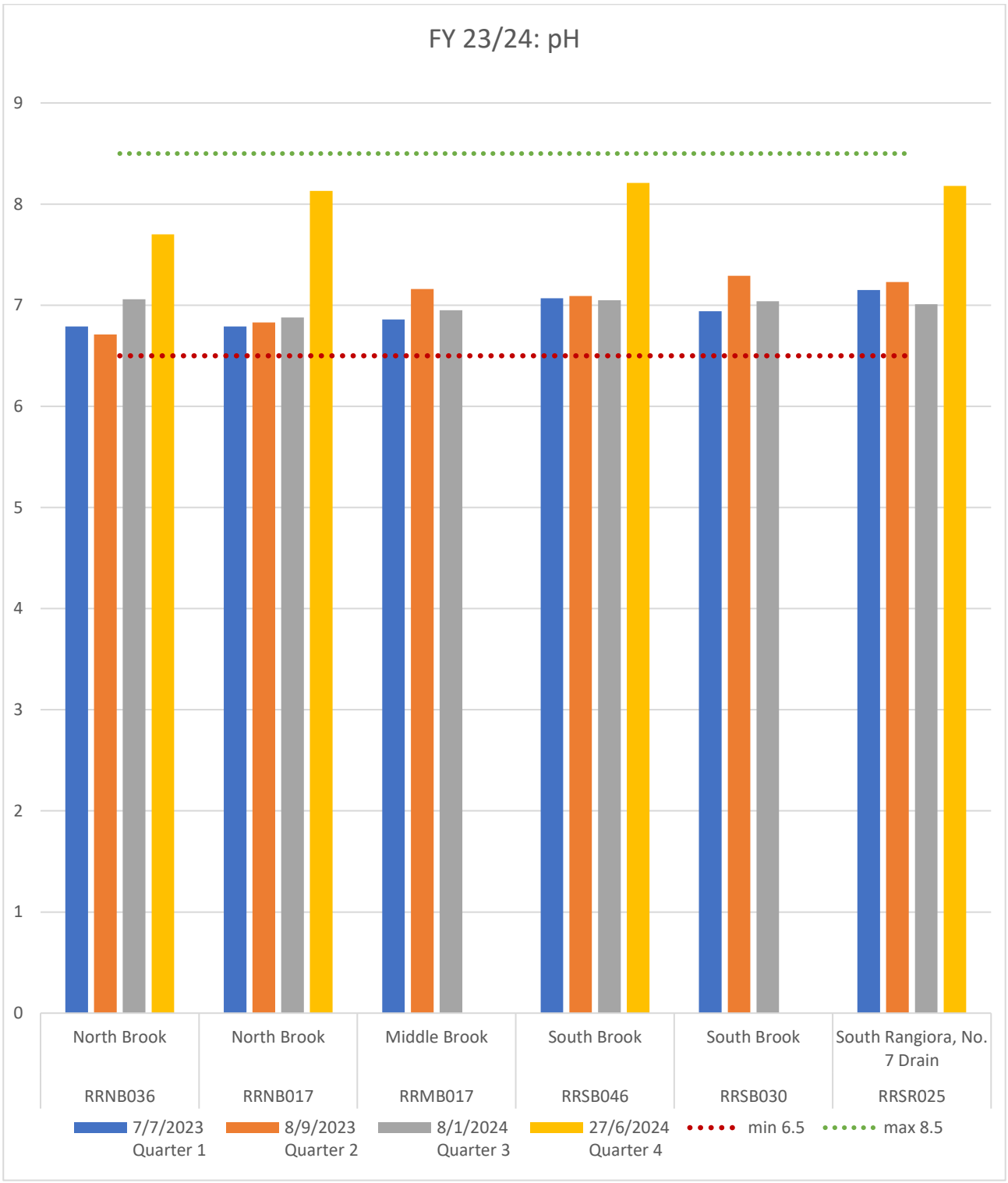

Figure 36. Stream Health - pH results for FY 23/24.

Results from previous financial year are offered separately for comparison.

5.6.4. 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 µS/cm was adopted as a limit. The following conductance results have been adjusted to 25^{o}C (specific conductance).

Results are presented in Figure 37. Results from previous year are presented in Figure 38 for comparison.

- The highest specific conductivities recorded were found during Quarter 1, at South Brook (sites RRSB046, Townsend Road and RRSB030, Railway Road), and at No. 7 Drain (RRSR025, Flaxton Road SMA outlet).
- The latest sampling recorded during Quarter 4, only shows one exceedance for conductivity at No. 7 Drain site (RRSR025, Flaxton Road SMA).
- Compared to last year, the above indicates the South Brook and No. 7 Drain still require action for potential discharges contaminating the waterways during dry weather sampling, beyond stormwater discharges during wet weather events.
- Compared to last year, the Middle Brook has shown as improvement in conductivity, with no exceedances recorded this FY 23/24
- Interestingly, for the North Brook site (RRNB036, Lilybrook Pond), there were high conductivity levels recorded during Quarter 1, which then go back to normal for the rest of the financial year.
- Specific conductivity for Quarter 1 is provided from manual calculations (see methodology section 3). Specific conductivity was not recorded at any sites during Quarter 1 due to instrumental failure (the probe was taking longer to stabilize and was reading unreliable results for adjusted conductivity)

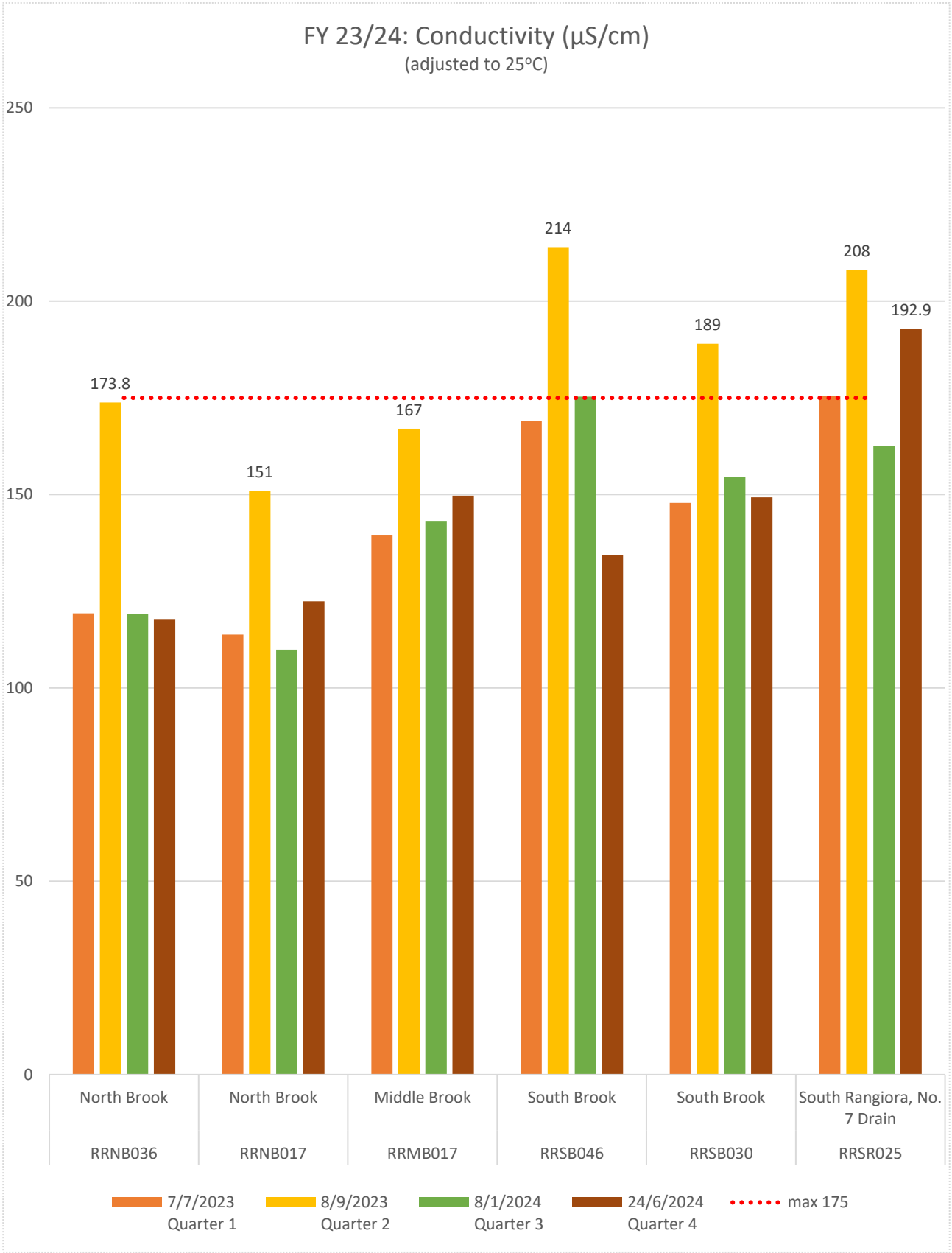

Figure 37. Stream Health - specific conductance sample results for FY 23/24. Note: there is no data available for Quarter 1 due to instrumental failure

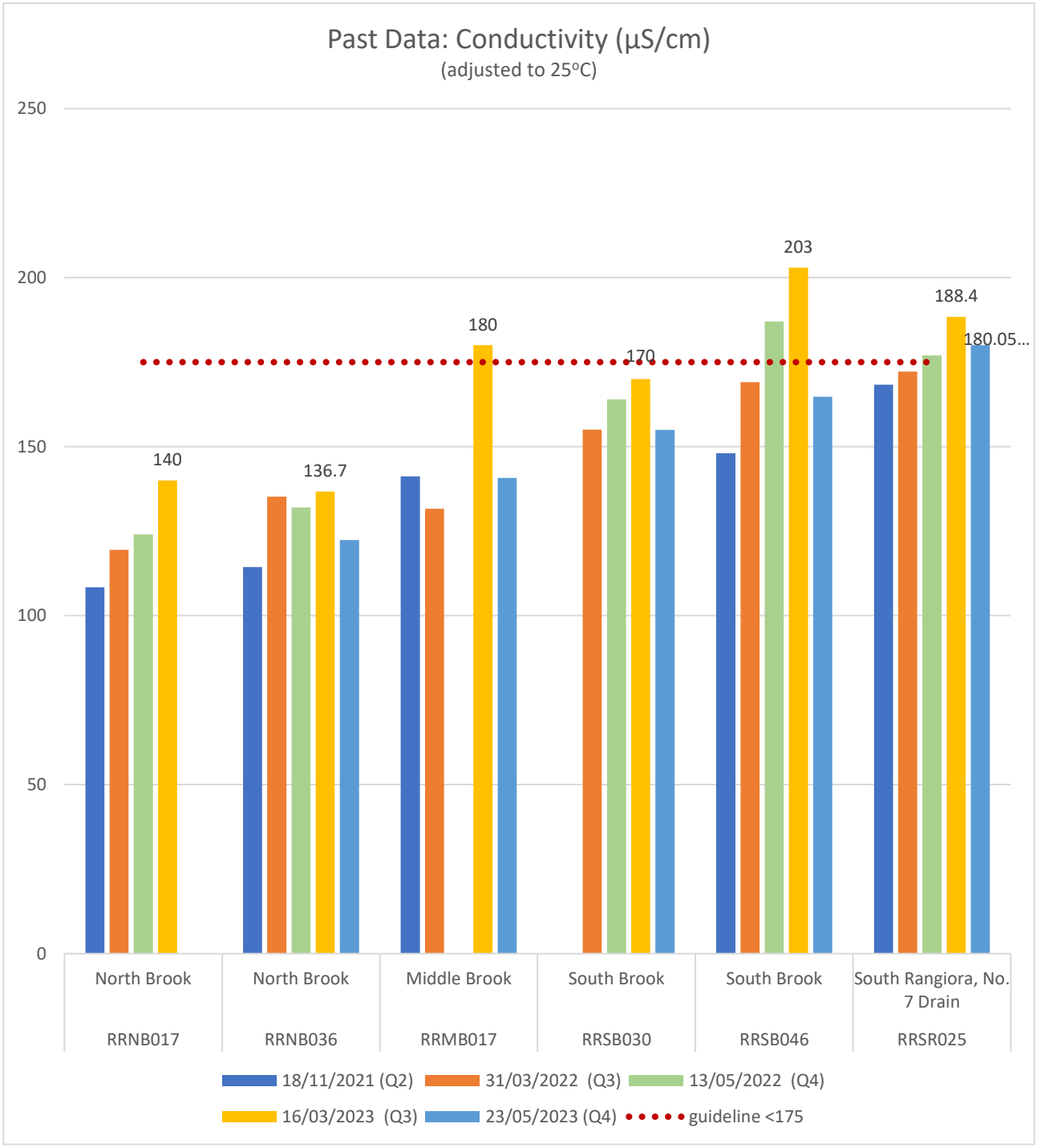

Figure 38. Stream Health - specific conductance sample results for FW 22/23, with FY 21/22 for comparison

5.6.5. Dissolved Inorganic Nitrogen (DIN)

Nitrogen occurs naturally in several forms in the environment. Dissolved Inorganic Nitrogen (DIN) is the sum of nitrite (NO_2), nitrate (NO_3) and ammonia (NH_3), and is the most bioavailable source of nitrogen used by plants, aquatic plans and algae.

Nitrate-Nitrogen (NO_3-N) is water soluble and is an important plant nutrient. Being highly soluble in water, it can leach easily into groundwater, especially after heavy rainfall. Nitrite-Nitrogen (NO_2-N) is also water soluble, but concentration of this form is generally low compared to nitrate and ammoniacal nitrogen. It can be highly toxic to aquatic life. Ammonia (NH_3) when dissolved in water, reacts to form ammonium (NH_4). The balance between ammonia and ammonium in water depends on the pH of water. Ammonia is highly toxic to aquatic life.

The most common sources of nitrogen in water are leaching run off from agriculture activities, wastewater treatment plants, fertilised lawns, leaky septic systems and industrial discharges (LAWA, 2023).

Results of DIN for FY 23/24 are presented in Figure 39. Data from previous year is offered in Figure 40 for comparison.

- Sites in the South Brook and No. 7 Drain had exceedances of the guideline value above 1.5mg/L Dissolved Inorganic Nitrogen (DIN) specially during Quarters 1, 2 and 3, at sites RRSB046 (Townsend fields), RRSB030 (West Side of Railway Road) and RRSR025 (No. 7 Drain, immediately south of Fernside Road).
- It is observed, the exceedances for sites at the South Brook, drop down significantly below 1.5 mg/L in Quarter 4 by the end of the financial year. This points out to seasonal influxes of nitrogen in these areas.
- In contrast, at site RRSR025 at No. 7 Drain the values of DIN are still high for Quarter 4 with values of DIN recorded at 1.68 mg/L. This indicates the industrial activities occurring in this area are likely a source of nutrients on this waterway.
- In the Northbrook, there was only one exceedance for RRNB036 (Lilybrook Park) in Quarter 2 at 1.58 mg/L.
- Compared to last financial year, results of DIN for the Middle Brook and the North Brook (Figure 40) have improved. Results of DIN for the South Brook and No. 7 Drain are similar, indicating that actions are required.
- No baseline monitoring for DIN was carried out in 2014, so no historical data was available for comparison.

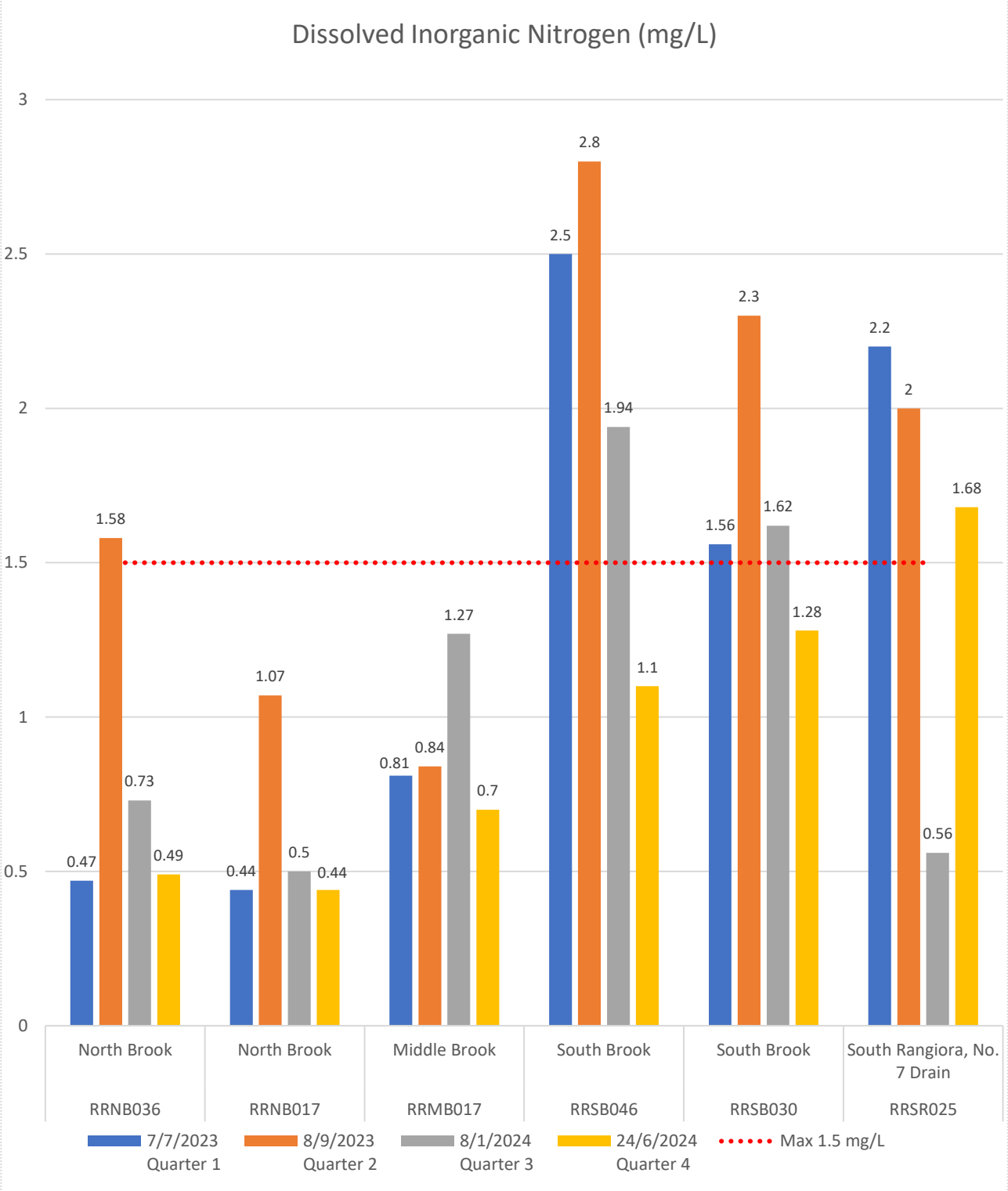

Figure 39. Stream Health - Dissolved Inorganic Nitrogen sample results for FY 23/24. No sampling rounds were missed.

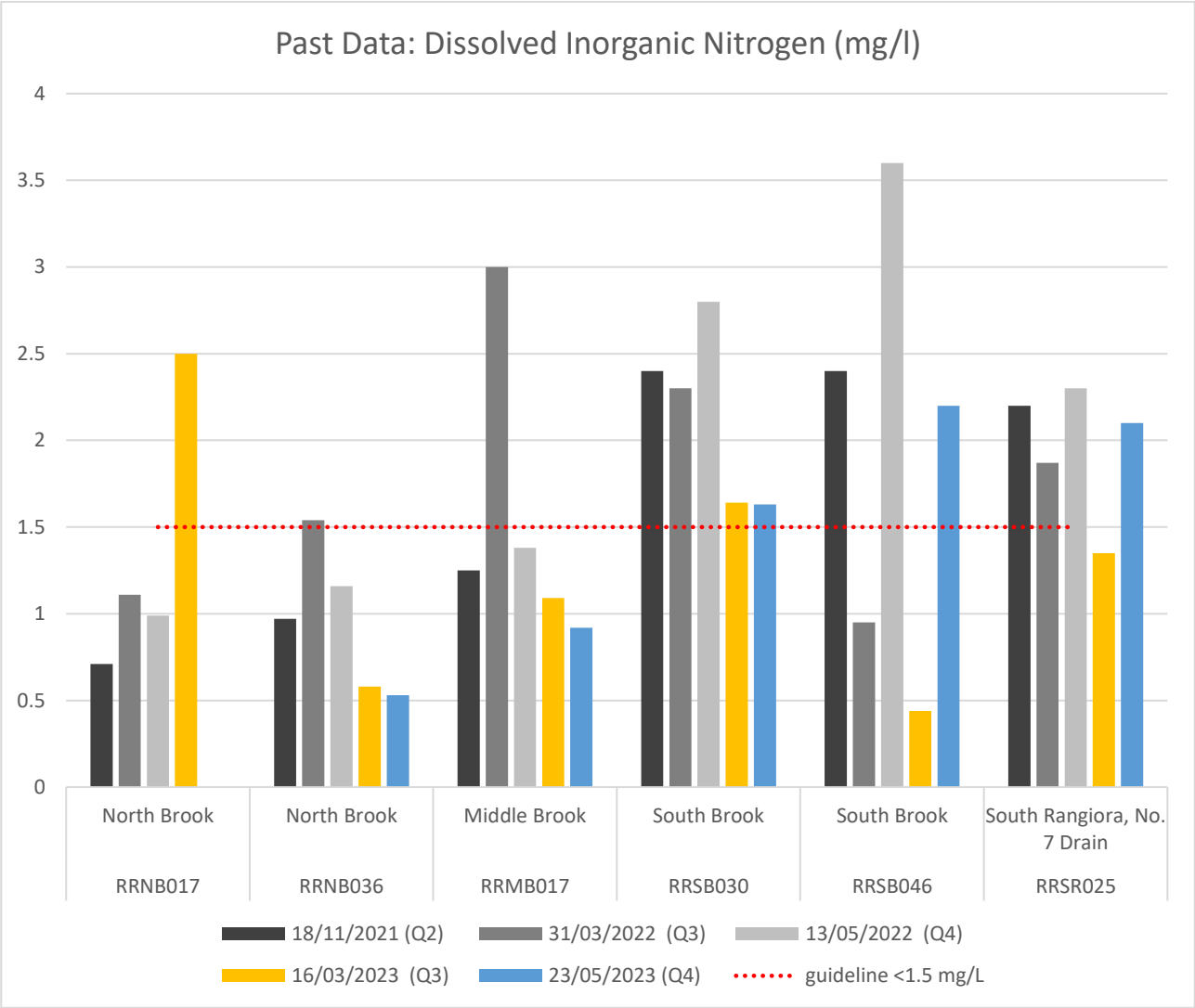

Figure 40. Stream Health - Dissolved Inorganic Nitrogen sample results for FY 22/23 (colour), with FY 21/22 results for comparison (grey)

Discussion

An investigation between WDC and Environment Canterbury is recommended to locate soils that have high nitrate leaching due to land management, to address practices that could be improved.

For the South Brook, at site RRSB046 (Townsend Road), it is observed sources of nitrogen could be coming from rural land use from further upstream, including from outside the urban limits (Figure 41). There are also discharges from Rangiora urban areas occurring just upstream of this site (Townsend Fields SMA). More sampling and investigations are recommended to locate the origin of this contaminant, with likely sources from agricultural runoff.

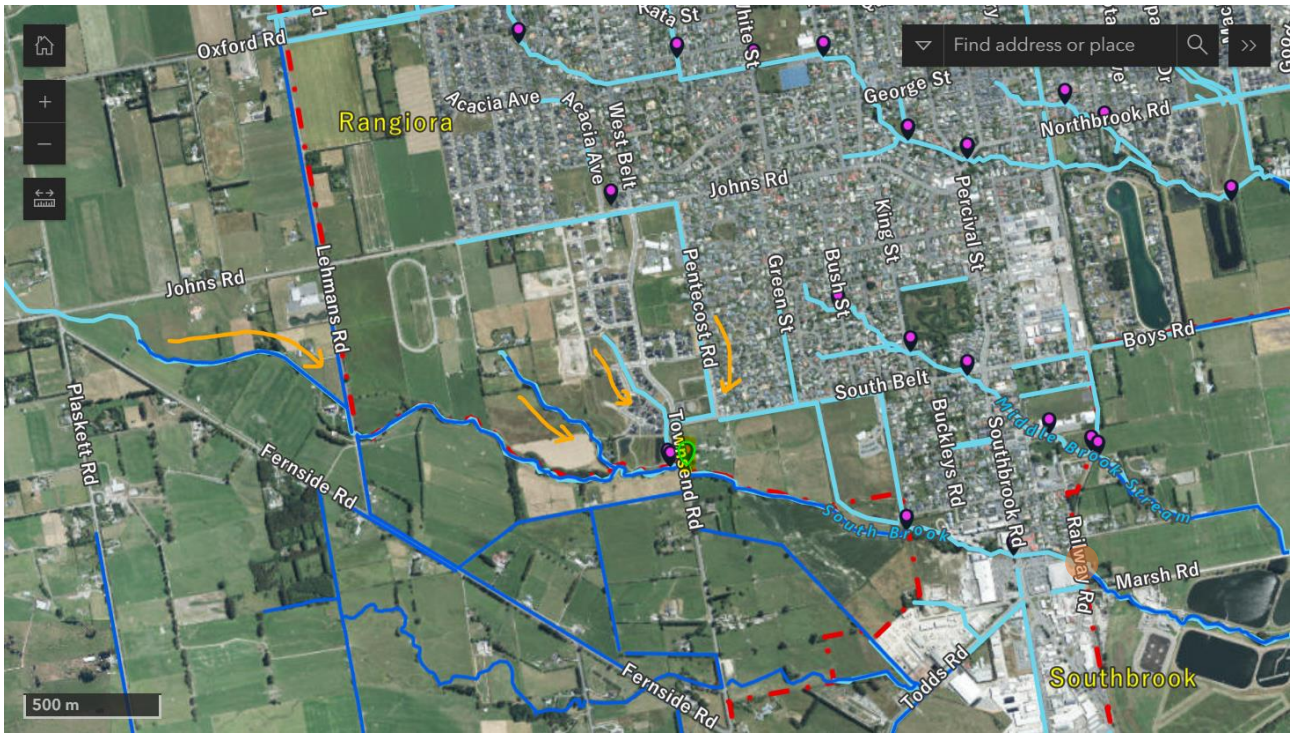

Figure 41. Suggested areas of investigation for DIN. The yellow arrows indicate possible areas contributing DIN onto South Brook site Townsend Road RRSR046 (marked in green in the middle), from agricultural runoff or urban. The urban limits of consent CRC184601 are marked with a dotted red line. In orange, Railway Road site RRSB030 is shown.

With regards RRSB030 on Railway Road, these exceedances could be coming from further upstream, or from contributions from neighbouring rural land use to the east of Railway Road.

It is suggested to investigate sources of DIN in collaboration with Environment Canterbury, to address exceedances of dissolved inorganic nitrogen found during stream health sampling, as this is outside the scope of this consent to address. Sources are likely to be from farming land use in rural areas north-west of South Brook by Townsend Road, and South Brook south-west of Johns Road / Lehmans Road.

At site RRSR025 in No. 7 Drain, there are discharge contributions from the Flaxton Road Drain, Pond C, No. 7 Drain, Todds Drain and from outside the urban limits. Further investigations in these areas are recommended exploring all the above as potential sources.

5.6.6. 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 1.75 mg/L at the lowest to 2.18 mg/L the highest.

All sampling recorded for Total Ammoniacal Nitrogen in FY 23/24 during Stream Health sampling was well below their respective guideline values. See Figure 42. A few sites presented TAN levels below the default detection limit. These are represented in Figure 42 as half the detection limit (0.005 mg/L).

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.

This result profile is similar to that found in FY 22/23, with no exceedances, presented in Figure 43 for reference.

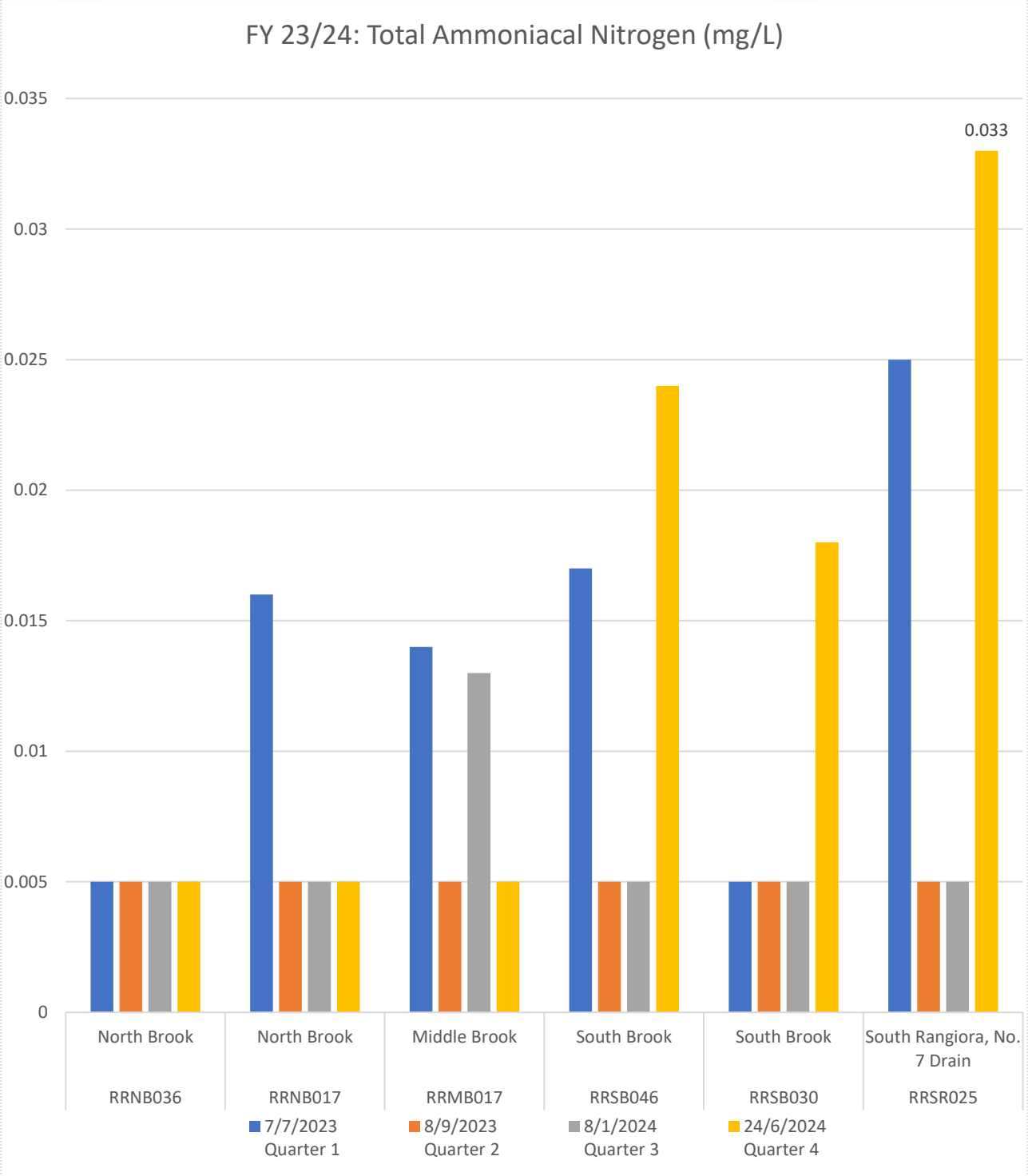

Figure 42. Stream Health Total Ammoniacal Nitrogen sample results for FY 23/24. All results were below the guideline values (not displayed in the graph). 2022/2023, with 2021-22 for comparison

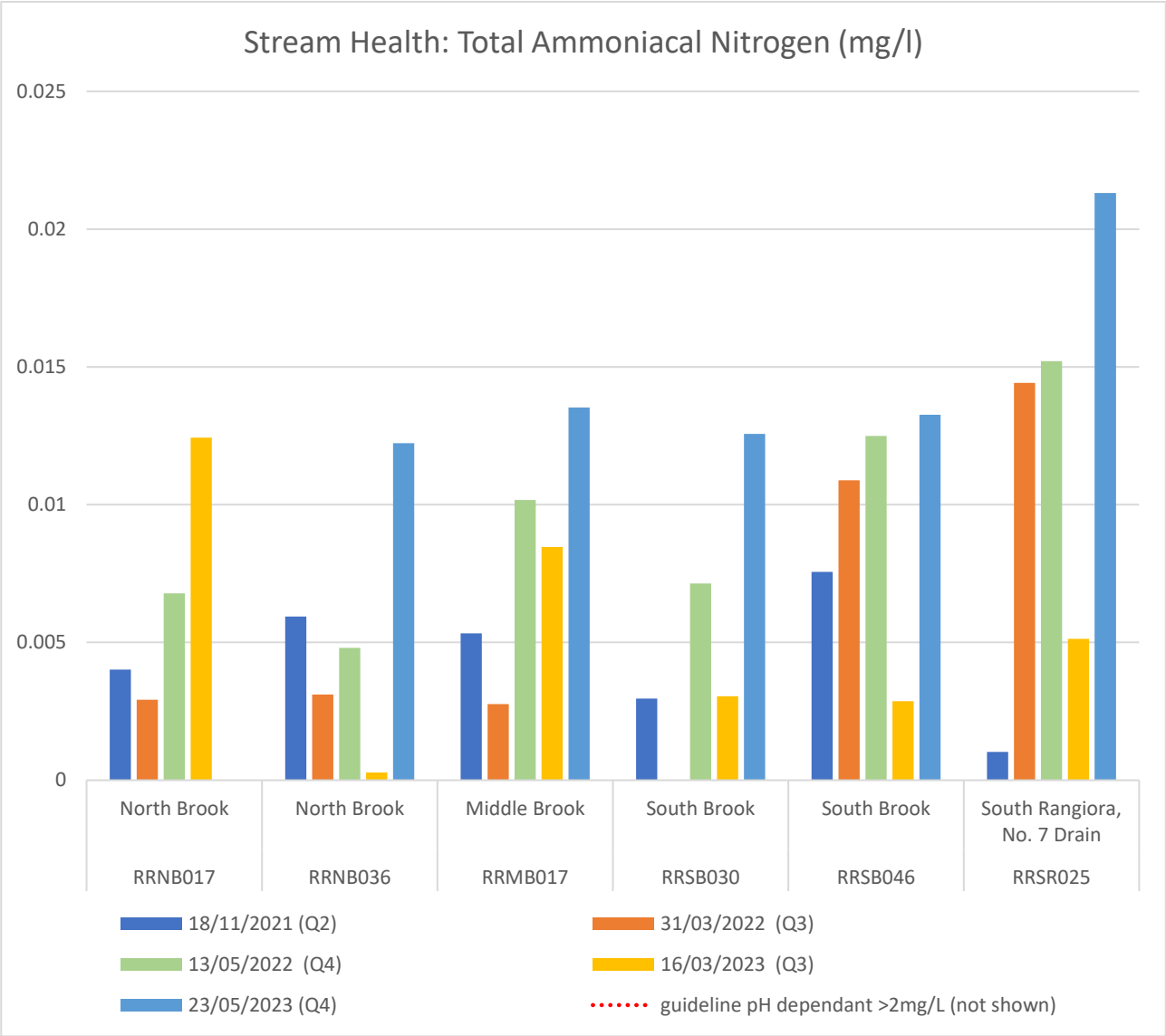

Figure 43. Stream Health Total Ammoniacal Nitrogen sample results for FY 22/23.

5.6.7. Total Suspended Solids

All Stream Health sites were well below the guideline value of 50 g/m^3 (Figure 44). This financial year, the following sites were found to be below the default detection limit of 3 g/m^3:

- RRNB036, North Brook, Lilybrook Park
- RRNB017, North Brook, on the northern side of Boys Road
- RRMB017, Middle Brook, Gefkins Road east of the Railway, upstream side of the bridge
- RRSB046, South Brook, east side of Townsend Road
- RRSB030, South Brook, west side of Railway Road
- RRSR025, No. 7 Drain, immediately south of Fernside Road

The above values are represented as half the detection limit (1.5 mg/L).

Baseline sampling in 2014 did not identify any sites over the guideline value, even during rain events.

Stream Health Sampling showed that TSS is not having an impact on the waterways. No actions are required or recommended. These results are consistent with findings from last financial year FY 22/23.

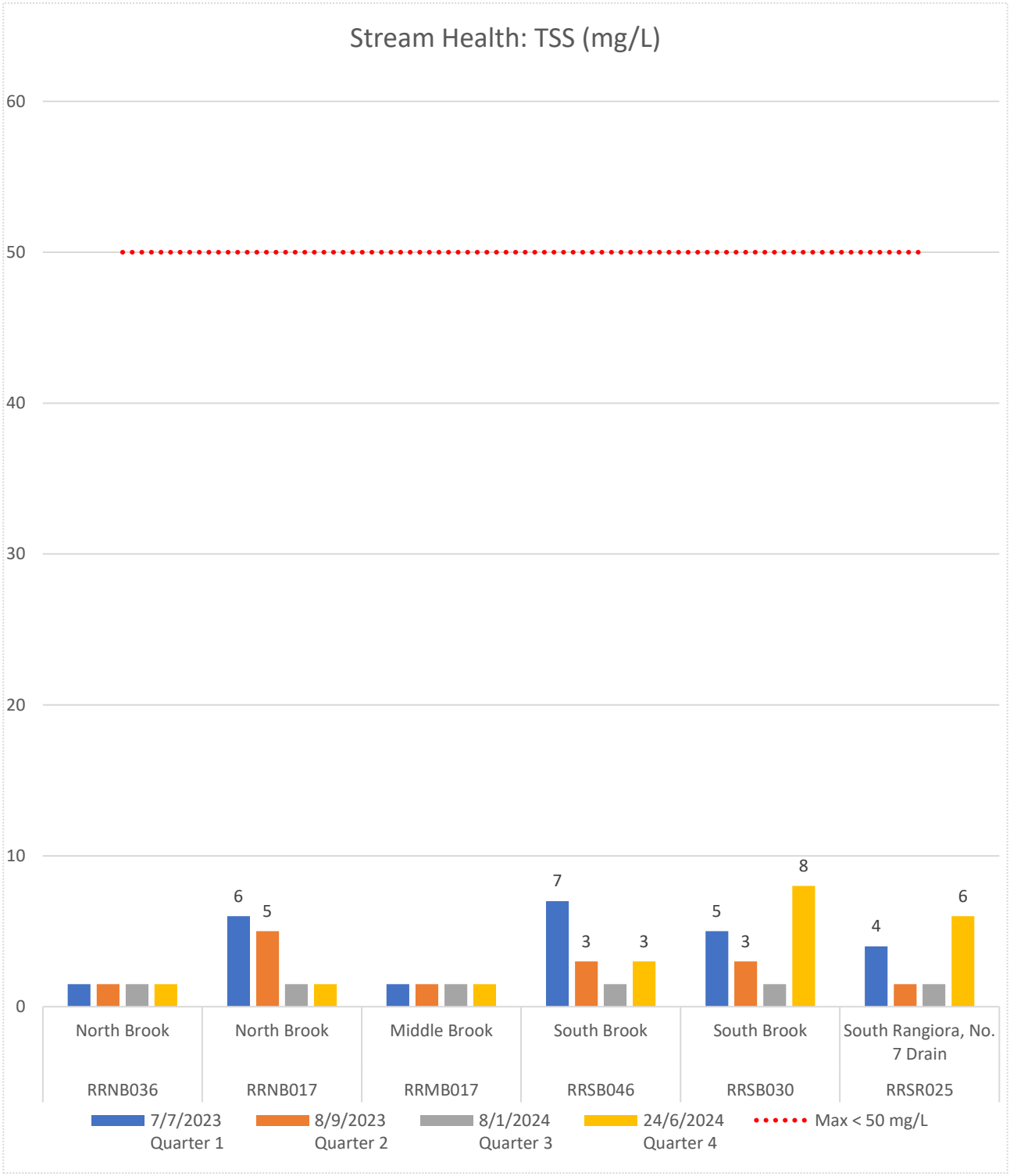

Figure 44. Stream Health - Total Suspended Solids sample results for FY 23/24. Values without numbers were below the detection limit of 3 mg/L and are shown as half the detection limit (1.5 mg/L).

5.6.8. Dissolved Reactive Phosphorus

All sites were below the guideline value for Dissolved Reactive Phosphorus (Figure 45), except one South Brook site (RRSB030, west Railway Road) and No. 7 Drain (RRSR025) during the last quarter, Quarter 4.

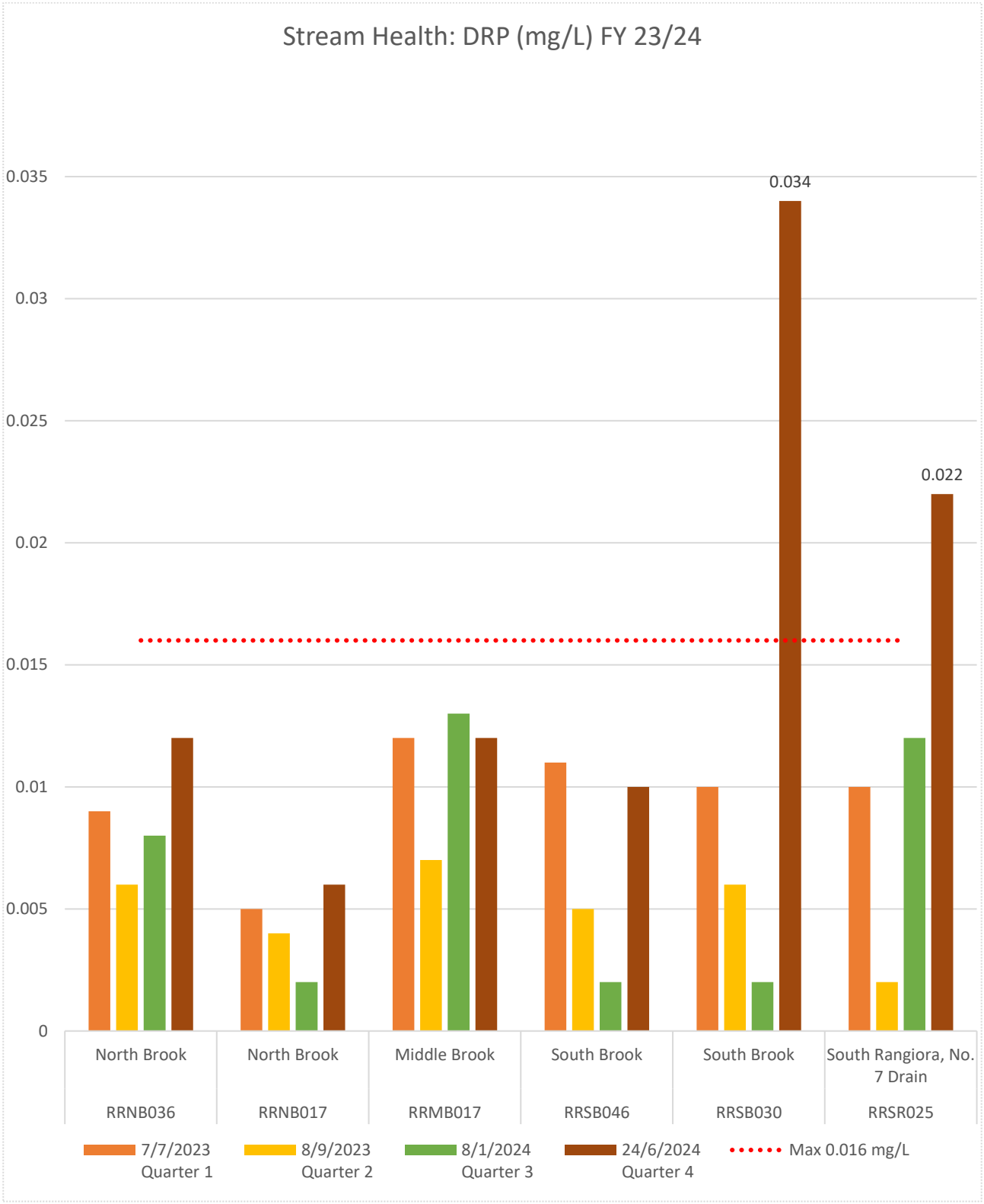

Figure 45. Stream Health - Dissolved Reactive Phosphorus sample results for FY 23/24.

Discussion

- Last financial year FY 22/23 saw all values for DRP below the guideline at all sampling sites. Baseline sampling in 2014 also found all samples to be below the guideline value during dry weather.
- In FY 23/24, DRP guidelines were exceeded during wet weather sampling, including at the sites with DRP detected in dry weather sampling.
- Follow up investigations from possible rural inputs of DRP are recommended between Environment Canterbury and WDC. See Figure 46 for an overview of suggested areas of investigations based on the exceedances encountered.

DRP results for RRSB030 in South Brook, Railway Road site was above the guideline one quarter and require further investigations.

It is noted, DRP levels did not exceed the recommended guidelines further upstream from this site (RRSB046). This links to the source possibly being located somewhere in this particular area. It would be interesting to sample during dry weather at upstream sites RRSB032 (South Brook Road), RRSB035 (Ellis Road) and at a downstream site in the South Brook, below Marsh Road. The upstream sites would test whether the source originates anywhere upstream of the site. It is also noted there are stormwater discharges on the Railway Road site from a pipeline running along railway Road.

Figure 46. Suggested areas in the South Brook to investigate possible sources of DRP (orange). Current site with DRP exceedances is RRSB030, South Brook Railway Road (green and yellow marker).

With regards exceedances for RRSR025, No. 7 Drain in June 2024, this is in alignment with the finding of a wastewater pipe needing repairs at Flaxton Road (works completed August 2024). Further sampling for FY 24/25 after pipe repairs will determine if sources of DRP for FY 23/24 were from wastewater origin or other. If levels of DRP were still high, then these results would be pointing out to other sources such as industrial or rural.

5.6.9. E. coli

E. coli is used as an indicator of possible sewage contamination as *E. coli* is commonly found in human and animal faeces. The guideline value is 550 MPN/100mL.

Results from FY 23/24 are represented in Figure 47.

- Only two sites exceeded the guideline values in two different occasions during dry weather.
- The first site is RRSB030 at Railway Road, which exceeded the guideline value in Quarter 3 (January 2024).
- The second site is RRSR025 at No. 7 Drain, South Rangiora, which exceeded the guideline in Quarter 2 (September 2023).

Actions are recommended to reduce faecal contamination in the Middle Brook. It is noted, an investigation was already undertaken to try and locate any dry weather sources of E. coli this financial year, without any conclusive results.

Results from previous financial year are presented in Figure 48 for comparison.

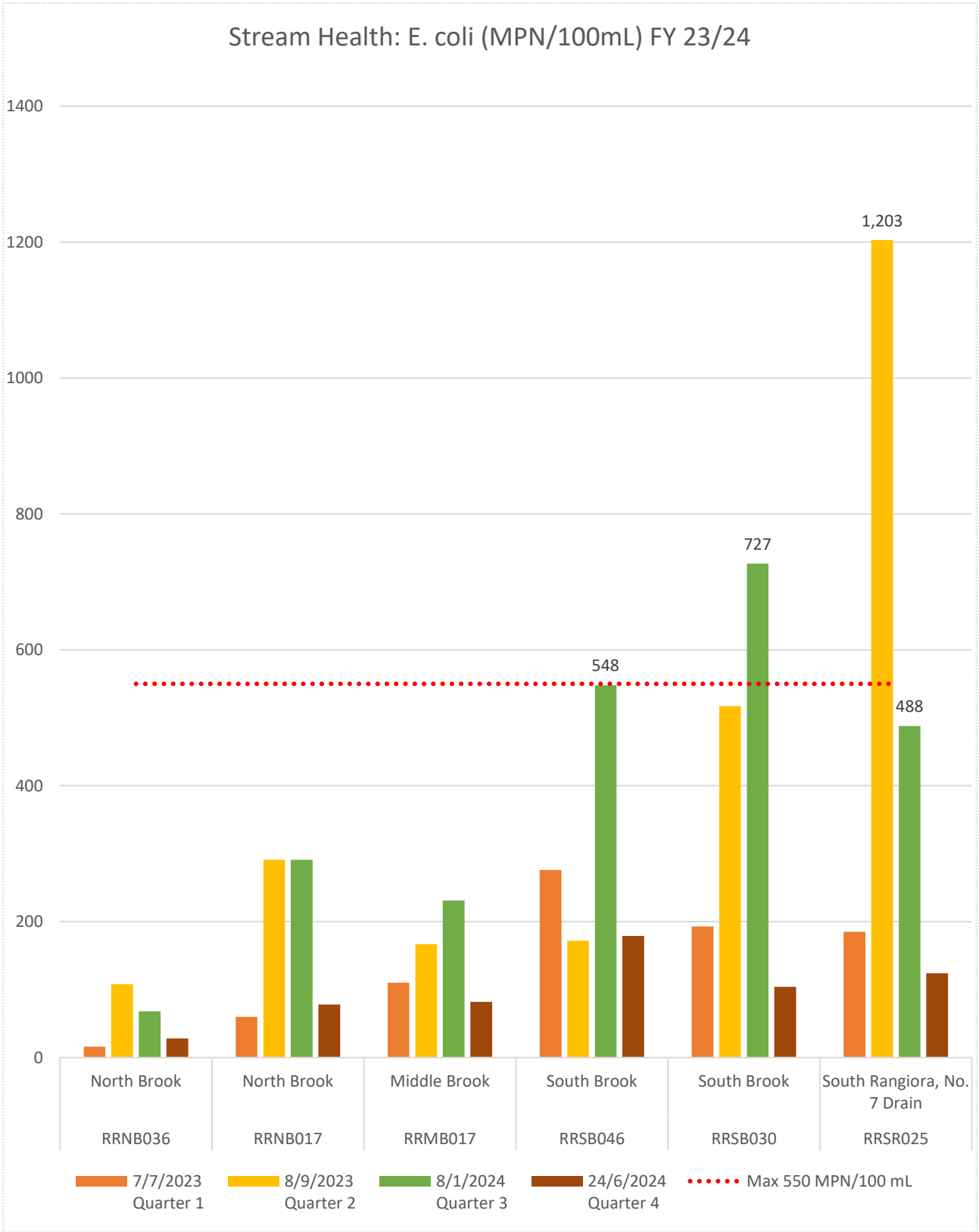

Figure 47. Stream Health - E. coli sample results for FY 23/24.

Discussion

Last year FY22/3, site RRMB017 (Middle Brook, Gefkins Road) was the only site exceeding the guideline values. This was followed up with further water sampling investigations with not conclusive evidence and low levels of E. coli.

This year FY 23/24, the same site meets the guideline value during dry weather sampling. In contrast, E. coli appears to be a problem further downstream, at sites in the Railway Road (RRSB030) and No. 7 Drain (RRSR025), with possible contamination contributions from site RRSB046 (Townsend Road, Quarter 3, January 2024).

The present results indicate that E. coli contamination is a localised problem which most likely occurs from animal contamination, due to its changing location.

Last year, it was noted that occasionally cattle trucks drive over the junction of Fernside Road / Flaxton Road, which is sampling site RRSR025 (No. 7 Drain). If this still occurs, it raises the question of whether cattle trucks lose any effluent on their drive. It is noted how *E. coli* levels were also high for this sampling site in FY 22/23, Quarter 3 (March 2022). It is thought that waterfowl is a much more likely source of *E.coli* contamination in Pond C (RRSS025).

Actions are recommended to follow up on these results with further investigations and faecal source tracking.

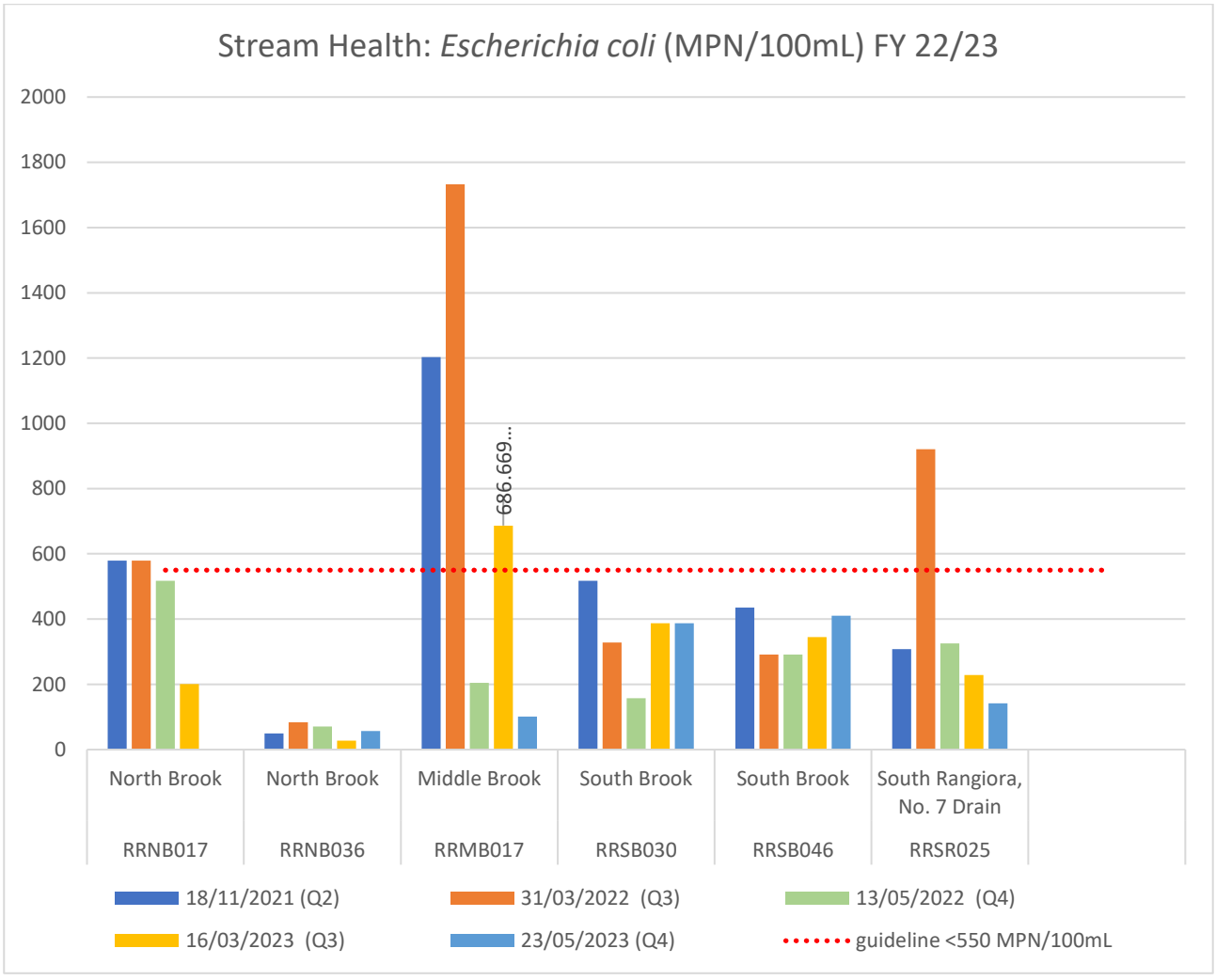

Figure 48. Stream Health - E. coli sample results for FY 22/23 with FY 21/22 for comparison

5.7. Stream sediment depth and cover results

Refer to Appendix 3, as per Boffa Miskell's Ecology report, December 2023.

5.8. Stream Sediment Toxicants

Refer to Appendix 3, as per Boffa Miskell's Ecology report, December 2023.

According to the monitoring programme, this sampling is required every 3 years, until 2025, with years 2021 and 2024 marked as required. Thereafter, sampling is required 5 yearly.

This sampling was undertaken in FY 23/24. Next round of sampling is planned for 2026.

5.9. Spills reported

Refer to the Annual Report 2023-2024, section 9, spills of significance.

6. Discussion

Table 18. Summary of compliance with CRC184601 guideline values in FY 23/24

Contaminant		Notes
Total Suspended Solids	Compliant	All sites were compliant for TSS in FY 23/24, including during stream health sampling (dry weather sampling)
Dissolved copper	Non-compliant	4 sites exceeded the guideline value during wet weather sampling. Previous FY 22/23: 7 sites exceeded the guideline value during wet weather sampling
Dissolved zinc	Non-compliant	7 sites exceeded the guideline value during wet weather sampling. Same number of sites exceeding in FY 22/23.
Dissolved Reactive Phosphorus	Non-compliant	Not met for all sites except Cam River. Actions recommended. Same as previous year.
E. coli	Non-compliant	Not met for all sites except Cam River and a Middle Brook site. Similar to last year FY 22/23. Actions recommended.
Total Ammoniacal Nitrogen	Compliant	
Dissolved oxygen	Guideline met*	* Not used for compliance. All following results are from Stream Health (dry weather sampling).
Temperature	Guideline met	
pH	Guideline met	
Conductivity	Not met	3 sites did not meet the guideline: two at South Brook (RRSB046, RRSB030) and another at No. 7 Drain (RRSR025). In FY 22/23, the guideline was not met at 3 sites (Middle Brook, South Brook, No. 7 Drain)
Dissolved Inorganic Nitrogen	Not met	Guideline value exceeded for 3 sites: two at South Brook, one at No. 7 Drain. Compared to previous year FY 22/23, 6 sites did not meet the guideline (North Brook, Middle Brook, South Brook, No. 7 Drain).
Total Ammoniacal Nitrogen	Guideline met	
Total Suspended Solids	Guideline met	
Dissolved Reactive Phosphorus	Not met	2 sites did not meet the guideline (South Brook, RRSB046 and No. 7 Drain, RRSR025). In FY 22/23, guideline values were met at for all sites.
E. coli	Not met	3 sites exceeded the guideline: two at South Brook (RRSR046 and RRSR030) and No. 7 Drain (RRSR025). Last FY22/23, 3 sites exceeded guideline values of *E. coli* (North Brook, Middle Brook, No. 7 Drain).

6.1. Discussion summary

Dissolved Copper:

- An increasing trend is **possible** in
    - Middle Brook in Bush Street (Kendall S = 15, p = 0.21, likelihood on the slope = 0.90)
- Actions are recommended to mitigate and treat stormwater for dissolved copper in the Middle Brook (see section 5.5.1, and Appendix 2 – H / All Cu Trends)
- It is likely that dissolved copper is decreasing in Pond C discharging to the No. 7 Drain (Kendall S = -35, p=0.09, likelihood = 0.97) (see section 5.2.5, and Appendix 2 – F / Pond C Trend Analysis)

Dissolved Zinc:

- An increasing trend is **possible** in
    - the North Brook, at Lilybrook Park (Kendall S = 21, p = 0.15, likelihood = 0.93)
    - the Middle Brook, western side of Bush Street (Kendall S = 17, p = 0.12, likelihood = 0.92)
    - the North Drain (Kendall S = 15, p = 0.28, likelihood = 0.86).

A decreasing trend was also identified for dissolved zinc in the South Brook, at Railway road (Kendall S = -15, p = 0.28, likelihood = 0.89).

Refer to Appendix 2 – H for full statistical and visual data representation details.

- Priority actions are recommended in the North Brook to treat stormwater for dissolved Zinc and investigations recommended to locate the source of the contaminants.
- Actions are also recommended to treat sources of dissolved Zinc in the North Drain.

DRP:

- Compared to baseline data available, no definite trends were shown for DRP, despite urban impact results showing values higher than 0.016 mg/L at all sites except Cam River (ranging from 0.018 mg/L, the lowest exceeding value, to 0.18 mg/L at the highest).
- No trends were identified for DRP from site-specific trend analysis
- The general trend analysis grouped by catchment came back with the Kendall Statistic value negative for most waterways, some with a strong negative number (Kendall S = -20) and some a bit weaker (Kendall S = -2). This was the case for Middle Brook, North Brook, North Drain, South Brook and South South Brook. A negative Kendall statistic, suggest that from data available from 2014-2024, over time, concentrations of DRP seem to decrease over time.
- However, when analysed for the confidence and likelihood of that possible decreasing direction, there was not enough certainty. The analysis concluded that a decreasing trend over time for DRP is about as likely as not for the Middle Brook, North Brook and South Brook.

- Exceptionally, trend analysis for No. 7 Drain showed a positive Kendall Statistic values, indicating a possible increasing trend of DRP over time. The analysis concluded there was not enough confidence to accept this, and an increasing trend was about as likely as not for DRP in the No. 7 Drain.
- Seasonal Mann Kendall analyses of DRP in the South Brook did not show any certain decreasing trends either.
- Remarkably, the analysis also concluded that an increasing trend of DRP in the Cam River is exceptionally unlikely.
- The lack of confidence in the direction of the trends as above is supported by high p-values ($p > 0.5$ and in some cases closer to 1).
- The fact that DRP levels were high historically makes it hard for the analysis to identify any trends. This points out to DRP being a problem already in the waterways before the approval of this consent.
- Actions to address the potential run off from phosphorus-based fertilizers are not specifically recommended to WDC only, rather the investigations should be in conjunction with Environment Canterbury as this is likely a problem outside of the scope of this consent.

E. coli

- There were no significant trends found for E. coli in Rangiora urban waterways, nor from the site-specific analyses or the general analyses by catchment.
- Similarly to DRP, historically, there have also been high values recorded for E. coli in some waterways during baseline sampling. This is the case for all the urban waterways except the Cam River, which are as follows: the Middle Brook, North Drain, South Brook, No. 7 Drain and South-south Brook.
- Trend analysis results by catchment for the above waterways came back with a lack of definite trends, despite the data set being robust. In fact, all of the Kendall S were negative (except for Cam River), suggesting a decreasing trend of E. coli. However, the confidence of this result was low, due to high p-values ($p>0.5$)
- Seasonal Mann Kendall trend analyses for E. coli in the North Brook didn't show any definite trends either.
- In view of the above, E. coli contamination of the waterways is thought to be already occurring prior to the concession of this consent.
- It is still recommended to follow up on the high exceedances with faecal source tracking investigations, aimed at understanding the nature of this contamination and its possible origin (birds, cattle or sewage)

TSS

- No significant increase or decrease trends were encountered for TSS in any waterways

- TSS values were not exceeding levels above the guideline, therefore actions are not recommended
- On a positive note, a decreasing trend was found as very likely for TSS in No. 7 Drain (Kendall S = -52, p = 0.05).
- This could indicate effective functioning of Pond C as expected, but it could also be dilution. Refer to the discussion on Pond C results below.

Pond C

- Positively, no increasing trends for any contaminants were found in Pond C
- In addition, decreasing trends are likely for dissolved copper concentrations and very likely for TSS
- Based on this, WDC is accomplishing its goal of seeking a decreasing trend for contaminants at Pond C
- On the other hand, there were no definite trends encountered for dissolved zinc, dissolved reactive phosphorus and E. coli
- Note that the data available for this analysis compared data from the stormwater discharge itself from the monitoring programme (RRSR026A), to a downstream point including a mixing zone (RRSR026) for baseline data.
- The above statement would be of concern if the actual contaminant results undertaken from 2021-2024 (at the discharge point) were higher than contaminant results recorded during 2015-2017 (below the discharge point). However, the opposite is occurring (refer to Pond C Trend Analysis graphs, Appendix 2-F). From the way the data is distributed, it is observed that contaminant data from the discharge point is actually lower than historical sampling.
- No actions are recommended for Pond C

Additional notes

It is noted, the following site was already flagged in last year's annual report with problems:

- RRNB055, North Brook, Aspen Street Park.
    - Levels of dissolved Zinc increased significantly over time (even with a weak trend analysis, assuming a linear distribution of the data)
    - Dissolved copper showing a tendency to increase without significant differences
    - DRP showed a tendency to increase over time without significant differences

6.2. Sediment sampling

The sites highlighted in yellow in Table 2, are recommended to be kept for the following years, to allow for comparison of results. The Dudley Park sampling is often dry, so this site is recommended to be dropped from the monitoring programme.

It is noted, being only the second year of sediment sampling, more years of systematic sampling are required to generate a robust data set. The time and sampling size components are important for data to reflect on natural variability while also allowing to discern on the anthropological impacts from data analyses.

It is also recommended to have codes associated with the sampling sites, to allow for easy comparison of results.

A summary of the sampling sites recommended to be kept for this sampling is:

1. North Brook Ward Park
2. North Brook below North Brook Ponds
3. Middle Brook 44 South Belt
4. Middle Brook Gefkins Road
5. South South Brook Below Pond A
6. No. 7 Drain Below Pond C

7. Recommendations

A summary of recommendations based on trends and the discussion above, is offered below in order of priority:

1. Dissolved zinc non-compliances in the North Brook (at Lilybrook Park, RRNB036), in the Middle Brook (at western side of Bush Street, RRMB029) and in the North Drain (at Coldstream Road, RRND012) are to be investigated and addressed as a priority.
2. Dissolved copper: Investigations and future treatment for dissolved copper in the Middle Brook at site on the western side of Bush Street (RRMB029) is undertaken.
3. To address non-compliances of heavy metals (copper and zinc), it is suggested to trial targeted and increased street sweeping of the roadside channel in areas upstream of where elevated levels of dissolved copper and zinc are encountered. This was proposed last year, to reduce the contaminant load of heavy metals in waterways (based on research led by NIWA).
4. DRP: Follow up actions and investigations on high levels of dissolved reactive phosphorus from rural inputs are recommended for referral to Environment Canterbury, as they are outside the scope of the Rangiora stormwater network discharge consent.
5. E. coli: Faecal source tracking investigations are recommended ideally for all waterways, except the Cam River. At a practical level, due to budget limitations and this analysis having a high cost, it is proposed to select the top streams and sites to reveal key information for this analysis (e.g. key sites

in South Brook with dry weather exceedances, then others to follow such as North Brook, Middle Brook, and No. 7 Drain).

6. DIN: collaboration with Environment Canterbury is recommended to address exceedances of dissolved inorganic nitrogen found during stream health sampling, as this is outside the scope of this consent to address. Sources are likely to be from farming land use in rural areas north-west of South Brook by Townsend Road, and South Brook south-west of Johns Road / Lehmans Road.
7. Sediment sampling: for consistency, it is recommended to continue sampling as per the Boffa Miskell 2023 report sampling sites and codes.
8. 3 Waters Compliance Officer to simplify compliance reports for the 24/25 monitoring period, in preparation for simultaneous reporting with stormwater discharge consents for Rangiora, Woodend, Oxford and Kaiapoi.
9. WDC to seek advice to improve data planning and preparation of data analyses for next financial year.
10. Outsourcing some or most of the stormwater field sampling for next financial year is recommended internally to help increase capacity to manage the monitoring for 4 discharge consents and the preparation of the upcoming compliance and monitoring reports for FY 24/25.

8. Acknowledgements

I want to acknowledge all the samplers who have undertaken stormwater sampling from 2014 to the current date: Alicia Klos, Janet Fraser and Sophie Allen. And also, to this year additions, including the water sampling team at Food and Health Standards and the PDU staff members who raised their hand to help sampling as part of the Stormwater Sampling Group.

9. References

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Rangiora Stormwater Network Discharge Consent CRC184601

Annual Report 2023-2024

Prepared by Waimakariri District Council
September 2024

Prepared for: Regional Leader - Compliance Monitoring and *Te Ngāi Tūāhuriri Rūnanga*

Prepared by: _____ Lorena Cardenas 3 Waters Compliance Officer

Reviewed by: _____ Sophie Allen Water Environment Advisor

Approved by: _____ Jason Recker Jason Recker

on behalf of 3 Waters, Waimakariri District Council

Published: September 2024

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Version Number	Prepared By	Comments	Date
1	Lorena Cardenas	First Draft	24/09/2024
2	Sophie Allen & Jason Recker	Review	21/10/2024 29/10/2024
3	Lorena Cardenas	Second draft	5/11/2024
4	Lorena Cardenas	Final draft	21/11/2023

Table of Contents

Abbreviations

AMP	Asset Management Plan
CBD	Central Business District
CCC	Christchurch City Council
DWPZ	Drinking Water Protection Zone
ECan	Environment Canterbury
FY	Financial Year
FY 23/24	Financial Year 1 July 2023 – 30 June 2024
FY 25/25	Financial Year 1 July 2024 – 30 June 2025
NIWA	National Institute of Water and Atmospheric Research
RAMM	WDC's Asset and Work Manager Software
RDMC	Roading, Drainage and Maintenance Contract
SMA	Stormwater Management Area
SNDC	Stormwater Network Discharge Consent
Tech 1	WDC's finance and asset Software
WDC	Waimakariri District Council

Table of Figures and Tables

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 Global Stormwater Network Discharge Consent (SNDC) Annual Report for Rangiora is the second report presented for this SNDC and covers the period from 1 July 2023 to 31 June 2024.

2. Introduction

In line with condition 35 from CRC184601, WDC is required to report on a series of information which also includes the "*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*" (condition 35d).

This information is reported separately on a water quality report, attached as an appendix (Appendix 1) to this report. The highlights of this water quality trend analyses are kept on this report, while the full justification and data analysis is provided separately.

3. Background

The specific contents of this report are defined by conditions 35a to l. Information for compliance with these conditions is presented in the following sections. The structure and headings for this report have been kept as much as possible in order and alignment with the consent conditions. Information on this is presented in order of appearance within condition 35, from section 10 to section 20.

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.

When it comes to sections 12, 13 and 14, these relate to results presented in the Monitoring Programme Report 2023-2024 (referred to as water quality report, or monitoring report) (TRIM 241031189470). This report can be found in Appendix 1. Only a summary of recommendations, results and discussion is offered here. All other specific details on results, trends and discussion are kept in the original report.

In addition to that, a WDC assessment is included at the beginning of each section, stating WDC's own evaluation in terms of compliance with the condition. Categories used to describe this include "compliant (information provided), nothing to report, non-compliance, N/A (non-applicable)".

Here's how all the sections relate to each consent condition. These headings have made clickable (*Ctrol + click*) for easier navigation:

Condition	***Description***	***Section number***	***Compliance***
Condition 14 and 21	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	Yes (information provided)
Condition 15	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)	Yes (information provided)
Condition 16	An update on the water quantity and flood modelling	**7.** Update on Water Quantity and Flood Modelling	Yes (information provided)
Condition 24	Update on the high-risk site assessment and management programme	**8.** Update on the high-risk site assessment and management programme	N/A
Condition 26	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	Yes (information provided)

Condition 35	Provide an Annual Report including:		Yes (provided)
35a, condition 22 and 23	Maintenance works undertaken	**10.** Maintenance works	Yes (information provided, frequencies met)
35b	Monitoring Programme Updates and list of changes made	**11.** Updates to Monitoring Programme	Yes (information provided)
35c	Results of Monitoring in a suitable format to upload to CRC water quality database, including:	**12.** Results **12.2** Data in a suitable format	Yes (information provided)
35c-i	Name of the person who collected samples, date and time samples were collected	**12.2 Data in a suitable format**Data in a suitable format	Yes (information provided)
35c-ii	Rainfall Data associated with Stormwater sampling events, including: date, time, duration, rainfall depth of the storm event	**12.3 Rainfall data for sampling events**	Yes (information provided)
35d	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**	Yes (information provided)
35e	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**	Yes (information provided)
35f	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**	Yes (information provided)
35g	Discussion of Compliance with condition 8 (Receiving Environment Objectives) and condition 14	**14. Discussion of compliance**	Yes (information provided)

	(Stormwater System Management); and results of investigations undertaken in accordance with condition 34 (Actions in response to monitoring), including but not limited to		Some exceedances on contaminants, as reported and discussed.
35g-i	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 Condition 35g** **The consent wording states** the following: a. *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*	Yes (information provided)

		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.* Trigger value exceedances, actions and investigations	
35g-ii	ii. Documentation of service requests indicating any flooding of dwelling houses described in condition 8a	**14.2 Service requests**	Yes (information provided)
35g-iii	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; and	**14.3 Remedial and improvement works**	Yes (information provided)
35g-iv	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**	Yes (information provided)
35g-v	v. a description of any future stormwater system proposals, including retrofitting of existing stormwater systems, to improve the management of stormwater within the	**14.5 Future Stormwater system proposals**	Yes (information provided)

<table>
<tr><td></td><td>Rangiora reticulated stormwater system; and</td><td></td><td></td></tr>
<tr><td>35g-vi</td><td>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 enhancemenet of mahinga kai areas</td><td>14.6 Protecting and enhancing mahinga kai</td><td>Yes (information provided)</td></tr>
<tr><td>35h</td><td>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</td><td>15. Sites investigations</td><td>Yes (information provided)</td></tr>
<tr><td>35i</td><td>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</td><td>16. Site Audits</td><td>Yes (information provided)</td></tr>
<tr><td>35j</td><td>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</td><td>17. Sites Excluded from this consent in the last year</td><td>Yes (information provided)</td></tr>
<tr><td>35k</td><td>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</td><td>5. Previous recommendations – follow up

All recommendations from last year have either been fully implemented Below are the recommendations from 2021-2023 Annual report and follow up actions undertaken:

<table><tr><th>2021-2023 recommendation</th><th>status</th></tr><tr><td>WDC Stormwater Engineer to</td><td>Implemented</td></tr></table></td><td>Yes (information provided)</td></tr>
</table>

		record and keep track of the frequency of inspection and servicing of soakage chambers		
		CORDE and Delta to report for each financial year on their maintenance works, with a clear description of the asset maintained, inspection date and frequency of maintenance.	Implemented and in progress	
		WDC to audit maintenance works, including contracts with Delta, Roading and Greenspace, to identify overlaps, any gaps and streamline maintenance process, costs and reporting.	In progress	
		WDC Stormwater Engineer to audit Delta maintenance contract to check that all basins are included in contract and being maintained as per Schedule 2 frequencies.	In progress	
		3 Waters Compliance Officer to retrieve a snapshoot of the	To be implemented by next financial year	

		maintenance works done in RAMM (sump cleaning) by 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 maintenance works and reporting to a more workable way.	Implemented	
		Have the revised first flush conditions approved by the Regional Manager Compliance at Environmental Canterbury.	Requested changes in the Monitoring Programme – awaiting response from Environment Canterbury	
		Next Annual Report to include all monitoring water quality data and trends in one single report.	Not implemented. Decided to keep it separate due to volume of report with trend analyses.	
		3 Waters Compliance Officer to improve Trend Analyses methodology.	Implemented	

		3 Waters Compliance Officer to audit stormwater data application and system (Lutra), address solutions in collaboration with Lutra, to facilitate a streamlined process for data download for the reporting of next financial year. — Implemented and in progress with Lutra ECan to provide information to WDC on which consents are currently active in Rangiora with CRC, and the latest monitoring that has been undertaken as per their consent, to inform WDC in decision making of high-risk sites. — Implemented and received List of Development sites approved to discharge and summary of sites	
35l	report on breaches of the bylaw over the previous year which WDC is aware of	**18. Summary of Sites discharging** WDC Assessment: Compliant (information provided) For information covering condition 35-k, go to section 5 from this report. Breaches of the Bylaw	Yes (information provided)

4. Recommendations

These recommendations are based on the present report and results from the Monitoring Programme Report (Appendix 1).

Recommendation	Person
1. Dissolved zinc non-compliances in the North Brook (at Lilybrook Park, RRNB036), in the Middle Brook (at western side of Bush Street, RRMB029) and in the North Drain (at Coldstream Road, RRND012) are to be investigated and addressed as a priority.	Water Environment Advisor, 3 Waters Compliance Officer, Waterways Engineer
2. Dissolved copper: Investigations and future treatment for dissolved copper in the Middle Brook at site on the western side of Bush Street (RRMB029) is undertaken.	Water Environment Advisor, Waterways Engineer
3. To address non-compliances of heavy metals (copper and zinc), it is suggested to trial targeted and increased street sweeping of the roadside channel in areas upstream of where elevated levels of dissolved copper and zinc are encountered. This was proposed last year, to reduce the contaminant load of heavy metals in waterways (based on research led by NIWA).	3 Waters Compliance Officer, Roading Team
4. DRP: Follow up actions and investigations on high levels of dissolved reactive phosphorus from rural inputs are recommended for referral to Environment Canterbury, as they are outside the scope of the Rangiora stormwater network discharge consent.	Environment Canterbury, Water Environment Advisor
5. E. coli: Faecal source tracking investigations are recommended ideally for all waterways, except the Cam River. At a practical level, due to budget limitations and this analysis having a high cost, it is proposed to select the top streams and sites to reveal key information for this analysis (e.g. key sites in North Brook, Middle Brook, South Brook and No. 7 Drain).	Environment Canterbury, Water Environment Advisor
6. DIN: collaboration with Environment Canterbury is recommended to address exceedances of dissolved inorganic nitrogen found during stream health sampling, as this is outside the scope of this consent to address. Sources are likely to be from farming land use in rural areas north-west of South Brook by Townsend Road, and South Brook south-west of Johns Road / Lehmans Road.	3 Waters Compliance Officer, Water Environment Advisor

7. Sediment sampling: for consistency, it is recommended to continue sampling as per the Boffa Miskell 2023 report sampling sites and codes.	Environment Canterbury, Water Environment Advisor
8. 3 Waters Compliance Officer to simplify compliance reports for the 24/25 monitoring period, in preparation for simultaneous reporting with stormwater discharge consents for Rangiora, Woodend, Oxford and Kaiapoi.	Water Environment Advisor
9. A new process is recommended to be implemented from a planning and development perspective to report better on any developments or resource consents proposed within an Environment Canterbury DWPZ (already implemented for the 24/25 monitoring period, to be reported on with the next report).	3 Waters Compliance Officer
10. DRP: Follow up actions and investigations on high levels of dissolved reactive phosphorus from rural inputs are recommended for referral to Environment Canterbury, as they are outside the scope of the Rangiora stormwater network discharge consent.	3 Waters Compliance Officer, Planning, Development Team
11. WDC to seek external advice and/or further data analyses training of 3 Waters Compliance Officer with R programming to help inform data and scope of trend analysis for next financial year.	3 Waters Compliance Officer, Water Environment Advisor
12. Outsourcing some or most of the stormwater field sampling for next financial year is highly recommended to help increase capacity of 3 Waters Compliance Officer with the preparation of the upcoming reports for FY 24/25 and managing the monitoring for 4 discharge consents.	Stormwater and Waterways Manager, 3 Waters Manager, 3 Waters Compliance Officer

4.1. Previous recommendations – follow up

All recommendations from last year have either been fully implemented Below are the recommendations from 2021-2023 Annual report and follow up actions undertaken:

2021-2023 recommendation	status
WDC Stormwater Engineer to record and keep track of the frequency of inspection and servicing of soakage chambers	Implemented

CORDE and Delta to report for each financial year on their maintenance works, with a clear description of the asset maintained, inspection date and frequency of maintenance.	Implemented and in progress
WDC to audit maintenance works, including contracts with Delta, Roading and Greenspace, to identify overlaps, any gaps and streamline maintenance process, costs and reporting.	In progress
WDC Stormwater Engineer to audit Delta maintenance contract to check that all basins are included in contract and being maintained as per Schedule 2 frequencies.	In progress
3 Waters Compliance Officer to retrieve a snapshoot of the maintenance works done in RAMM (sump cleaning) by the end of each financial year.	To be implemented by next financial year
3 Waters Compliance Officer to propose an updated Schedule 2 in collaboration with WDC teams and ECan to streamline maintenance works and reporting to a more workable way.	Implemented
Have the revised first flush conditions approved by the Regional Manager Compliance at Environmental Canterbury.	Requested changes in the Monitoring Programme – awaiting response from Environment Canterbury
Next Annual Report to include all monitoring water quality data and trends in one single report.	Not implemented. Decided to keep it separate due to volume of report with trend analyses.
3 Waters Compliance Officer to improve Trend Analyses methodology.	Implemented
3 Waters Compliance Officer to audit stormwater data application and system (Lutra), address solutions in collaboration with Lutra, to facilitate a streamlined process for data download for the reporting of next financial year.	Implemented and in progress with Lutra
ECan to provide information to WDC on which consents are currently active in Rangiora with CRC, and the latest monitoring that has been undertaken as per their consent, to inform WDC in decision making of high-risk sites.	Implemented and received

5. List of Development sites approved to discharge and summary of sites

WDC assessment: Compliant (information provided)

This section covers condition 35-k (construction phase stormwater) and conditions 14 & 21 (operational phase stormwater).

Since 1 July 2023, there have been no new approvals to discharge under the Rangiora Global Stormwater Consents. Over the last financial year, WDC has only had questions and conversations with developers. WDC continues to work on internal processes and systems to better manage enquiries and approvals.

The only consent approved for stormwater discharge under the global SNDC remains as reported on the previous Annual Report. Please refer to CRC184601 Stormwater GNDC Rangiora Annual Report 2021 -2023 (TRIM 240325047404, Table 1).

The above information provides answer to the consent requirement 35k, and the additional information requested under Condition 14 and 21. See further consent conditions below.

5.1. Conditions Covered

From consent 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**)."*

The above refers to "**Operational phase stormwater**" (clarification sought from ECan, January 2024).

In addition to the above, **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 later refers to "**Construction Phase Stormwater**".

5.2. Comments and WDC's process for approvals under the SNDC

The number of Stormwater approvals (n=0) don't match the number of stormwater assets vested to WDC (see section *14.4 New Stormwater systems* vested). The reason for this is:

- 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 test their stormwater systems for 2 years, after which time, if there are no issues, the system is vested with council.

- Additionally, the vesting of Stormwater systems after the 2-year maintenance period, does not translate in direct approval to discharge under the global SNDC directly.

- WDC is implementing a process and system, where an ECan compliance report is sought, while the developers hold the consent for their operational phase stormwater discharges. Before WDC approves the discharge of a new development under the global consent, an ECan compliance report is requested from developers. If the report confirms no compliance issues, WDC inspections are satisfactory, and all requirements are met, WDC will issue a written approval letter authorising the discharge under the global consent.

- Only developments with a written letter of approval are allowed to discharge under the global SNDC.

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

WDC assessment: Compliant (all new developments meet condition 15-i)

6.1. Context

Under Condition 15, WDC is required to not approve any stormwater discharges for any developments that fall within an ECan Drinking Water Protection Zone (DWPZ), unless 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. Drinking Water Zones in Rangiora

The Drinking Water Safety Plan Rangiora 2023 (TRIM 230901135436) states the following:

- The Rangiora drinking-water supply bores are located in Kaiapoi which is located 7 km to the southeast of Rangiora.
- The drinking-water supply comprises five groundwater bores, commonly referred to as the 'Smith Street Wells', and a water treatment plant, as shown on Figure 2.2. The Rangiora drinking-water supply includes six additional back-up groundwater bores located within the Rangiora urban limits.

In conclusion, the Ayers Street and Dudley Park wells are primarily used as an emergency backup. All drinking water from the reticulated network in Rangiora is sourced from the Kaiapoi bores.

Additionally, all stormwater discharges in Rangiora urban area are connected to WDC stormwater network, and therefore those stormwater discharges won't pose a risk for the DWPZ. Any risks were assessed in August 2023 with the Drinking Water Safety Plan, Rangiora.

Figure 1. Rangiora Ayers Street Wells and Headworks (Source: Rangiora Drinking Water Safety Plan 2023)

Figure 2. Dudley Park Well. (Source: Rangiora Drinking Water Safety Plan 2023)

6.3. Methodology

WDC has undertaken a search using the DWPZ layer available from Environment Canterbury, against a list of Resource Consents Applications approved over the 23/24 financial year. 339 Resource Consents were reviewed in Rangiora for this reporting period. From those, 12 were identified as falling within a DWPZ. The identified developments are presented in Table 1.

All decision letters for each Resource Consent were checked to have the following requirements as conditions:

- Water Supply (connection available): applicants to apply for WDC approval to connect to the Council's existing water reticulation supply.
- Stormwater: applicant to install and provide a Stormwater connection to the Council's reticulated stormwater system.

Where there was no clarity on a development meeting the requirements, a high-level desktop assessment was conducted. This involved consulting with planners, engineers and water safety specialist for advice.

The results are summarised in the following section.

6.4. Results and information

Consent Code	Address	Applicant	Description	Status	Date approved	Approved under condition 15
RC235117	79 River Road	Cambridge Blue Developments Limited		IN PROGRESS (not approved yet)	N/A	N/A
RC235098	264 Kingsbury Avenue	Sarbaz Estates Limited	Two lot subdivision (1 additional lot)	Decision issued	23/11/2023	i (consent holder has made a reticulated water supply available to the property prior to discharge commencing)
RC235099	264 Kingsbury Avenue	Sarbaz Estates Limited	To construct and maintain a dwelling on undersized lots created from a subdivision of rc235098	Decision issued	23/11/2023	i (consent holder has made a reticulated water supply available to the property prior to discharge commencing)
RC235114	113 West Belt, Rangiora	Josephus Hubertus Maria Sopers	Construct a new garage	Decision issued	05/07/2023	i (consent holder has made a reticulated water supply available to the property prior to discharge commencing)
RC235123	61 Church Street, Rangiora	Kainga Ora - Homes And Communities	7 lots residential subdivision (4 additional lots created) created from a consented CRD under RC225212	Decision issued	26/09/2023	i (consent holder has made a reticulated water supply available to the property prior to discharge commencing)
RC235124	5 Lindon Street, Rangiora	Kainga Ora - Homes And Communities	5 lot residential subdivision (3 additional lots created) created from a consented crd under rc225133	Decision issued	11/09/2023	i (consent holder has made a reticulated water supply available to the property prior to discharge commencing)
RC235136	10 Oxford Road, Rangiora	Brian Charles Elias, Tessa Maria Elias	Two Lot Residential 2 Subdivision (1 Additional Lot Created)	Decision issued	17/07/2023	i (consent holder has made a reticulated water supply available to the property prior to

						discharge commencing)
RC235137	10 Oxford Road, Rangiora	Brian Charles Elias, Tessa Maria Elias	Land use consent to erect and maintain dwellings on undersized lots and an internal recession plane breach created from a subdivision of RC235136	Decision issued	17/07/2023	i (consent holder has made a reticulated water supply available to the property prior to discharge commencing)
RC235162	46 Enverton Drive, Rangiora	David Frederick Allaway, Estelle Gail Allaway	To construct a double storey dwelling which breaches the minimum 20% glazing requirements under mdrs of variation 1 of the act	Decision issued	25/07/2023	i (consent holder has made a reticulated water supply available to the property prior to discharge commencing)
RC235306	161 Ashley Street, Rangiora	Hakatere Investments Limited	Section 127 to vary a number of landuse conditions of RC215421 relating to design changes, acoustic fencing, accessible/staff visitor car parking, vehicle crossing & landscaping	Decision issued	15/03/2024	i (consent holder has made a reticulated water supply available to the property prior to discharge commencing)
RC245029	83 Ayers Street, Rangiora	Chesthor Limited	Two lot residential 2 subdivision (1 additional lot)	Decision issued	18/04/2024	i (consent holder has made a reticulated water supply available to the property prior to discharge commencing)
RC245064	2 A Rata Street, Rangiora	Kainga Ora - Homes And Communities	To subdivide a residential lot into four fee simple lots, containing existing dwellings from rc195360	Decision issued	14/06/2024	i (consent holder has made a reticulated water supply available to the property prior to discharge commencing)

Rc245071	276 King Street, Rangiora	Brian George Beaven, Wendy Ann Beaven	Subdivision into 6 allotments in relation to an approved comprehensive development	Decision issued	03/05/2024	i (consent holder has made a reticulated water supply available to the property prior to discharge commencing)

Table 1. List of all developments identified between 2023-2024 that fall within a Drinking Water Protection Zone (DWPZ) in Rangiora

6.5. Assessment

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 are within a DWPZ are required to connect to WDC existing water reticulation network as required by Condition 15.

6.6. Improvements

For FY 24/25, WDC teams are actively refining processes from a planning and development standpoint to improve reporting on developments and resource consents proposed within ECan's DWPZ.

7. Update on Water Quantity and Flood Modelling

WDC assessment: Compliant (information provided)

This update remains as per last financial year, with the exception that this financial year, WDC ran a full range of scenarios and assessed the results.

There have been no major updates to our existing flood model for financial year 2023-2024. However, a full system performance analysis was conducted using the model in 2024, which had not been carried out since 2014.

WDC ran 1:5 and 1:50 year rainfall events of different durations. Events with the highest flooding impact were looked at on detail. These were used to do a system performance analysis of the stormwater system, investigating where flooding is occurring for each event. The results are found in TRIM 240508073139.

There have been small updates undertaken in the model to account for new subdivision areas constructed between 2023 and 2024. This includes updates to the catchments and the network plus the inclusion of any associated Stormwater Management Areas (SMAs). Other than that, 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 some high-level calibration undertaken a few years ago. The 2D infiltration parameters were derived from a piece of work undertaken by DHI Ltd using available soil parameters from ECan.

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

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

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

Work has commenced and will be fully implemented by 1 January 2025.

For FY 23/24, there has been no update to what was already established in our consent conditions. This condition does not apply until 1 January 2025.

WDC is preparing to undertake a full assessment of high-risk sites inside the Rangiora Urban limits which would fall under the scope of the SNDC as of 1 January 2025.

In preparation for this, we have gathered the tools and information required, including access from GIS team and Environment Canterbury to a live map of HAIL Sites in Waimakariri District, and a full list of all discharge consents currently active in Rangiora Urban limits held by Environment Canterbury, with compliance gradings. Additionally, there is a signed MOU between WDC and ECan with a process for the exclusion of LLUR HAIL sites.

A preliminary assessment and list of high-risk sites for potential exclusion is currently underway by the 3 Waters Compliance Officer. ECan will be provided this exclusion list once the assessment has been completed.

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)

For FY 23/24, Rangiora registered 3 spills.

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*.

For 2023-2024, 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 table 2, 3 and 4 for a list of all spill events responded to between 2023-2024 that meet reporting requirements of CRC184601 section 3.2.

9.2. Updates

WDC have established a coordinated spill response system across all WDC teams. When a spill is reported internally, all teams are aware of the appropriate contacts within Drainage and/or 3 Waters to ensure a prompt response to any incident that could affect the stormwater network.

A review of the current spill response process from Customer Services was undertaken over FY 23/24 and completed in August 2024.

Over the last financial year WDC 3 Waters teams have also engaged with the Land Development Team and the Building Unit to address sediment discharges from developments (greenfield) and building sites. 3 Waters continues to be in conversations with the Building Unit to incorporate a good process.

Currently, WDC is preparing a trial for building inspectors to use the Snap/Send/Solve app to report on any ESC incidents. This process has already been set up from a Customer Service perspective. The next implementation step is to run a request through the Building Unit (currently in preparation).

Date of spill (DD/MM/YY)	**12/12/2023**
WDC Service Request number (or ECan pollution incidence response number if applicable)	TRIM 231220204945
Adherence to spill response timeframes set out in the monitoring programme section 3.2.1	Yes
The estimated time (and duration) of spill	2:07pm
Location of spill (GPS and/or address)	Torlesse Street
Estimated volume of the spill	15-20L
The cause of the spill	Dual spill. 1) A burst fuel pipe on a B&H Works Ltd Truck (CHE363) caused part of the diesel spill. This was detected at Torlesse Street. The vehicle drove through Rangiora coming off SH1, down Lineside Rd, across Ashley Bridge, into Fawcetts Rd, then up Marshmans Rd and into Douds Rd, Sefton. 2) Another car was identified spilling fuel at Torlesse St towards Southbrook Rd 15 min after the truck. Diesel spill was not consistent, barely noticeable on sections.
The type of hazardous substance(s) spilled;	Diesel fuel
Clean up procedures undertaken;	Field inspections by 3 WDC teams: Roading, Environmental Services Unit and 3 waters. Roading team deployed contractors (CORDE), applying sand over affected areas.
Details of the steps taken to control and remediate the effects of the spill on the receiving environment;	1. Identify the sources of contaminants and contacted truck driver 2. Deployment of sand/grit on the roads to contain the spill 3. Field inspections of the areas where the vehicles drove pass 4. Inspection of stormwater sumps and road by 3 waters team (SA, LC) to assess whether spill was affecting waterways. found the impact was minor due to diesel evaporating and drying out. 5. Recommended absorption measures in 3 sumps, to prevent diesel getting into stormwater network/waterways
An assessment of any potential effects of the spill;	minor
Measures to be undertaken to prevent a recurrence.	1. Absorb at sumps as a prevention 2. Get clarity on contract with CORDE and spill response, to have clear measures in place for protection
Reported by	Lorena Cardenas

Table 2. Part 1. List of spill events WDC responded to from 2023-2024 that meet CRC184601 requirement for reporting.

Date of spill (DD/MM/YY)	**21/02/2024**
WDC Service Request number (or ECan pollution incidence response number if applicable)	NA
Adherence to spill response timeframes set out in the monitoring programme section 3.2.1	Yes
The estimated time (and duration) of spill	1 day, then dry but still flowing. Water works stopped.
Location of spill (GPS and/or address)	10 Queen Street, Rangiora old bunnings site
Estimated volume of the spill	10L
The cause of the spill	Contractors on site were water blasting the building. There is sediment build up at the entrance, accumulating in the road channel, and flowing onto the sump. There was a dry track of sediment on the roadside channel, which was also still wet by the sump. The sediment reached the sump.
The type of hazardous substance(s) spilled;	Dirt from an old building, possible sediment from digging holes in the ground.
Clean up procedures undertaken;	Called project Manager Fitz Consulting (Paul 021 270 2309). Advised to get contractors to clean it up. Sweep the sediment, the roadside channel, and suck up the sump.
Details of the steps taken to control and remediate the effects of the spill on the receiving environment;	Called project manager, asked questions and explained the situation. Recommended CORDE or similar contractor. Called CORDE. Shared phone numbers.
An assessment of any potential effects of the spill;	It has reached the sump. Followed up with Site Manager, reiterated over the week that roadside channel needed cleaning, sump needed emptying out, dirt on site needed to be cleaned and contained with ESC before weekend rain.
Measures to be undertaken to prevent a recurrence.	Follow up with site manager several times, site and sump checked several times. “Suck it up contractors” engaged by site manager to do the work.
Reported by	Pat Towse, Lorena Cardenas

Table 3. Part 2. List of spill events WDC responded to from 2023-2024 that meet CRC184601 requirement for reporting.

Date of spill (DD/MM/YY)	**10/05/2024**
WDC Service Request number (or ECan pollution incidence response number if applicable)	
Adherence to spill response timeframes set out in the monitoring programme section 3.2.1	Yes
The estimated time (and duration) of spill	5 min, at 4:45pm
Location of spill (GPS and/or address)	151 Percival Street, Rangiora
Estimated volume of the spill	5L
The cause of the spill	Deck primer 10L can lifted from vehicle, fell on the road, and spilled
The type of hazardous substance(s) spilled;	water based deck primer
Clean up procedures undertaken;	add sand to soak it up, add protection socks to sumps to prevent any spills inside sump
Details of the steps taken to control and remediate the effects of the spill on the receiving environment;	It happened in front of WDC staff. Spill reported to Roading team immediately, CORDE engaged, sand added to soak it up and clean it up, sumps protected with socks
An assessment of any potential effects of the spill;	it hasn't reached the sump. No rainfall after spill
Measures to be undertaken to prevent a recurrence.	sweep up the sand/grit
Reported by	Shaun Fauth

Table 4. Part 3. List of spill events WDC responded to from 2023-2024 that meet CRC184601 requirement for reporting.

10. Maintenance works

WDC Assessment: Compliant (information provided & frequencies met)

This section covers condition 35-a.

From this condition, WDC is required to report on maintenance works undertaken, in accordance with best practices (condition 23) and in accordance with WDC Stormwater Maintenance Schedule, reference to as CRC184601 – Schedule 2 (condition 21).

Schedule 2 details outlined in the table below.

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

Table 5. Current Schedule 2 as attached to CRC184601.

It was raised on the previous Annual Report that the current Schedule 2 does not provide for ease of reporting in alignment with WDC current Maintenance Contracts for Drain Channels, Stormwater Management Areas, sumps and road sweeping.

As a result, a new Schedule 2 has been developed in collaboration with WDC teams. This new proposed Schedule 2 has been submitted and adopted for the SNDC in Kaiapoi, Woodend and Oxford. The New proposed Schedule is presented in the following section.

For reporting on the SNDC in Rangiora, we will adopt the newly proposed schedule to streamline WDC's reporting processes in line with the conditions applied to the other three towns. We acknowledge that this differs from the schedule outlined in the current Rangiora consent conditions. To address this, WDC will apply for a consent variation within one year to update the stormwater maintenance Schedule 2 under CRC184601, ensuring consistent schedules and reporting approaches across all towns.

10.1. New Proposed Maintenance Schedule 2

Task		sumps			Infiltration basins, swales and dry basins
		Critical [1] sumps	**Non-critical sumps**	**To soakage chambers [2]**	
Removal of debris and litter likely to adversely affect the operation of the system		Annually	Annually	Annually	6 monthly
Removal of sediment likely to adversely affect the operation of the system		Annually	Annually	Annually	Annually
Assess and remove hydrocarbons where present if over a total area of greater than 0.5 m^2 (swales and basins) or a layer greater than 5mm thick (sumps)		Annually	Annually	Annually	6 monthly
Vegetation control (weed control and grass mowing)		-	-	-	Annually
Sweeping [3] of roadside channels	CBD	weekly			-
	Adjacent CBD	3 weekly			-
	All others	6 weekly			-

Assets maintained by		CORDE [sumps & sweeping]	Delta [infiltrations basins, swales and dry basins]

Table 6. Proposed Maintenance Schedule 2 for Rangiora, to be submitted with a variation of consent within the next year. This format is already submitted as part of all other SNDC in Oxford, Woodend and Kaiapoi. This format is also used for reporting on the present report.

Notes from Table 6:

1. Critical sumps are additionally inspected before big rain events. Non-critical sumps are inspected and serviced on an annual basis. This means a critical sump could be checked more often than annually, depending on weather events.
2. All sump chambers are inspected and cleaned on an annual frequency, to ensure they function as designed at all times.
3. The sweeping frequencies added are the current frequencies set up in roading and drainage maintenance contract (CON 19/43)

10.2. Maintenance Contracts and Items of Maintenance

WDC contracts CORDE and Delta to undertake various maintenance works in the Rangiora stormwater network. These contractors are managed by different units within our Utilities and Roading team, resulting in different reporting methods to WDC.

The Roading and Drainage Maintenance contract, with services provided by CORDE Ltd, covers the annual sump cleaning and street sweeping. This also includes maintaining the sumps discharging to soakage chambers.

Last year, this was initially understood as the servicing of the soakage chambers themselves. However, after further discussion and review of the consent conditions within WDC teams, it is now clearer that this interpretation was incorrect. A more accurate understanding is that the maintenance refers to the sumps discharging into the soakage chambers. These sumps are already covered under the regular sump cleaning services provided by Corde through the Roading and Drainage maintenance contract.
The Delta Maintenance contract covers the maintenance of drain channels, infiltration basins, swales and dry basins, including vegetation control of those assets.

Additionally, a contract with Delta, managed by the WDC Greenspace team, looks after the maintenance of wetlands and wet ponds. There is also Hydrovac and other contractors, who provide work on an as-needed basis for inspection and clean-up of soakage chambers, and the removal of sediment from SMAs.

10.2.1. Items of Maintenance

For last year's report WDC reported maintenance works for 48 drain channels in Rangiora. It is noted, this item is not a requirement of consent conditions and therefore the maintenance of drain channels is not included in the present report. The maintenance of the drain channels in Rangiora continues to be undertaken as business as usual (before, during and after a storm).

The total of items reported in this report are:

- SMA, total 20
- Sumps, total 1937
- Sweeping, in Rangiora township

10.3. Delta: Maintenance of Stormwater Management Areas (SMA)

WDC Assessment: Compliant (all maintenance frequencies met as higher than consent requirements)

All 20 SMA's were visited and maintained at a frequency higher than 6-monthly during the 2023/24 financial year.

Refer to Table 7 for a summary of maintenance works for SMA's undertaken by Delta. This information is reported on in alignment with the new proposed Schedule 2 from Table 6. The full details for each individual visit to the SMA, and the month of the year that it was undertaken, can be found on Appendix 6.

In general, stormwater grills (drains) and SMA's are checked regularly for debris and litter, including before, during and after storm events. These are checked monthly and maintained as required. See Appendix 6 for details on when SMAs were visited and maintained.

Additionally, a full list and Map of Stormwater Management Areas, and their locations is provided in Figure 3.

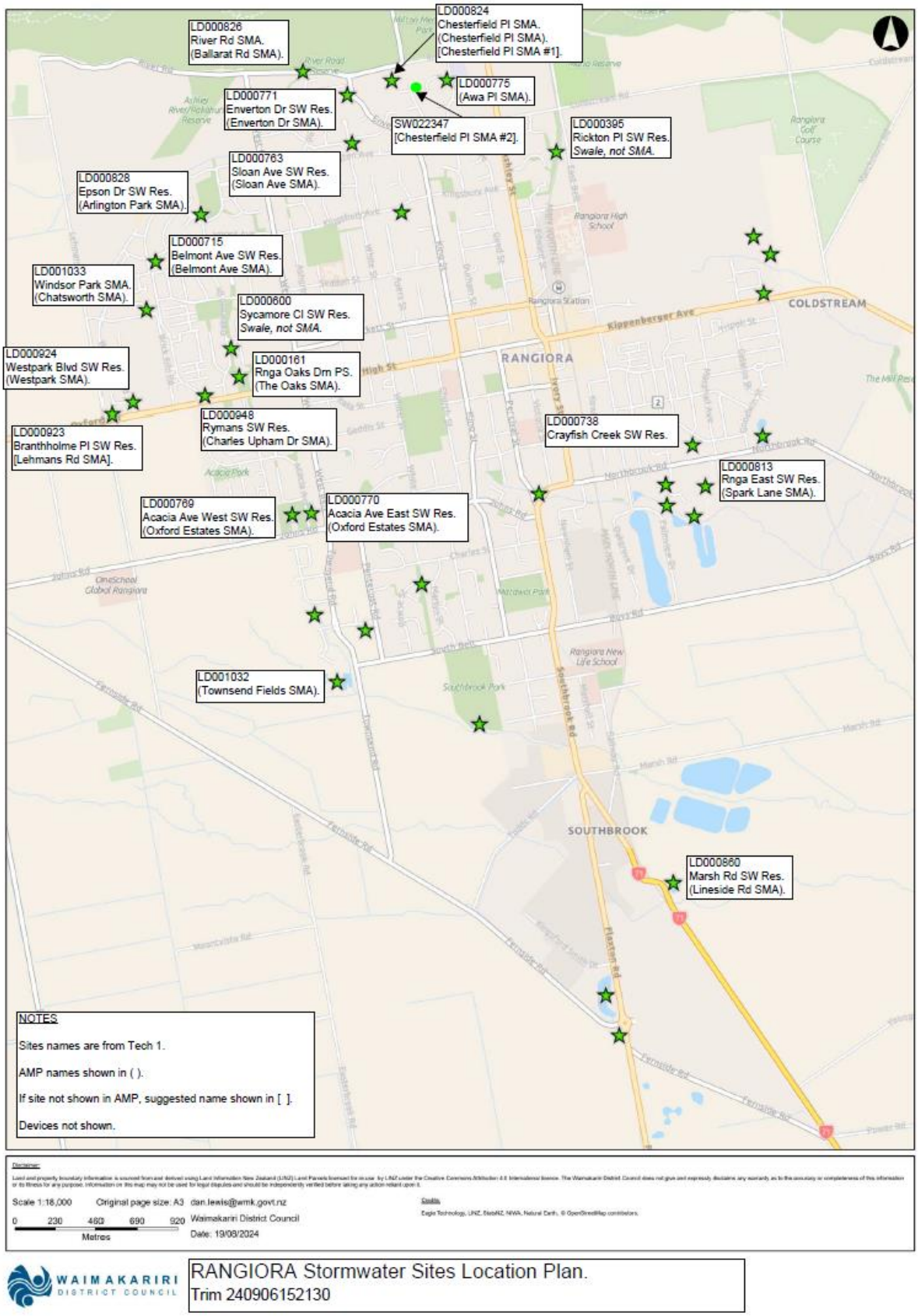

Figure 3. Location of Stormwater Management Areas in Rangiora. Note: Crayfish Creek SW reserve involves riparian maintenance, weeding and mowing. There are no stormwater systems or discharges into Crayfish Creek.

Reporting of infiltration basins, swales and dry basins in Rangiora				
Site	**Removal of debris and litter likely to adversely affect the operation of the system.** (6 monthly)	**Removal of sediment likely to adversely affect the operation of the system.** (Annually)	**Assess and remove hydrocarbons where present if over a total area of greater than 0.5 m² (swales and basins) or a layer greater than 5mm thick (sumps).** (6 monthly)	**Vegetation control (weed control and grass mowing)** (Annually)
LD000826 Ballarat Road SMA	Sites inspected monthly. Litter and debris removed as required monthly.	No sediment requiring removal during this reporting period.	No hydrocarbons observed requiring removal during this reporting period.	Vegetation controlled multiple times during this reporting period.
LD000824 Chesterfield Place SMA #1				
LD000824 Chesterfield Place SMA #2				
LD000775 Awa Place SMA				
LD000771 Enverton Drive SMA				
LD000763 Sloan Avenue SMA				
LD000828 Arlington Park SMA				
LD000715 Belmont Avenue SMA				
LD001033 Chatsworth SMA				
LD000948 Charles Upham Dr SMA				
LD000924 Westpark SMA				
LD000923 Lehmans Road SMA				
LD000161 The Oaks SMA				
LD000738 Crayfish Creek SW Res				
LD000769 Oxford Estates SMA				
LD000770 Oxford Estates SMA				
LD000860 Lineside Road SMA				
LD000395 Rickton Place SW Reserve				
LD000813 Spark Lane SMA				
LD001032 Townsend Fields SMA				
LD000600 Sycamore Close SW Reserve				

Table 7. Summary of Maintenance works undertaken for infiltration basins and dry basins in Rangiora for FY 23/24. All maintenance frequencies were higher than the frequencies required from the consents conditions as per Schedule 2 and new proposed Schedule 2.

Additional notes from Table 7:

- Sediment: all areas are inspected regularly at a frequency higher than annually by WDC Stormwater Engineer. There have been no instances were accumulated sediment at basins has required removal to allow for the proper operation of the system.
- Hydrocarbons: WDC has not recorded any events with hydrocarbons in infiltrations or dry basins. However, if they were any, these would be reported on, checked and removed as per best practices, as per the CORDE Roading contract.

10.4. CORDE: Sump Cleaning and Road Sweeping - CON19/43

WDC Assessment: Compliant (all frequencies met)

CORDE look after road reserves, with the specification in detailed in CORDE Contract CON19/43 (Road and Drainage Maintenance Contract). Part of this contract with CORDE includes maintenance of stormwater structures and channels, detritus removal, street cleaning, litter control, vegetation control, land drainage, public drains and waterways.

As per Table 6, 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; and
    - hydrocarbons
- **Street Sweeping**

A key sump (or critical sump) is a sump that requires regular maintenance due to getting blocked more frequently, increased traffic flow, or increased flooding. A non-critical sump is a sump that does not require extra attention.

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

- Annually, for key sumps and non-key sumps. These are set up as annually in the new proposed Schedule 2.

Based on the above, our contract frequencies 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
- Adjacent to CBD – 3 weeks
- All other areas in Rangiora – 6 weeks

The above items have been added to the Proposed Schedule 2 and are reported on accordingly.

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. Sump Cleaning 2023-2024

There is a total of 1,937 sumps in Rangiora. The inspections and clean-up of these sumps are managed using RAMM by the WDC Roading Team and maintained by CORDE, who also has access to this platform. This provides the Roading Team on the status of the sump cleaning programme in real-time. See Figure 4.

Our contract frequency requirement for sump cleaning with CORDE, is aligned with the requirement outlined in Schedule 2 of CRC184601. This has been achieved for FY 23/24.

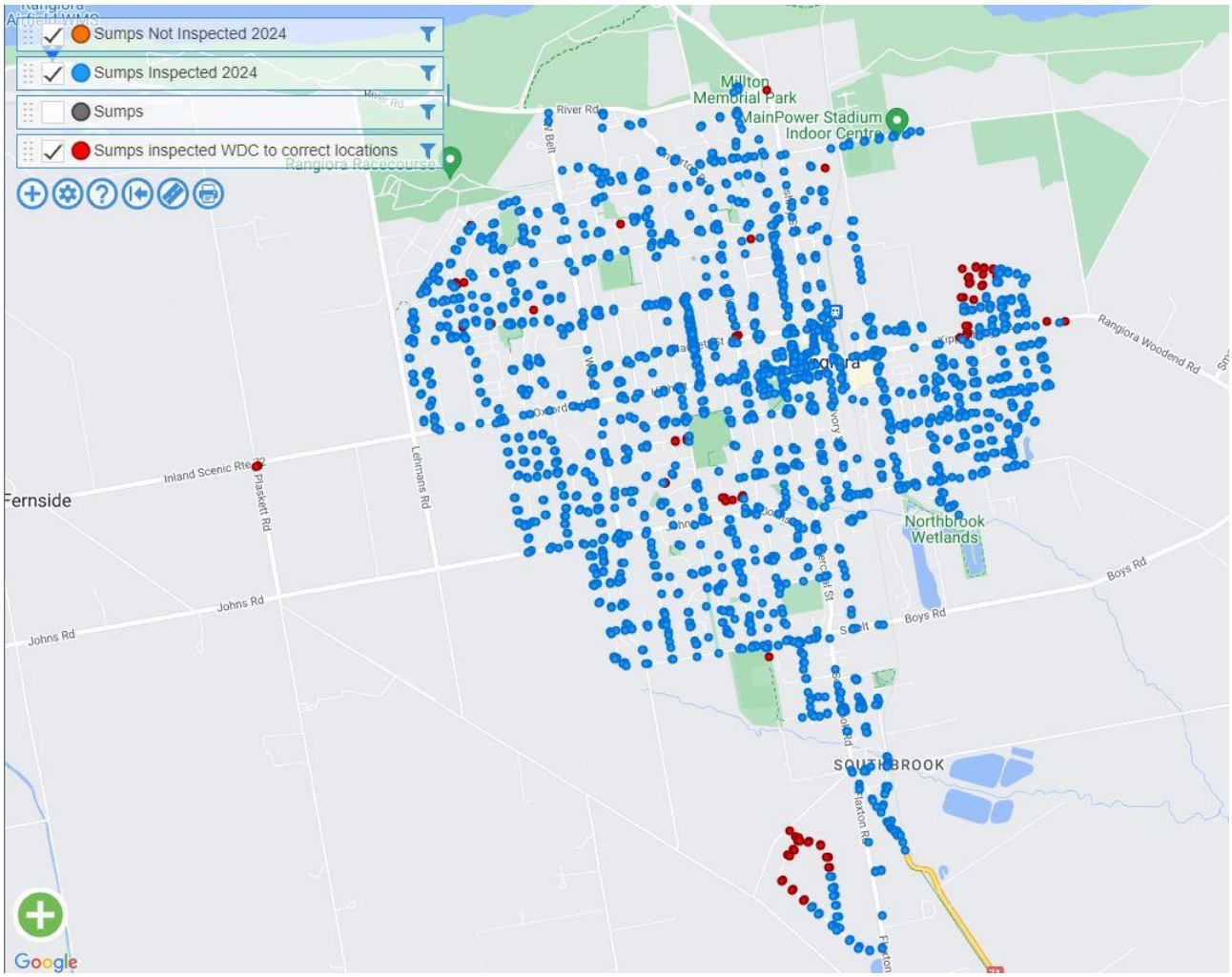

Figure 4. Standard map view of Sump cleaning works delivery completed in Rangiora for FY 23/24. Colour coding stands for: blue = Inspected and cleaned. Red = Inspected and clean, WDC to update location on map. Source: RAMM

10.4.2. Sweeping

WDC Assessment: 2023 – 2024 Compliant (all frequencies met)

The sweeping of road channels provides an opportunity for WDC to improve stormwater quality. Although this activity is not mandated under the CRC184601 consent conditions outlined in Schedule 2, there is substantial evidence linking road sweeping to improvements in stormwater runoff quality.

An Envirolink report prepared by NIWA for Nelson City Council in 2011[i] assesses street sweeping as an effective Best Management Practice for improving stormwater quality.

This is why we have added the sweeping frequency as an item of maintenance for the new Proposed Schedule 2. In the foreseeable future, WDC is looking at ways to adjust the frequency of sweeping where required as a way to mitigate dissolved metals and other contaminants potentially entering the waterways as a result of stormwater discharges.

Sweeping Frequencies

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

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

See maps and figures below from Figure 5 to Figure 8.

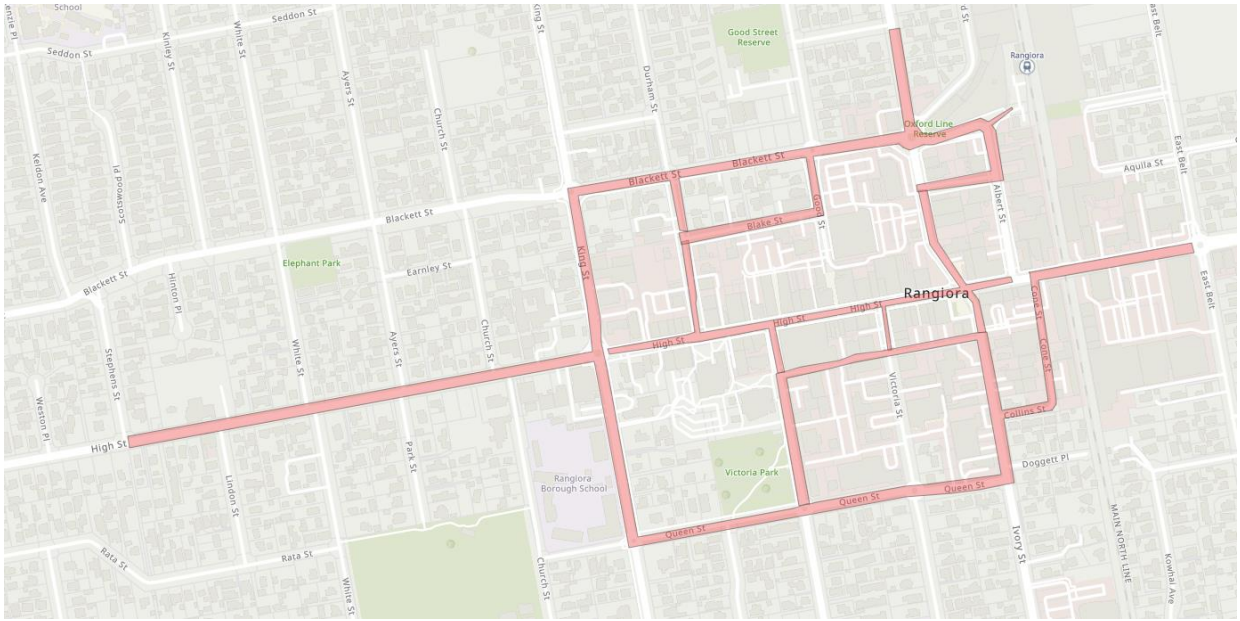

Figure 5. Weekly Sweeping in Rangiora town Centre. Source: RAMM.

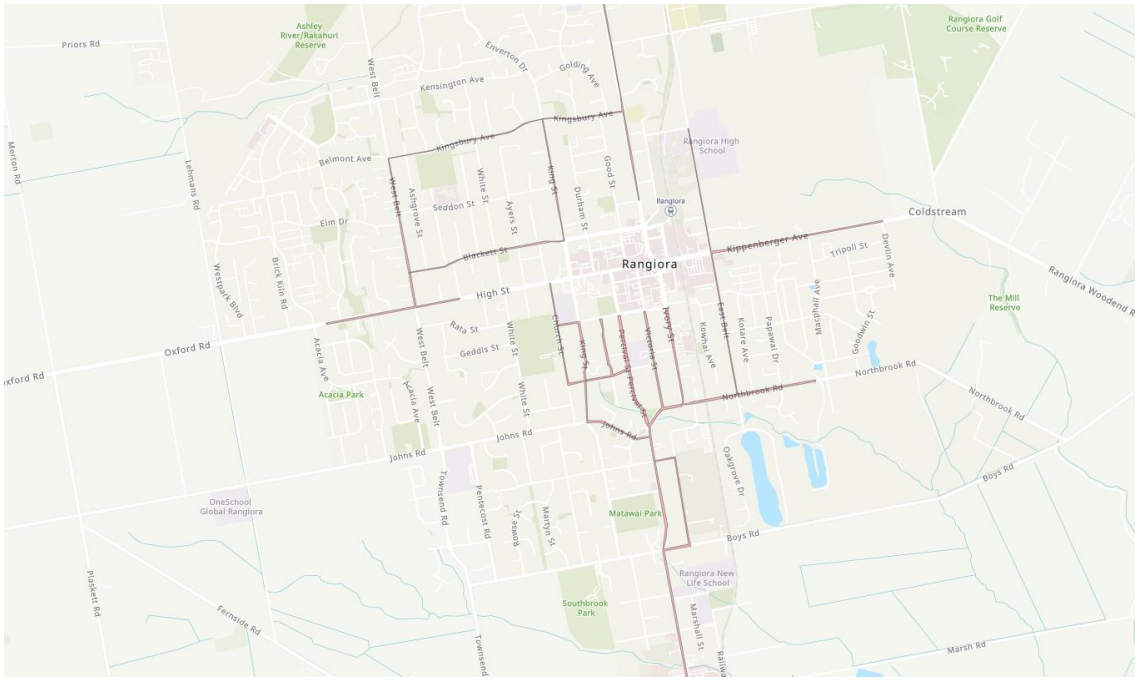

Figure 6. 3 weekly sweeping in Rangiora, areas adjacent to CBD. Source: RAMM.

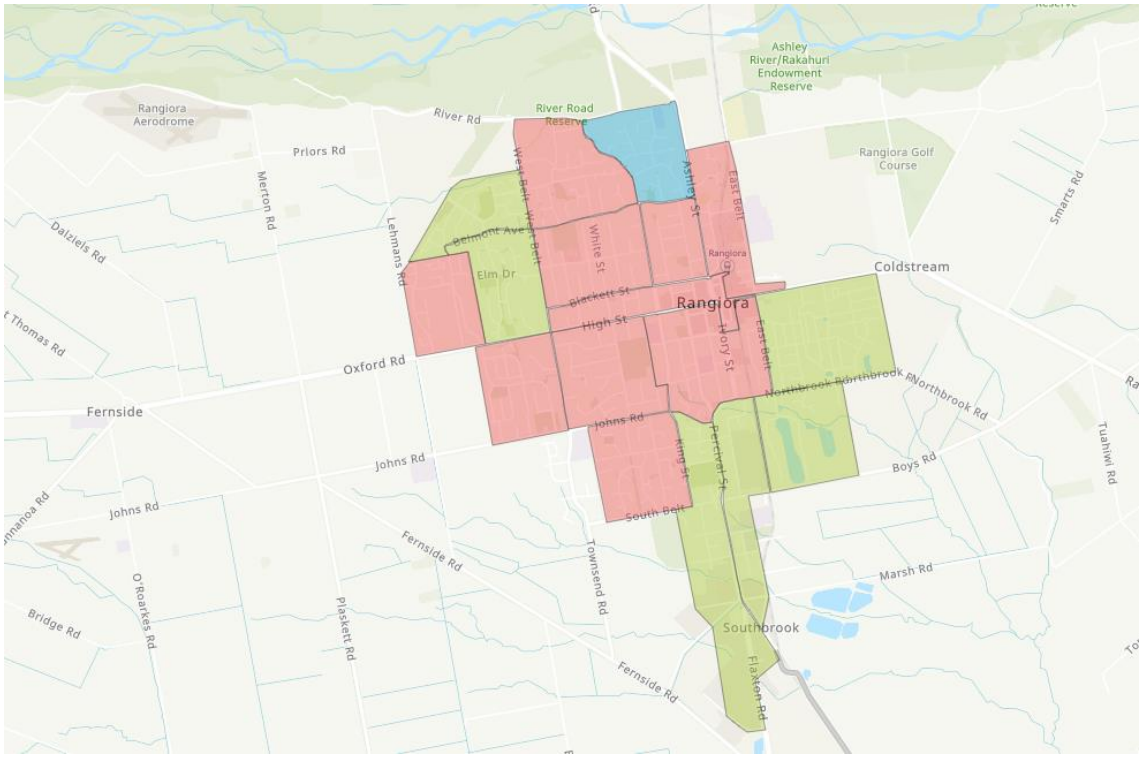

Figure 7. 6 weekly sweeping in all other areas of Rangiora boundary. Source: RAMM.

Sweeping summary

All sweeping in Rangiora township has been delivered for 23/24 as per contract 19/43 and frequencies stated in this section.

Further information about road sweeping is available on request.

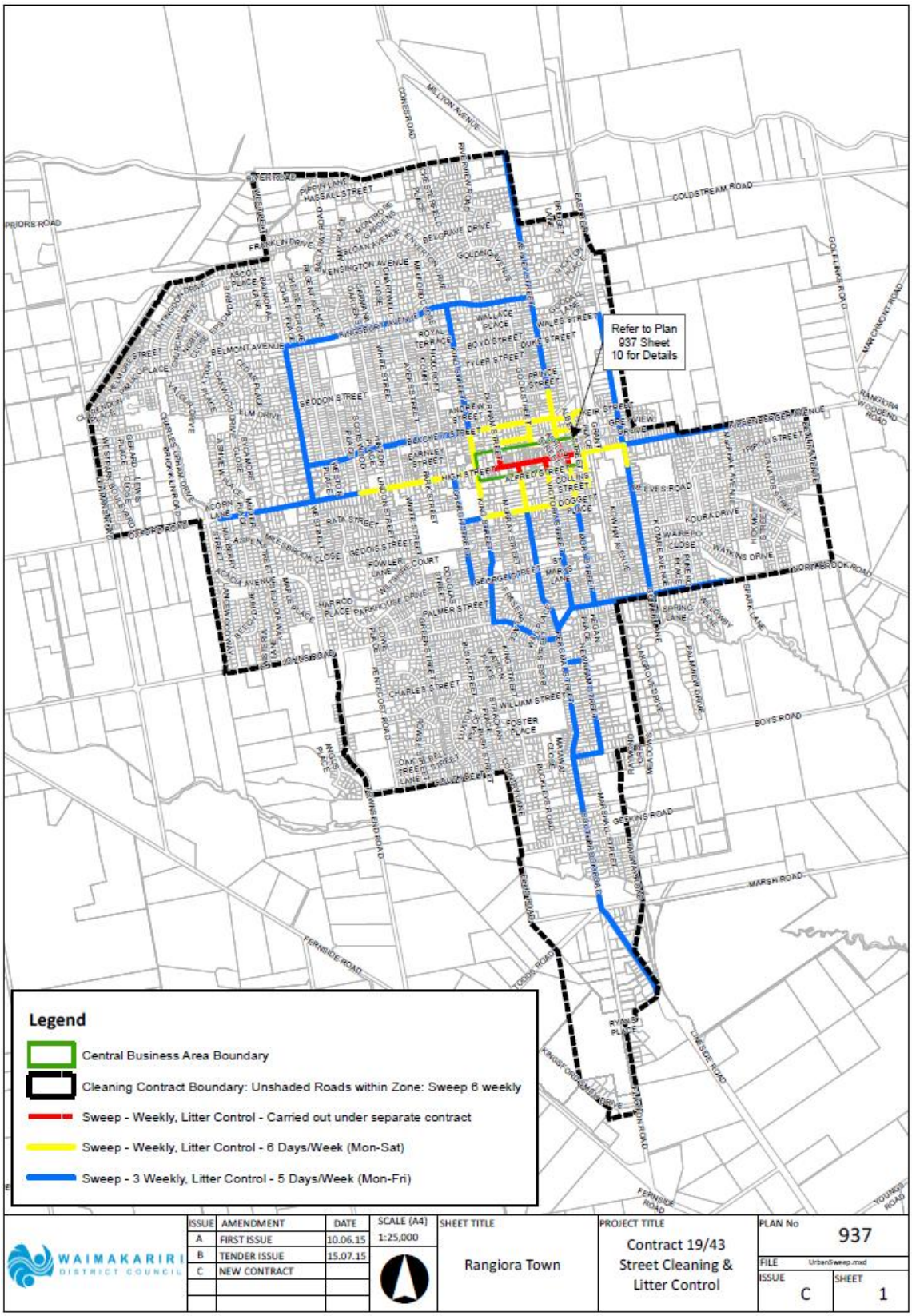

Figure 8. Summary of all sweeping frequencies in Rangiora, as per roading contract with Corde. Source: WDC internal records.

10.4.3. Improvements

Across financial years, there have been challenges to overcome and lessons learnt from working with WDC contractors. See Table 8. One of the biggest challenges is that the contract delivery timeframes do not align with WDC reporting timeframes from a consent perspective. In the past this has been challenging for contractors, as they have a timeframe to adhere to that is not part of their contract delivery, but they must for WDC to be compliant with these works from a consent perspective.

Summary of sump cleaning work delivery across financial years			
2019-2021	**2021-2022**	**2022-2023**	**2023-2024**
Completed. Contract year: November 2019 – 31 October 2021.	Not completed. Contract year: 1 November 2021 – 31 October 2022.	Completed in April 2024 (after submission of FY 2021/23 reports). Reported as: 91% completed (February 2024). Contract year: 1 November 2022 – 31 October 2023.	Completed in September 2024. Contract year: 1 November 2023 – 31 October 2024.

Table 8. Summary of sump cleaning maintenance works since the beginning of RC 2021-2024 in Rangiora.

WDC has been working closely with contractors to deliver the completion of this work in time for the reporting of FY 23/24.

To overcome this and other challenges, WDC prepared an internal memo with recommendations and feedback for the elaboration of the new roading contract (see TRIM 240827144003, “Request to align the Roading and Maintenance Contract with SNDC August 2024”). The contract has been renewed to the same contractors in November 2024 (CORDE). However, it will go to tender again before November 2025. The new roading and drainage maintenance contract is currently being written and developed.

WDC has taken this as an opportunity to provide recommendations in the memo mentioned above, for the elaboration of the new contract to better align with the requirements set up in our consent conditions as per Schedule 2. The memo discusses items such as delivery timeframes, new proposed Schedule 2, spills response and street sweeping. It concludes with 10 recommendations for improved alignment of the new contract with the requirements of the SNDC.

WDC teams continue to work internally and with contractors to implement the learnings from past financial years.

10.5. Soakage chambers

WDC Assessment: info not required for compliance.

The information previously reported on this section is not a requirement of consent conditions.

This section has been maintained to acknowledge the above, and to provide a reason why this information is not presented this year.

The maintenance required under the “soakage chambers” section from Schedule 2, is actually referring to sumps discharging to soakage chambers.

The maintenance of the sumps discharging to soakage chambers has been completed and reported for in section 10.4.1, as part of CORDE’s sump cleaning delivery works.

10.6. Summary

As outlined on previous sections, Table 9 presents a summary and how we are meeting the frequencies of the proposed maintenance schedule.

Summary of maintenance works (Green = frequencies met)					
Task		sumps			Infiltration basins, swales and dry basins
		Critical [1] sumps	**Non-critical sumps**	**To soakage chambers [2]**	
Removal of debris and litter likely to adversely affect the operation of the system		Annually	Annually	Annually	6 monthly
Removal of sediment likely to adversely affect the operation of the system		Annually	Annually	Annually	Annually
Assess and remove hydrocarbons where present if over a total area of greater than 0.5 m^2 (swales and basins) or a layer greater than 5mm thick (sumps)		Annually	Annually	Annually	6 monthly
Vegetation control (weed control and grass mowing)		-	-	-	Annually
Sweeping [3] of roadside channels	CBD	weekly			-
	Adjacent CBD	3 weekly			-
	All others	6 weekly			-

Table 9. Summary of all maintenance works frequencies met as per proposed Schedule 2, in Rangiora for FY 23/24.

10.7. Condition 22

WDC Assessment: Compliant (*) (frequencies met and information provided)

(*) Until the new proposed Schedule 2 is incorporated in CRC184601, WDC compliance with condition 22 won't be fully met. This Condition 22 requires WDC to maintain stormwater systems as per Schedule 2, the way it is attached to the consent. Until this happens, there will be a transitional period of adaptation.

10.8. Condition 23

WDC Assessment: Compliant (information provided)

This condition is met with WDC Land 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 after 2 years of proven functionality of the system.

10.9. Assessment

WDC assessment:

35a. Compliant
22. Compliant (based on proposed Schedule 2);
23. Compliant

11. Updates to Monitoring Programme

WDC Assessment: Compliant (consultation process followed & information provided)

This section refers to Condition 35-b.

There have been updates to the monitoring programme, in accordance with consent condition 35b, Condition 31 and Condition 13.

The details and rationale for these changes were provided to Environment Canterbury on 20th June 2024. WDC is still awaiting a response to proceed with acceptance and implementation. At the same time, evidence of meeting Condition 13, was also provided to Environment Canterbury.

Changes to the Rangiora Monitoring Programme include:

- New maps, displaying further clarity of Visual Discharge sampling sites.
- New site descriptions, amended for accuracy for Visual Discharge and Urban Impact sampling sites.
- New definition of first flush conditions to allow for sampling of first flush events.

The submission email with all the above information provided to Environment Canterbury is presented as Appendix 7.

Once these submitted changes are approved by ECan, all informal changes WDC has been following based on ECan advice will be current (e.g. first flush conditions).

11.1. Condition 13: Ngai Tuahuriri Runanga

WDC Assessment: Compliant (consultation process followed & information provided)

Prior to submission of these changes to ECan, this was submitted for consultation with Ngai Tuahuriri on May 2024. On 18th June 2024, MKL issued a response, for which WDC provided a written response 2 working days after.

This response to Ngai Tuahuriri addressing comments was within 10 working days as per consent conditions.

An email copy of the submission date and documents submitted to Environment Canterbury is provided (Appendix 7).

The following are internal WDC references for those documents:

Item	Date issued	WDC Reference
Request to MKL to review changes to the Rangiora monitoring programme to MKL	30/5/2024	TRIM 240530088133
MKL's review of changes to the Rangiora monitoring programme (cultural Advice)	18/06/2024	TRIM 240620100332
Response to MKL review of changes	20/6/2024	TRIM 240620100590

Updates to the Monitoring Programme submitted to ECan	20/6/2024	TRIM 240620100943

Table 10. Items and timeframes for the submission of changes to the Rangiora monitoring programme in FY 23/24.

11.2. List of Changes submitted for FY 23/24

For full details on changes proposed to the Rangiora Monitoring Programme, refer to Appendix 7. The proposed changes listed below were submitted to ECan on 20/06/2024.

List of changes submitted to Environment Canterbury for sign off made between 2023-2024:

- New maps, displaying further clarity of sampling sites, such as:
    - Visual Discharges:
        - RRSB046: changed to RRSB046A, a few meters apart in Townsend Fields
        - RRSR026: changed to RRSR026A, a few meters apart in Pond C
        - RRMB017: changed to RRMB017A, a few meters apart in Middle Brook

- 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”

11.3. Meeting first flush criteria

First flush criteria were revisited by ECan on 9/06/2022, to allow for a minimum of 3mm rainfall event to be considered as a first flush event. This is a lower threshold rainfall criterion which allows for stormwater sampling to be undertaken, provided that the conditions below are met. WDC adopted this advice for FY 23/24.

The revisited first flush criteria submitted as changes to the monitoring programme 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

The above has been submitted as an update to the Rangiora Stormwater Monitoring Programme.

12. Results

WDC assessment: Compliant (sampling undertaken and reported for; data provided in suitable format)

This section covers conditions 35-c-I, 35-c-ii and 35-d.

Refer to Appendix 1 Rangiora Stormwater Monitoring Report 2023-24. This report summarises all water quality monitoring data and results from the Stormwater Sampling in Rangiora from 1 July 2023 to 30 June 2024, including visual representation of data, interpretation and discussion of results, statistical analyses and trend analyses.

Trend analysis was incorporated into these results using time trends by NIWA. 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 2023-2024 (TRIM 241031189470). This document is submitted with this Annual Report. The water quality report continues to be kept separately to allow better clarity with presenting the results.

Trend analyses for all water quality monitoring data was undertaken in alignment with the Australian and New Zealand Water Quality Guidelines for Fresh and Marine Water Quality (waterquality.gov.au), including data preparation and exploratory analysis. Statistical analyses were undertaken with Time Trends, developed by NIWA.

12.1. Wording for consent conditions covered

Conditions 35-c-i & 35-c-ii:

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;*

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 now directly referenced with SQ codes and it is regularly submitted to Environment Canterbury directly via Hill Labs, as soon as water samples are analysed. Environment Canterbury should have a record of these files as soon as the reports are issued by Hill Labs.

WDC acknowledges, incorporating Environment Canterbury's SQ codes format has caused a bottle neck with the mapping for our water quality reporting software Infrastructure Data. It has also caused additional work for Hill Labs.

All sampling results are referenced to ECan in the Hill Labs quotes with the consent CRC184601 code.

Based on the above, no additional data spreadsheet is provided to ECan with this submission. These are now provided on a regular basis to ECan. All other data collected from the field with in-situ probes measurements is recorded with Infrastructure Data phone app and is presented in the monitoring report (appendix 1). All raw data from in-field measurements is available on request.

For reference, this is a copy of all ECan SQ codes, WDC monitoring site codes and site descriptions.

SQ number	Monitoring site code	Site Description
SQ36781	RRND012	North Drain, Coldstream Road
SQ36784	RRNB045	North Brook, at Dudley Park, White Street pipe outlet
SQ36792	RRNB033	Northern branch of the North Brook, west side Kowhai Avenue
SQ36804	RRNB009	North Brook, outlet of the North Brook Ponds
SQ34187	RRMB017A	Middle Brook at Gefkins Road
SQ36802	RRSB030	South Brook, pipe outlet on west side of Railway Road
SQ36799	RRSS026	South South Brook Stormwater Pond Outlet, Lineside Road
SQ36806	RRSR026A	South Rangiora, Stormwater Pond C Outlet, Flaxton Road
SQ36800	CRCR120	Cam River, on the southern side of Kippenberger Avenue
SQ30382	RRNB017	North Brook, on the northern side of Boys Road
SQ36473	RRNB036	North Brook, Lilybrook Park
SQ36787	RRNB044	North Brook, on Church St across from Dudley Park
SQ36788	RRNB055	North Brook, at Aspen Street Park
SQ36789	RRMB017	Middle Brook, Gefkins Road east of the Railway, upstream side of the bridge
SQ36790	RRMB029	Middle Brook, on the western side of Bush Street
SQ32914	RRSB046	South Brook, on the east side of Townsend Road
SQ30414	RRSR026	South Rangiora, No. 7 Drain immediately south of Fernside Road (allows for mixing zone)

Table 11. List of Rangiora sampling sites with equivalent Environment Canterbury code. All data ready to upload is submitted as an csv attachment 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.

The information above is also included as part of the Hill Laboratory lab sheet in pdf and .csv format.

12.3. Rainfall data for sampling events

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 available to Environment Canterbury on request.

All rainfall data is regularly documented in a tracking spreadsheet. WDC has a rain gauge on Ayers St, Rangiora, which provides precipitation SCADA data available to WDC staff (with a 5-to-15-minute delay, depending on how busy the server is).

A summary of rainfall data associated with stormwater sampling events, is provided as follows.

Date	**24/07/2023**	**28/07/2023**	**28/09/2023**	**20/11/2023**	**4/12/2023**
Time	8:45am	9:10am	9:00am	9am	10am
Antecedent dry weather	11.5h	48.5h	70.25h	65h	60h
Rainfall Depth (mm) ***sampling commenced***	44mm	3mm	11.6 mm	9mm	4mm
Rainfall Depth (mm) ***sampling finished***	125mm	3.2mm	11.6 mm	9mm	6mm
Duration	43.5h	9.75h	22.25h	Not recorded	5.25h
Event Description	Moderate - large rain event. 44mm of accumulated rainfall in last 24 hours before sampling commenced	Small rain event that meets new first flush criteria. Note that it fell in two lots, with dry in between	Break of 3 hours with no rain. Counted this still as one rain event, not two separate events. Rain started 8pm the day before and continued through to 10pm, with a pause at 7am	3 sites were sampled for visual discharge. Rain event started 1:35am and lasted until 6:28am. All sites re-sampled on 4/12/23 and 12/12/23. Lack of flow.	Moderate to small rain event. Rain started at 3am an continued raining until 1pm. A total of 3mm cumulative rainfall was reached at 8.30am. It continued raining throughout the sampling. It stopped at 1pm, then resumed at 3pm for 30mins. TSS and visual discharge for 6 sites undertaken.
Type Sampling Event	Visual Discharges	Major network outlets	Urban Impact	Visual discharges	Visual discharges, Major network outlets
Person Sampling	Sophie Allen	Sophie Allen	Sophie Allen	Sophie Allen, Lorena Cardenas	Sophie Allen, Lorena Cardenas

Table 12. Part 1. Summary of Rangiora CRC184601 rain events 2023-2024. Event description standards: from Metservice. Rainfall depth source: SCADA (WDC Ayers St rain gauge)

** 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).*

Date	12/12/2023	15/03/2024	12/04/2024	21/05/2024
Time	11:30am	2:35pm	9am	9am
Antecedent dry weather	48.5h	75.5h	8 days	47 hours
Rainfall Depth (mm) ***sampling commenced***	5.6mm	5mm (from 2:35pm)	7.2mm	12.8mm
Rainfall Depth (mm) ***sampling finished***	10.4mm	10.4mm (at 4:55pm)	7.2mm	21mm
Duration	3.5h	4.70h (2:35pm to 7:15pm)	4h	7h
Event Description	Overnight it rained 3.8mm. Rain started 10:35am. Re-sampled visual discharges. Sampled the rest of visual discharges sites left from 4/12/23 sampling.	Met revised first flush criteria of 3mm, and dry period of at least 24 hours	Light shower at time of sampling then it stopped raining. Rainfall event started 20:25h the day before, lasted overnight. Total Rainfall on the evening before was 18.4mm. Cumulative rainfall including previous evening rain and morning rain, 25.6mm	Dry weather leading to sampling for two days. Minimal 0.8mm of rain on Sunday 19/5/24 10am. Proper flush. Rain started at 5:35am and didn't stop until 4.30-5pm. All water sampling finished by 12:30pm. All visual discharges finished by 2:30pm.
Type Sampling Event	Visual discharges	Visual Discharges, Major Network Outlets	Urban Impact	Visual Discharges, Major Network Outlets
Person Sampling	Sophie Allen, Lorena Cardenas	Sophie Allen	Lorena Cardenas, Sophie Allen, Tim Doornkamp	Lorena Cardenas, Tim Doornkamp, Aaron Kibblewhite

Table 13. Part 2. Summary of Rangiora CRC184601 rain events 2023-2024. Event description standards: from Metservice. Rainfall depth source: SCADA (WDC Ayers St rain gauge)

Note on sampling undertaken below 3mm and/or over 25mm of total rainfall

There was only one sampling event undertaken with a cumulative rainfall over 25mm. The reason for this is that the rain event started during a weekend, on Friday evening. Therefore, the cumulative rainfall went over 25mm by the time it was Monday and WDC was available to start sampling.

WDC staff rationalised that undertaking sampling outside of first flush conditions was preferable to no sampling being undertaken for the quarter.

In 9/06/202, advice was sought from Environment Canterbury on the difficulty of meeting first flush requirements for Rangiora stormwater sampling. Adopting these recommendations helped WDC undertake sampling more frequently after that date. These changes have been submitted for signoff to ECan with the latest update to the Rangiora Stormwater Monitoring Programme.

Having a more relaxed first flush criteria and setting up WDC staff access to almost real time SCADA rain gauge data in 2022/23 has helped WDC staff improve the field stormwater sampling and hence the collection of data for FY 23-24.

The sampling data presented in this report, is the best possible information WDC was able to provide with the existing tools and resources available at that time.

12.4. Monitoring Results

See Appendix 1 for full results, covering condition 35-c.

13. Interpretation of Trends

WDC Assessment: Compliant (analyses undertaken, information provided)

This section covers condition 35-d, 35-e and 35-f.

See Appendix 1, section 5.2 Trend Analysis, specifically from section 5.2.3 to 5.2.5 and its associated summary tables.

A summary of results and trends identified is presented below, extracted from the Stormwater Monitoring Report.

- Decreasing trends identified at Pond C for dissolved copper and TSS. No trends identified for other contaminants in Pond C. No increasing trends identified.
- An increase trend over time is possible for Dissolved Zinc in the North Brook, at Lilybrook Park site (RRNB036), in the Middle Brook, on the western side of Bush Street (RRMB029), and in the North Drain (RRND012)
- An increase trend is also possible for Dissolved Copper in the Middle Brook, on the western side of Bush Street (RRMB029)
- A decrease trend is possible for Dissolved Zinc in the South Brook, on the west side of Railway Road (RRSB030)
- No trends identified for all other contaminants in all other waterways.
- Trends were extremely unlikely for Cam River on DRP and E. coli, which states the ecological value of this waterway

13.1. Interpretation of significance and reasons for changes

WDC Assessment: Compliant (information provided)

See Appendix 1, Section 6.1 – Discussion summary.

Exceedances and non-exceedances are addressed individually for each contaminant throughout section 5 of the Monitoring report (Appendix 1). These are addressed one by one under the titles “trends” and “discussion” after visual presentation of results for each contaminant.

13.2. Investigations undertaken and responses planned

WDC Assessment: Compliant (information provided)

In June 2024, there were specific water quality investigations undertaken to follow up on high E. coli levels found in the Middle Brook during dry weather sampling events.

The conclusion of these investigation and additional sampling didn't point out to any specific sources. A total of 6 sites were sampled during dry weather across the Middle Brook. There were no exceedances found. This concludes that E. coli contamination is an isolated, one-off event that occurs occasionally on a basis outside of our network, rather than a regular source of contamination.

Further investigations are being explored, such as faecal source tracking, to help bring further clarity on this.

More details and full lab results are provided on Appendix 4.

14. Discussion of compliance

WDC Assessment: Compliant (information provided)

This section covers condition 35-g, from i-vi.

Refer to Appendix 1 - Monitoring programme report, Section 6 and 6.1 for a full discussion of compliance.

Below is a Summary of results for 2023-2024 extracted from the monitoring report.

It is noted that the same non-compliances were also identified last year for dissolved zinc, copper, DRP and E. coli.

All non-compliances are aimed to be addressed by 2040 with the Rangiora Stormwater Management Plan.

Table 14. Summary of compliance with CRC184601 guideline values in FY 23/24

Contaminant		Notes
Total Suspended Solids	Compliant	All sites were compliant for TSS in FY 23/24, including during stream health sampling (dry weather sampling)
Dissolved copper	Non-compliant	4 sites exceeded the guideline value during wet weather sampling. Previous FY 22/23: 7 sites exceeded the guideline value during wet weather sampling
Dissolved zinc	Non-compliant	7 sites exceeded the guideline value during wet weather sampling. Same number of sites exceeding in FY 22/23.
Dissolved Reactive Phosphorus	Non-compliant	Not met for all sites except Cam River. Actions recommended. Similar to FY 22/23.
E. coli	Non-compliant	Not met for all sites except Cam River and a Middle Brook site. Similar to last year FY 22/23. Actions recommended.
Total Ammoniacal Nitrogen	Compliant	
Dissolved oxygen	Guideline met*	* Not used for compliance. All following results are from Stream Health (dry weather sampling).
Temperature	Guideline met	
pH	Guideline met	
Conductivity	Not met	3 sites did not meet the guideline: two at South Brook (RRSB046, RRSB030) and another at No. 7 Drain (RRSR025). In FY 22/23, the guideline was not met at 3 sites (Middle Brook, South Brook, No. 7 Drain)
Dissolved Inorganic Nitrogen	Not met	Guideline value exceeded for 3 sites: two at South Brook, one at No. 7 Drain.

		Compared to previous year FY 22/23, 6 sites did not meet the guideline (North Brook, Middle Brook, South Brook, No. 7 Drain).
Total Ammoniacal Nitrogen	Guideline met	
Total Suspended Solids	Guideline met	
Dissolved Reactive Phosphorus	Not met	2 sites did not meet the guideline (South Brook, RRSB046 and No. 7 Drain, RRSR025). In FY 22/23, guideline values were met at for all sites.
E. coli	Not met	3 sites exceeded the guideline: two at South Brook (RRSR046 and RRSR030) and No. 7 Drain (RRSR025). Last FY22/23, 3 sites exceeded guideline values of *E. coli* (North Brook, Middle Brook, No. 7 Drain).

In alignment with condition 8, WDC keeps track of stormwater and flooding damage through various processes within the 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 Water Quality 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 Plan (SMP), to be presented to ECan in 2025. As part of WDC's on going relationship with Runanga, WDC is aware of wāhi tapu sites. No Wahi taonga habitats or sites have been identified by MKT. WDC has engaged with Ngāi Tūāhuriri Rūnanga via MKT to get their cultural input on Stormwater management projects, wāhi tapu, wāhi taonga and mahinga kai protection.

With regards to condition 14, WDC ensures compliance with Water Quantity and Quality conditions with due diligence undertaken by the planning team and subdivisions team. In addition, the 3 Waters team is set up with a Hach portable turbidimeter, ready to monitor discharges from subdivisions where applicable.

14.1. Condition 35g

The consent wording states the following:

b. *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:*

vii. *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;*

viii. *Documentation of service requests indicating any flooding of dwelling houses described in condition (8)(a);*

ix. *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*

x. *A summary of new stormwater systems vested to WDC during the preceding year which will discharge under this consent; and*

xi. *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*

xii. *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.*

14.2. Trigger value exceedances, actions and investigations

WDC Assessment: Compliant (information provided)

Condition 35-g-i is covered in the previous section.

Recommendations are offered in Appendix 1, section 7 – Recommendations, and throughout the Results section of the report, where specific actions are discussed and suggested for each contaminant, particularly for contaminants from Urban Impact sampling.

14.3. Service requests

WDC Assessment: Compliant (information provided)

This section covers Condition 35-g-ii.

All flooding is documented by WDC (Figures 9 and 10) and reported on as Quarterly Non-financial Performance Measure. 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 financial year. 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 FY 23-24. Therefore, there have been no service requests lodged indicating flooding of houses as per condition 8a. The information provided below covers the entire district, including Rangiora.

Measure (from Annual Plan)	Target	Q1 Performance	Q1 Comments	Q2 Performance	Q2 Comments
Urban Stormwater					
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 the first quarter. The district experienced a significant rainfall event over the weekend of 22-24 July 2023, with the coastal area around Woodend receiving approximately 150mm of the rainfall over a 48 hour period. There were 30 garages / sheds that were reported as flooded and 3 habitable floor levels - two in rural areas (Jeffs Drain Road and Te Poupatuki Road) and one in urban areas (Queens Ave, Waikuku Beach). The flooding in the urban area related to private issues and not overflow from the public stormwater system.	Nil	There were no flooding events of habitable floor levels reported during this quarter.

Figure 9. Part 1. Summary of non-Financial Performance Measures - Drainage & Stockwater for 2023-2024. No actions required from these investigations.

Q3 Performance	Q3 Comments	Q4 Performance	Q4 Comments	YTD Performance	YTD Comments
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.	Nil	No habitable floor levels were inundated in less than a 50 year storm event. The district experienced a significant rainfall event over the weekend of 22-24 July 2023, with the coastal area around Woodend receiving approximately 150mm of the rainfall over a 48 hour period. There were 30 garages / sheds that were reported as flooded and 3 habitable floor levels - two in rural areas (Jeffs Drain Road and Te Poupatuki Road) and one in urban areas (Queens Ave, Waikuku Beach). The flooding in the urban area related to private issues and not overflow from the public stormwater system.

Figure 10. Part 2. Summary of non-Financial Performance Measures - Drainage & Stockwater for 2023-2024. No actions required from these investigations.

14.4. Remedial and improvement works

WDC Assessment: Compliant (information provided)

This section covers Condition 35-g-iii. Below is a summary of remedial and improvement works undertaken over the last financial year to improve the quality and quantity of stormwater discharges.

23/24 Rangiora Improvement Works			
Project Name	**Project Description**	**Improvement**	**Budget**
Under Channel Piping	Under channel piping in Geddis Street, and a short section in Edward Street.	Quantity	$120,000.00
Palmer / Church Pipework Upgrade	Design of 450mm pipeline along Palmer Street to Douglas Street.	Quantity	$151,000.00
Wiltshire Green Pipework Upgrade	Pipework upgrades from Wiltshire Court and Janelle Place through to Parkhouse Terrace	Quantity	$1,133,250.00
Ashley St Pipe Upgrades	Pipe upgrade in Ashley Street from Golding Ave to the North Drain	Quantity	$245,000.00
Eastbelt Rain Gardens & Soakpits	Installation of three rain gardens on East Belt in the vicinity of the high school.	Quantity	$300,000.00

Table 15. Remedial and improvement works undertaken in Rangiora during FY 23/24

Other works undertaken in FY 23-24 associated with this condition include:

- Water Unit: fixed the Middle Brook pump at Rowse Street in 2023-24, to provide ecological baseflow to the Middle Brook and improve the quantity of water flow.

Internally, WDC is also undertaking an assessment of possible bank erosion works in Rangiora stormwater channels. This is still preliminary work and budget has been allocated to undertake it across the next 5-10 years. Works and investigations on this have not commenced yet. Any updates, progress and outcomes from these investigations will be reported on for next financial year FY 24/25.

14.5. New stormwater systems vested

WDC Assessment: Compliant (information provided)

This section covers condition 35g-iv.

A list of all new Stormwater assets vested to WDC from 2023-2024 was requested to 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. The outcome is a spreadsheet, which is provided in Appendix 5.

14.6. Future Stormwater system proposals

WDC Assessment: Compliant (information provided)

This section covers condition 35-g-v.

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 from FY 23-24: North Drain Treatment, Middle Brook Treatment and Three Brooks Enhancement Work.

Project Name	Description	Start Year	Complete Year
Lineside Road Drainage Upgrade Stage 2	This project involves stormwater pipe upgrades along Lineside Road.	2023	2025
North Drain Treatment	Investigate and implement SW treatment options for the North Drain catchment. Inlcudes 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 the headwaters of the Cam River. To align with development of the north east 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 Enhacement 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 16. Future Capex Stormwater Projects Planned as part of WDC Long Term Plan 2024-24

14.7. Protecting and enhancing mahinga kai

WDC Assessment: Compliant (information provided)

This section covers condition 35-g-vi.

Actions that have been carried out in 2023-24 by WDC that could protect and enhance mahinga kai species are presented in Table 17. Note that actions for future mahinga kai protection and enhancement is a under discussion with Ngai Tuahuriri for drafting of the Rangiora Stormwater Management Plan in 2024-25.

A summary of actions is presented below:

Date	WDC contact person	Location	Project
19 December 2023	Sophie Allen	North Brook tributary	Fish passage remediation of a partial barrier on a tributary of the North Brook at Cotter Lane with a rock ramp, to allow species (such as the mahinga kai species inanga) to pass upstream easier.
15-18 December 2023	Sophie Allen	6 sites in Rangiora	Boffa Miskell Ltd carried out the ecological surveys for the consent monitoring programme at 6 sites within Rangiora for fish and macroinvertebrates, with recommendations for species and habitat improvements (such as placement of boulder clusters for kanakana lamprey spawning, a mahinga kai species).

Table 17. Actions taken to enhance mahinga kai between 2023-2024

15. Sites investigations

WDC Assessment: Compliant (information provided)

This section covers condition 35-h.

As far as we are aware, between 2023-2024, 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 (information provided)

This section covers condition 35-i.

There have been no site audits undertaken yet. All investigations and site audits for the potential exclusion of high-risk sites, is currently undergoing and the results will be implemented after the submission of this report.

No information to report between 2023-2024.

17. Sites Excluded from this consent in the last year

WDC Assessment: Compliant (information provided, nothing to report)

This section covers condition 35-j.

No sites have been excluded yet from this SNDC. Therefore, there is no information to report between 2023-2024.

18. Summary of Sites discharging

WDC Assessment: Compliant (information provided)

For information covering condition 35-k, go to section 5 from this report.

19. Breaches of the Bylaw

WDC Assessment: Compliant (information provided)

This section covers condition 35-l.

No information to report between 2023-2024. There probably have been breaches of the bylaw, but none that WDC is aware of.

It is noted, the new WDC Stormwater, Drainage and Watercourse Protection Bylaw 2024 was passed in October 2024, with key changes from 2018. This information is available in WDC website.

20. Summary and Recommendations

Summary of compliance:

- Most items from this consent are compliant (information provided), with a few contaminant exceedances documented in Appendix 1 and addressed with the following recommendations.
- Long-term all non-compliances are to be addressed by 2040 with the Rangiora Stormwater Management Plan

Summary of recommendations based on trends and discussion of results, in order of priority:

1. Dissolved zinc non-compliances in the North Brook (at Lilybrook Park, RRNB036), in the Middle Brook (at western side of Bush Street, RRMB029) and in the North Drain (at Coldstream Road, RRND012) are to be investigated and addressed as a priority.
2. Dissolved copper: Investigations and future treatment for dissolved copper in the Middle Brook at site on the western side of Bush Street (RRMB029) is undertaken.
3. To address non-compliances of heavy metals (copper and zinc), it is suggested to trial targeted and increased street sweeping of the roadside channel in areas upstream of where elevated levels of dissolved copper and zinc are encountered. This was proposed last year, to reduce the contaminant load of heavy metals in waterways (based on research led by NIWA).
4. DRP: Follow up actions and investigations on high levels of dissolved reactive phosphorus from rural inputs are recommended for referral to Environment Canterbury, as they are outside the scope of the Rangiora stormwater network discharge consent.
5. E. coli: Faecal source tracking investigations are recommended ideally for all waterways, except the Cam River. At a practical level, due to budget limitations and this analysis having a high cost, it is proposed to select the top streams and sites to reveal key information for this analysis (e.g. key sites in North Brook, Middle Brook, South Brook and No. 7 Drain).
6. DIN: collaboration with Environment Canterbury is recommended to address exceedances of dissolved inorganic nitrogen found during stream health sampling, as this is outside the scope of this consent to address. Sources are likely to be from farming land use in rural areas north-west of South Brook by Townsend Road, and South Brook south-west of Johns Road / Lehmans Road.
7. Sediment sampling: for consistency, it is recommended to continue sampling as per the Boffa Miskell 2023 report sampling sites and codes.
8. 3 Waters Compliance Officer to simplify compliance reports for the 24/25 monitoring period, in preparation for simultaneous reporting with stormwater discharge consents for Rangiora, Woodend, Oxford and Kaiapoi.

9. A new process is recommended to be implemented from a planning and development perspective to report better on any developments or resource consents proposed within an Environment Canterbury DWPZ (already implemented for the 24/25 monitoring period, to be reported on with the next report).
10. WDC to seek external advice and/or further data analyses training of 3 Waters Compliance Officer with R programming to help inform data and scope of trend analysis for next financial year.
11. Outsourcing some or most of the stormwater field sampling for next financial year is highly recommended to help increase capacity of 3 Waters Compliance Officer with the preparation of the upcoming reports for FY 24/25 and managing the monitoring for 4 discharge consents.

21. References

Depree, Craig NIWA (add NIWA citation for this report in APA format) https://envirolink.govt.nz/assets/Envirolink/934-NLCC51-Street-sweeping-an-effective-non-structural-best-practice-for-improving-stormwater-quality.pdf

WAIMAKARIRI DISTRICT COUNCIL

MEMO

FILE NO AND TRIM NO:	DRA-21 / 240827144003
DATE:	26/08/2024
MEMO TO:	Joanne McBride – Roading and Transport Manager Tim Donaldson – Roading Contract Engineer
FROM:	Lorena Cardenas – 3 Waters Compliance Officer Jason Recker – Stormwater and Waterways Manager
SUBJECT:	Request to align the Roading and Drainage Maintenance Contract with SNDC

Given the upcoming renewal of the Roading and Drainage Maintenance contract (RDMC), the main purpose of these recommendations is to provide guidance to align the RDMC with the Global Stormwater Network Discharge Consents (SNDC) for the townships of:

- Rangiora CRC18460
- Kaiapoi CRC204251
- Woodend CRC195459
- Oxford CRC204325

1. Background

Each consent and township have its own monitoring program, which collects water quality data and is due for reporting at the end of each financial year with the Canterbury Regional Council. Other items that are required to be reported on as a consent condition are Maintenance Works undertaken in the Stormwater Network (condition 35a), which includes the maintenance of roading assets such as sumps. The frequencies and items of this maintenance are set up in the RDMC. The SNDC requires WDC to report on maintenance works at the frequencies, as set in Schedule 2 (as below, see section 1.2). The servicing frequencies of these assets have a direct impact on the water quality in the receiving environment (waterways).

In the latest Annual Report (April 2024, TRIM 240325047404) a gap was identified between the contract timeframes to deliver the completion of maintenance works, and the delivery timeframes of reporting of such works as per the SNDC. This creates the risk of having to report these items as non-completed (and non-compliant). Nonetheless this gap is understandable, as the RDMC came into effect in 2019, while the SNDC for Rangiora came into effect in May 2021. Other items which have been discussed between 3 Waters and Roading teams are the contents of Schedule 2, street sweeping and spill responses. These are areas where there is a crossover and interest from both teams.

The following recommendations are aimed at understanding how to work together to bridge these gaps in delivery and highlighting the learnings to inform the next write up of the Roading and Drainage Maintenance contract renewal and/or tender process.

2. Contract timeframes vs Consents and reporting timeframes

The following table describes how the timeframes of the current Roading contract and the requirements of the consent conditions as set by the Canterbury Regional Council are not in alignment.

	Rangiora CRC18460	Kaiapoi CRC204251	Woodend CRC195459	Oxford CRC204325
Consent Start date	1 May 2021	1 July 2024		
Roading Contract delivery timeframes	November			
End of financial year and reporting	30 June			
Start of new financial year and consent reporting	1 July			
Due Date of 2023/24 annual report (1 July 23 – 30 June 24)	September 2024	N/A		
Due date of 2024/25 annual report (1 July 24 – 30 June 25)	September 2025			
2024 due date of completed Maintenance works	September 2024 (for period 23/24)	N/A		
2025 due date of completed Maintenance works	30 June 2025 (for period 24/25)			
Post 2025 due date of completed Maintenance works each year	Every 30 June			

Table 1. Timeframes for delivery of roading maintenance contract and annual reporting for consents.

For example, for the Rangiora 2023/24 annual report, the financial year ended on 30 June 2024. The consent conditions require to report on maintenance works on the previous 12-month period. This information is to be retrieved and completed by the end of the financial year. During the latest discussion between 3 Waters and Environment Canterbury, a 3-month report preparation period was agreed to. This is why maintenance works can be delivered in September 2024 for the 23/24 period.

In the consent conditions, there is no due date for the delivery of the Annual Report. However, it is a compliance requirement to show proof of completed Maintenance Works by 30 June of each year for the previous 12-month period. This can be achieved by retrieving a snapshot from RAMM on the preferred date (*i.e*. 30 June) displaying all maintenance works as completed.

3 Waters continue to work with Environment Canterbury on the delivery dates for these reports. The timeframes set up in Table 1 are based on these ongoing discussions.

3. Maintenance Works: Schedule 2

In consultation with Roading, Operations and Drainage 3 Waters teams, the Maintenance Schedule 2 was revisited and re-written.

The proposed Schedule is currently attached to the Kaiapoi, Woodend and Oxford consents. For the Rangiora consent, this is not approved yet. However, for ease of reporting, WDC is also adopting it for Rangiora, while simultaneously seeking a consent variation to formally approve it.

Task		sumps			Infiltration basins, swales and dry basins
		Critical sumps	**Non-critical sumps**	**To soakage chambers**	
Removal of debris and litter likely to adversely affect the operation of the system		Annually	Annually	Annually	6 monthly
Removal of sediment likely to adversely affect the operation of the system		Annually	Annually	Annually	Annually
Assess and remove hydrocarbons where present if over a total area of greater than 0.5 m^2 (swales and basins) or a layer greater than 5mm thick (sumps)		Annually	Annually	Annually	6 monthly
Vegetation control (weed control and grass mowing)		-	-	-	Annually
Sweeping of roadside channels	CBD	weekly			-
	Adjacent CBD	3 weekly			-
	All others	6 weekly			-

Table 2. Proposed Maintenance Schedule, referred to as “Schedule 2” in the consents

4. Spills and water quality

In the event of a road spill that could impact the stormwater network by entering the sumps, such as through the kerb and roadside channel, all sumps within the affected area need to be protected. These sumps are at risk of being impacted by the spill. If not protected, the spill will flow into the waterways with the next rain event. If it is already raining, or wet weather is coming, the following steps for sump protection increase in urgency.

Given a basic Spill management process (below, guidelines taken from Ministry for the Environment), the stormwater protection step would come immediately after containing the spill.

Please take special note on steps 3, 4 and 6. These are specific steps designed to achieve water quality outcomes:

1. Be safe
    - Identify the source – what is it?
    - Wear protective equipment – if needed
2. Stop the source of the spill
    a. Turn off the tap, plug the leak or roll the drum over – if it is safe to do so
3. Protect the stormwater
    a. Block off access to stormwater sumps or unsealed surfaces by bunding or other methods
    b. Contain the spill with sandbags or absorbent boom socks
4. Identify the type of contaminant
    a. Gather as much information as possible and available about the contents of the spill, such as:
        i. type of contaminant, brand
        ii. is it water-based or oil-based[1]?
    b. The above can be addressed by taking a photo of the manufacturer's container and/or label. If not possible, this is to be found out by searching online for the substance and its respective Material Safety Data Sheet.
    c. *Example:* Deck Primer. Photo provided below. This shows on the label that this product is "water-based". See Fig. 1.

5. Notify 3 Waters

6. Clean up
    a. Do not hose or sweep the spill down a stormwater drain
    b. Stop wash water or sweepings getting into stormwater sumps or soil
    c. Neutralize hazardous substances using absorbent materials
    d. Pump or sweep into a safe container
    e. Clean up within the contained area
7. Dispose responsibly
    a. Dispose of all spill materials in an appropriate landfill facility.

[1] This difference is important to assess the impact. If the contaminant is water based and enters the sump, it will dilute with water inside the sump and will require to be completely sucked up. If the contaminant is oil based, it will float, and only the first layers of the sump will require cleaning up, until no contaminant is left inside. Go to section 4.4.

Figure 1. Deck primer and associated details identified as the contaminant from a spill.

4.1 - How to protect the stormwater from a spill:

- Bunding: Use silt socks/tubes, sandbags or absorbent boom socks around the sumps, to prevent contaminant from entering the sump.

Figure 2. Silt socks installed around the sump to protect contaminants from draining inside it.

4.2 - If the spill has already reached the stormwater network:

- Continue to protect the sump to avoid further impact as described above.
- Check inside the sump through the grate with a flashlight to assess the impact. Take a photo if possible.
- Notify 3 Waters Team: Lorena.Cardenas@wmk.govt.nz, Sophie.Allen@wmk.govt.nz
- Undertake clean-up of the contaminants inside the sump, this involves sucking up the contaminated contents inside the sump.

4.3 – Recommended materials for spill management:

- Spill absorbent boom socks (Figure 3)
- Silt socks (Figure 4)
- Natural spill absorbent material (Figure 5)
- Absorbent pads & Mats (Figure 6)

Figure 3. Spill fix 1.5m absorbent Boom Sock. An industrial absorbent boom sock made from 100% renewable coir peat, available from a variety of providers (e.g. Rifft Safety, NZ Safety Blackwoods)

Figure 4. Silt socks being installed around a stormwater grate to protect the sump from a spill.

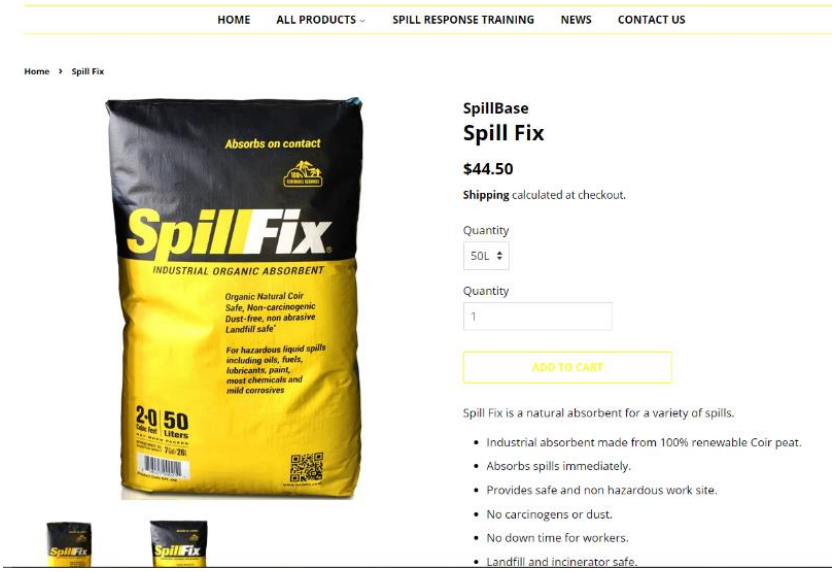

Figure 5. Spill Fix, a natural based absorbent made from coir peat.

4.4 – How to clean up water-based vs oil-based contaminants

If a contaminant has entered the sump, the response actions depend on whether they are water based or oil-based contaminants.

- **Water-based contaminants**: because they dilute in water, all water in the sump will need sucking up to ensure no contaminants flush from the Stormwater Network onto the waterways.

- **Oil-based contaminants**: these won't dilute in water, but will float, and so only the upper layers of water containing the contaminant will require cleaning up from inside the sump, until no contaminant is left inside.

  An oil layer can have floating absorbent blocks/pads installed inside the sumps. This technique requires follow up monitoring later the same day or the next day, with a subsequent visit and sump inspection to ensure the contaminant has been fully absorbed. Once this is achieved, the pad/mat requires removing and disposing of responsibly at a landfill facility.

  It is not recommended to install spill absorbent pads/mats and leave them inside the sump without having a plan on when these will get checked and removed. It is priority to ensure all contaminant is removed from the sump before the next rain event. If there is rain already, the absorbent pads can still be used (they are hydrophobic). This technique was used in the past with a spill incident from Sutton Tools in Kaiapoi.

Figure 6. Spill absorbent pads and mats, recommended to absorb oil-based contaminants where the contaminant has entered the sump. These have water repellent properties, so can also be used in the rain or float on water to absorb oil & fuel only.

4.5 – Contact list

At all times, 3 Waters ask to be notified of any spills that could potentially impact the stormwater systems.

In addition to letting 3 Waters know, ECan Pollution hotline should also be contacted simultaneously in the following occasions:

- Spills of paint wash & concrete wash
- Spills in rural areas (outside of urban boundaries as per contract)
- Spills in waterways (rivers and streams)

The justification for this is that those areas fall under Environment Canterbury's responsibility and WDC also has an interest in mitigating them.

Name	Contact	email
ECan Pollution hotline	0800 765 588	-
Lorena Cardenas (3 Waters Compliance Officer)	027 303 5746	Lorena.cardenas@wmk.govt.nz
Sophie Allen (Water Environment Advisor)	027 209 3210	Sophie.allen@wmk.govt.nz

5. Street Sweeping

In addition to the flood, safety and aesthetics components of undertaking street sweeping, there is also a direct link with water quality. Street sweeping is an economic and flexible mitigation option to reduce the contaminant load downstream of roads, which can readily be adapted as traffic demands and patterns, and/or land use change.

Street sweeping, specifically with vacuum sweeper trucks, allows for fine sediments with contaminants to be removed before they flow onto the stormwater system and the waterways with the next rain event. This has been well documented by NIWA and is supported by CCC.

We recommend a clause be added to the roading contract which allows for the flexibility to increase the road sweeping frequency in specific areas of the urban areas, as required.

The contaminant load in the waterways is regularly monitored through the Monitoring Programmes for the global SNDC. Where contaminant loads are found to be excessive, for example in industrial areas, WDC wishes to be able to adjust the frequency of street sweeping with vacuum sweepers to rectify this.

5.1 – Notes on street sweeping for reference and to consider

Some notes from CCC on how they are achieving stormwater quality improvements with street sweeping. The statements below are extracted from a full Statement of Evidence provided by Mark Pinner (Stormwater Engineer) for CCC in 2018, as evidence for the application of Christchurch's global SNDC.

Full document here:

- *[10] Street sweeping is undertaken within the Council's Road Maintenance Contracts, which are Term Maintenance Contracts (up to a 5 years term). There are four of these contracts that covers Council's network. […]*
- *[14] Council monitors the needs of the road network continuously to identify where the highest potential for mitigation of contaminant load by sweeping or sump cleaning will be.*
- *[16] Council inspects and empties, as required, sumps at a six-monthly interval. The Council is recording the frequency that sumps need emptying to build up a good picture of where the demands are most extensive. As the extent of results increases we will better understand these demands. Council will consider scheduling cleaning of specific sumps at pre-determined intervals, in areas of the highest contaminant loads, where it will enable Council to optimise its effectiveness and efficiency.*

- *[53] The frequency of sweeping is re-adjusted within our Road Maintenance Contracts every six months, to meet changing activity needs. This is done to balance risk, environmental effects and customer experience within the funding that is available and to ensure that the Council targets resources to areas of highest need.*
- *[44] In total 2,707.5km of drainage assets are scheduled to be cleaned and this equates to 44,800km of cleaning that is undertaken per year.*
- *[45] There are approximately 30,000 sumps across the City. Council's sumps are currently inspected twice per year, and cleaned (fully) only when <50mm freeboard below the invert of the outlet. It is Council's intention that over the next few years this frequency is rationalised further to reduce inspections where they are less critical, being those that do not need cleaning so often. Council can then turn its focus to those where the benefit to reducing contaminant load has highest potential (ie those that fill up most*

quickly). This also, as per sweeping frequency, recognises that change in use of an area or activity is continually occurring; Council recognises that the network needs to adapt.

- *[46] Approximately 8 sweepers are continuously engaged over the entire network, generally sweeping between 6am and 10pm, the hours reduced to alleviate noise disturbance. Regional & Arterial roads are not swept between 7.30am to 6pm, to avoid delays.*
- *[47] The sweeping activities are undertaken as part of a wider road maintenance contract, for which there are currently four contractors employed currently by Council. Although the plant is of different age and type across and within the companies, they all currently use Vacuum sweepers for road maintenance.*
- *[48] Sweeping by hand is required when access is reduced due to parked cars; often in the dense areas of the inner City. Some of the sweeper units are fitted with suction snorkel to allow cleaning under the bridge blocks, cleaning the sumps and the dish channel operation. For smaller, narrower, sections such as cycleways and footpaths/accessways, where needed, additional bespoke plant is used.*
- *[49] Sweeping is paid as a Lump sum per month. The weight removed is paid in addition by the tonne at the Transfer Station. In FY1718 (01 July 2017 to 30th June 2018), the cost of all of these operations across the City was approximately $3.0m per annum (inclusive of $800k of waste (9,150T)).*
- *[71] Council recognises that sweeping performance in the real world is very dependent on the equipment, particularly the sweeper brush itself, to ensure maximum potential for pick up. Council will ensure the Contractors' quality plans for sweeping record and undertake the necessary maintenance and changing of their brushes.*

6. Recommendations

Timeframes for delivery

1. To align the delivery of sump cleaning completion in Rangiora, Kaiapoi, Woodend and Oxford by the 30 of June for each year.

2. To ensure contractors provide a specific plan on how they will manage the delivery of completed maintenance works for these 4 townships by 30 June each year, including showing how they will allocate resources to achieve this.

Spills

3. Contractors to have the recommended materials readily available as part of their spill kits to respond with sump protection and sump cleaning as described in this document.

4. In the event of an urban Spill, contractors to identify if the substance has entered, or has realistic potential to enter the sump. Contractors are to identify the type of substance as far as practicable, and to assess a response based on likely effects to a receiving environment (i.e. waterway), and human health (from Material Safety Data Sheets for example).

5. If a spill has entered the stormwater network via sumps or has realistic potential to do so:
    a. Contractor to install sump protection around the sump to prevent further contamination.
        i. The sump protection method recommended is bunding with silt socks or absorbent spill booms of appropriate sizes (depending on the spill).

    b. Contractor to arrange clean-up of the sump contents to ensure no contaminants flush into the waterways.
        i. If the contaminant is water-based, the sump is to be fully emptied out
        ii. If the contaminant is oil-based, it may require only the removal of the top layer or as much as required to ensure no contaminant remains in the sump.

6. Contractor to arrange the clean-up of the spill from road, kerb and roadside channel with appropriate absorbent materials. Then to ensure the remaining materials are swept and disposed of appropriately to landfill/transfer station.

7. To ensure the spill is not swept or hosed down any stormwater drains/sumps during spill response / clean-up process.

8. Ensure contractors have an appropriate spill kit which includes:
    a. Sump protection equipment: silt socks, absorbent spill booms of different sizes to contain spills of various sizes, with minor spills being less than 5L, and major spills over 5L, 10L, etc.
    b. High absorption spill material (e.g. Spill fix)

Street Sweeping

9. We recommend a clause be added to the contract which allows for the flexibility to increase the road sweeping frequency in specific areas of the urban areas, on an as required basis.

10. We recommend adding a clause to the contract which specifies the minimum equipment required for effective street sweeping, including:
    a. Vacuum sweeper trucks with effective brushes
    b. Brushes on vacuum sweeper trucks to be checked regularly and replaced as required, to ensure they remain effective
    c. Sweeping by hand to be required when access is reduced due to parked cars, or by using sweeper units fitted with suction snorkel