Christchurch City Surface Water Quality Report 2024-25

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Christchurch City Council

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1	2026	Christopher Watt, Waterways Ecologist, Quality & Compliance, Three Waters	Emily Tredinnick, Team Leader Quality & Compliance	17/06/2026

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Executive Summary

The Christchurch City Council monitors the water quality of representative waterbodies within Christchurch and Banks Peninsula, as part of the Comprehensive Stormwater Network Discharge Consent (CSNDC; CRC231955). Monthly water quality monitoring is undertaken at 51 freshwater and coastal sites to assess consent compliance, long-term trends, and overall water health. The main contaminants assessed are total suspended solids, dissolved copper, dissolved zinc and dissolved lead, alongside other water quality parameters used to calculate the Water Quality Index.

The 2024 results noted 27% of samples were rainfall-influenced. Declining trends included increasing dissolved inorganic nitrogen at Aylmers Stream, suspended solids at Akaroa Harbour, turbidity at Curlett and Steamwharf Stream, and salinity at Linwood Canal. These trends suggest potential nutrient enrichment, sediment inputs and salinity pressures within some ecologically sensitive sites.

Some positive trends were recorded, including improvements in dissolved copper and dissolved lead at selected sites. Water Quality Index results showed most sites wre rated Good or Fair, with three sites rated Very Good and one site, Stream Reserve Drain, rated Very Poor. Ōtūkaikino was the best-performing catchment, while Linwood Canal was the poorest-performing. Twenty-five sites did not meet Attribute Target Levels, with priority investigations identified at Nottingham Stream, Heathcote at Ferrymead bridge and Stream Reserve Drain.

The 2025 results show mixed outcomes. Full compliance with all stormwater contaminant targets was 38% of sites, with the highest levels of compliance generally recorded in the less urbanised Ōtūkaikino catchment. However, many sites exceeded at least one target, with dissolved zinc remaining the main contaminant of concern. The highest numbers of exceedances were recorded at Nottingham Stream, Curletts Road and Cashmere Stream, which have also shown poorer water quality in previous years and have been recommended for targeted investigation or monitoring.

Overall, dissolved zinc had the greatest number of exceedances and the highest proportion of declining trends, although most annual increases were small. Encouragingly, most sites showed improving trends for dissolved copper and lead. Broader water quality results were generally similar to previous years, with conductivity, turbidity, dissolved reactive phosphorus, dissolved inorganic nitrogen and *E. Coli* remaining the main parameters influencing Water Quality Index scores.

Changes to the updated copper and zinc assessment methods mean that some sites now show different compliance outcomes compared with previous years, even where contaminant concentrations are similar. These updated methods are considered to provide a more accurate indication of metal contaminant risk to aquatic life. Priority sites for investigation include Stream Reserve Drain and Cashmere Stream, due to zinc trends and their locations within sensitive receiving environments.

1. Introduction

Christchurch City Council (hereafter referred to as Council) is required to monitor the water quality of representative waterbodies within Christchurch and Banks Peninsula, as part of the Comprehensive Stormwater Network Discharge Consent (CSNDC; CRC231955). In accordance with the CSNDC Environmental Monitoring Programme (EMP), monitoring was undertaken monthly at waterway and coastal sites. This report summarises the results of monthly monitoring for the 2024 and 2025 calendar years and analyses trends over time since monitoring commenced. Targeted wet weather reporting for 2025 has been combined with the Condition 59-Responses to Monitoring.

2. Background

2.1. Monitoring Sites & Guideline Levels

Monthly water quality monitoring is undertaken at 51 freshwater and coastal sites across Christchurch and Banks Peninsula, including waterways within Christchurch's five main river catchments, coastal receiving environments, and settlement areas on Banks Peninsula. Sites are presented in Figure 1 and Table 1.

Relevant guideline levels and consent Attribute Target Levels are used to assess the potential effects of stormwater contaminants on aquatic life. The key contaminants assessed under the consent framework are total suspended solids, dissolved copper, dissolved zinc and dissolved lead. Other water quality parameters that are not specifically included in the consent schedules are assessed against the most appropriate guideline values set out in the Environmental Monitoring Programme (EMP) (Kerr et al.2025).

Guideline values for copper and zinc have been updated since the original consent schedules were prepared. For the 2024/25 reporting period, copper and zinc were assessed using the updated Gadd et al. (2023) guidance, consistent with EMP and agreed by Council. Compliance was assessed using annual median concentrations for bioavailable copper and lead, and monthly exceedances for dissolved zinc.

Long-term analyses, including state and trend assessments, were undertaken using methods consistent with the EMP and previous annual reports to maintain comparability over time. Where relevant, comparisons between historic and updated assessment methods are also provided, with supporting rationale, guideline details and data limitations set out in the appendices.

2.2. Data Collection & Analysis

Monthly grab samples and field measurements are collected at each monitoring site and analysed by the Council's IANZ-accredited laboratory in accordance with the EMP. The full 2007-2025 dataset was quality checked and cleaned before being used for the annual compliance assessment, Water Quality Index calculations (WQI), and state and trend analysis ((Instream Consulting, 2025 & Noakes & Martens, 2025).

A Water Quality Index (WQI) was developed in 2016 for Council monthly monitoring sites, based on the Canadian Council of Ministers of the Environment (CCME, 2017) framework. The WQI evaluates water quality using three components: scope (the proportion of parameters exceeding guideline values at least once), frequency (the proportion of samples exceeding guideline values, and amplitude (the extent to which guideline values are exceeded. WQI scores range from 0 to 100, with higher scores representing better water quality. Parameters and guideline thresholds can be selected to suit the monitoring programme and receiving environment.

The Council WQI incorporates dissolved copper, dissolved zinc, pH, total suspended solids (TSS), dissolved oxygen (DO), temperature, biochemical oxygen demand (BOD5), total ammonia, nitrate, dissolved reactive phosphorus (DRP), and E coli. Dissolved inorganic nitrogen (DIN) is excluded from the index, as ammonia and nitrate are already represented within this parameter group and their inclusion could result in double counting and potential bias.

WQI scores are used to classify monitoring sites into four categories: 'very poor' (0-39.99), 'poor' (40-69.99), 'fair' (70-79.99), 'good' (80-89.99), and 'very good' (90-100). These categories were developed based on local understanding of Christchurch waterway condition relative to national water quality expectations. Annual WQI scores have been calculated since 2016 to enable comparison of trends over time.

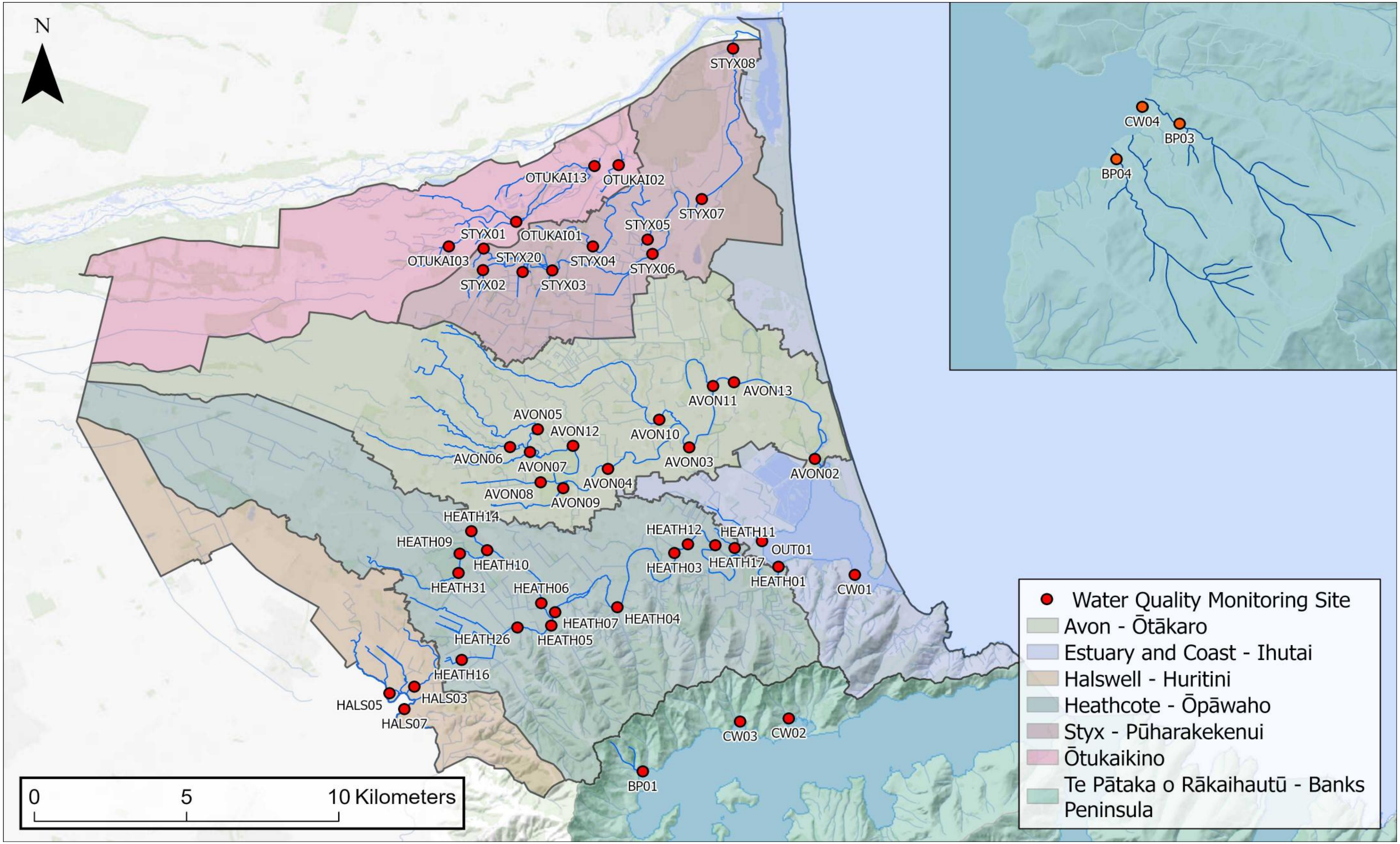

Figure 1: Location of Water Quality Monitoring Sites. Credit: Instream Consulting Limited

Table 1: Christchurch City Council surface water quality monitoring sites, and associated waterway classifications under the Comprehensive Stormwater Network Discharge Consent Environmental Monitoring Programme to allow comparison to guideline levels. Avon at Pages/Seaview, Tai Tapu Road & Heathcote at Tunnel Road were removed as sites and not sampled during 2025.

Site ID	Catchment	Location	Monthly Water Quality	Easting (NZTM)	Northing (NZTM)	Classification
AVON02	Ōtākaro-Avon River	Avon River at Bridge Street	Yes	1577691	5180813	SFP-U
AVON03	Ōtākaro-Avon River	Avon River at Dallington Terrace/Gayhurst Road	Yes	1573560	5181210	SFP-U
AVON04	Ōtākaro-Avon River	Avon River at Manchester Street	Yes	1570890	5180481	SFP-U
AVON05	Ōtākaro-Avon River	Wairarapa Stream downstream of Fendalton Road	Yes	1568250	5181303	SFP-U
AVON06	Ōtākaro-Avon River	Waimairi Stream downstream of railway bridge	Yes	1568233	5181172	SFP-U
AVON07	Ōtākaro-Avon River	Avon River at Mona Vale	Yes	1568334	5181046	SFP-U
AVON08	Ōtākaro-Avon River	Riccarton Main Drain	Yes	1568683	5180019	SFP-U
AVON09	Ōtākaro-Avon River	Addington Brook	Yes	1569427	5179826	SFP-U
AVON10	Ōtākaro-Avon River	Dudley Creek	Yes	1572574	5182150	SFP-U
AVON11	Ōtākaro-Avon River	Horseshoe Lake Discharge	Yes	1574342	5183294	SFP-U
AVON12	Ōtākaro-Avon River	Avon River at Carlton Mill Corner	Yes	1569737	5181259	SFP-U
AVON13	Ōtākaro-Avon River	Avon River at Avondale Road	Yes	1574752	5183557	SFP-U
BP01	Stream Reserve Drain / Zephyr Stream (Governors Bay)	Stream Reserve Drain above Outfall to Governors Bay	Yes	1572035	5170197	BP
BP03/SQ00170	Balguerie Stream (Akaroa)	Balguerie Stream downstream of Settlers Hill (Road)	Yes	1597748	5149578	BP
BP04	Aylmers Stream (Akaroa)	Aylmers Stream downstream of Rue Jolie, next to Bruce Terrace	Yes	1596920	5149096	BP

CW01	Ihutai-Avon-Heathcote Estuary	Estuary of the Heathcote and Avon Rivers/Ihutai at the eastern tip by Beachville Road	Yes	1579001	5176882	Coastal Contact Recreation Water
CW02	The operational area of the Port of Lyttelton	Lyttelton Port at the small wharf opposite Voelas Road	Yes	1576834	5172004	Coastal Aquatic Ecology Water
CW03	Cass Bay	Eastern side of Cass Bay off the Cass Bay Walkway	Yes	1575236	5171897	Coastal Contact Recreation Water
CW04	Akaroa Harbour	Akaroa Harbour at the termination of Rue Balguerie	Yes	1597257	5149806	Coastal Shellfish Gathering Water
HALS03	Huritini-Halswell River	Nottingham Stream at Candys Road	Yes	1564532	5173080	SFP-U
HALS05	Huritini-Halswell River	Knights Stream at Sabys Road	Yes	1563723	5172852	SFP-U
HALS07	Huritini-Halswell River	Halswell River at Wroots/Halswell Roads	Yes	1564359	5172477	SFP-U
HEATH01	Ōpāwaho-Heathcote River	Heathcote River at Ferrymead Bridge	Yes	1576491	5177150	SFP-U
HEATH03	Ōpāwaho-Heathcote River	Heathcote River at Opawa Road / Clarendon Terrace	Yes	1573071	5177615	SFP-U
HEATH04	Ōpāwaho-Heathcote River	Heathcote River at Bowenvale Ave	Yes	1571198	5175780	SFP-U
HEATH05	Ōpāwaho-Heathcote River	Cashmere Stream at Worsleys Road	Yes	1569030	5175155	BP
HEATH06	Ōpāwaho-Heathcote River	Heathcote River at Rose Street	Yes	1568701	5175918	SFP-U
HEATH07	Ōpāwaho-Heathcote River	Heathcote River at Ferniehurst Street	Yes	1569157	5175612	SFP-U
HEATH09	Ōpāwaho-Heathcote River	Hayton Stream at Retention Basin	Yes	1566020	5177596	SFP-U
HEATH10	Ōpāwaho-Heathcote River	Curletts Road Stream upstream of Heathcote River Confluence	Yes	1566928	5177711	SFP-U
HEATH11	Ōpāwaho-Heathcote River	Heathcote River at Catherine Street	Yes	1574413	5177883	SFP-U
HEATH12	Ōpāwaho-Heathcote River	Heathcote River at Mackenzie Avenue Footbridge	Yes	1573520	5177917	SFP-U
HEATH14	Ōpāwaho-Heathcote River	Curletts Road Stream at Southern Motorway	Yes	1566405	5178358	SFP-U
HEATH16	Ōpāwaho-Heathcote River	Cashmere Stream at Sutherlands Road	Yes	1566086	5173988	BP

HEATH17	Ōpāwaho-Heathcote River	Steamwharf Stream upstream of Dyers Road	Yes	1575049	5177794	SFP-U
HEATH26	Ōpāwaho-Heathcote River	Cashmere Stream at Penruddock Rise	Yes	1567915	5175090	BP
HEATH31	Ōpāwaho-Heathcote River	Heathcote River at Warren Crescent	Yes	1566034	5177359	SFP-U
OTUKAI01	Ōtūkaikino River	Ōtūkaikino River at Groynes Inlet	Yes	1567878	5188869	SFP
OTUKAI02	Ōtūkaikino River	Wilsons Drain at Main North Road	Yes	1571241	5190793	SFP
OTUKAI03	Ōtūkaikino River	Otukaikino Creek at Omaka Scout Camp	Yes	1565664	5188038	SFP
OTUKAI13	Ōtūkaikino River	Ōtūkaikino River downstream of Dickeys Road	Yes	1570444	5190767	SFP
OUT01	Linwood Canal/City Outfall Drain	Linwood Canal/City Outfall Drain at Humphreys Drive	Yes	1575952	5178026	SFP-U
STYX01	Pūharakekenui-Styx River	Smacks Creek at Gardiners Road near Styx Mill Road	Yes	1566804	5187956	SFP-U
STYX02	Pūharakekenui-Styx River	Styx River at Gardiners Road	Yes	1566790	5187226	SFP-U
STYX03	Pūharakekenui-Styx River	Styx River at Main North Road	Yes	1569066	5187219	SFP-U
STYX04	Pūharakekenui-Styx River	Ka Putahi Creek at Blakes Road	Yes	1570401	5188030	SFP-U
STYX05	Pūharakekenui-Styx River	Ka Putahi Creek at Belfast Road	Yes	1572194	5188267	SFP
STYX06	Pūharakekenui-Styx River	Styx River at Marshland Road Bridge	Yes	1572358	5187778	SFP
STYX07	Pūharakekenui-Styx River	Styx River at Richards Bridge / Teapes Road	Yes	1573975	5189640	SFP
STYX08	Pūharakekenui-Styx River	Styx River at Kainga Road / Habour Road Bridge	Yes	1574998	5194749	SFP
STYX20	Pūharakekenui-Styx River	Styx Drain upstream of Styx Mill Road	Yes	1568084	5187163	SFP-U

3. Results

3.1 Water Quality Parameters

Summary

- For the 2024 monitoring year, 27% of samples were influenced by rainfall. Trends were identified using a combination of newly emerging patterns, noteworthy changes from the previous year, and site-specific knowledge, noting that many sites have relatively short datasets of approximately 4 to 5 years.
- Notable declining water quality trends included increases in dissolved inorganic nitrogen at Aylmers Stream (21% annually), total suspended solids at Akaroa Harbour (25% annually), turbidity at Curlett Stream at Motorway (25% annually) and Steamwharf Stream (17% annually), and salinity at Linwood Canal (20% annually). These changes indicate potential nutrient enrichment, sedimentation inputs, and elevated salinity effects, with some sites warranting closer monitoring due to ecological sensitivity, including inanga spawning habitat.
- Positive trends were observed for dissolved copper at Avon River in Avondale and Ka Putahi Creek at Belfast Road, and dissolved lead at both Curlett Road Stream sites and the Heathcote River at Opawa.
- Based on the Water Quality Index (WQI), three sites were rated Very Good (Heathcote at Bowenvale Ave, Ōtūkaikino at Scout Camp & Ōtūkaikino at Groynes), nineteen Good, fifteen Fair, nine Poor and one very poor (Stream Reserve Drain). Two sites (Haytons Stream & Halswell at Wroots Road) demonstrated improving WQI trends, while Dudley Creek declined. No Catchments recorded significant long-term WQI change overall. The best performing catchment was Ōtūkaikino, while the poorest performing was Linwood Canal.
- Twenty-five sites did not meet the Attribute Target Level (ATL), with priority investigative sites at Nottingham Stream at Candys Rd, Heathcote at Ferrymead Bridge and Stream Reserve Drain identified. Investigation proceeded at Nottingham Stream whereas time constraints and site logistics prohibited progress at the other sites.
- For the 2025 monitoring period, 19 sites met all four consent Attribute Target Levels (ATLs), while 31 sites exceeded at least one stormwater containment limit. Sites in full compliance were generally located near upstream spring-fed sources or within larger mainstem waterways, with several occurring in the Ōtūkaikino Catchment (See Figure 2).
- Dissolved zinc recorded the greatest number of exceedances, with only 40% of sites meeting the relevant consent level. In comparison, all sites met the dissolved lead target, 98% met the total suspended solids target, and 76% met the dissolved lead copper target.
- The highest contaminant concentrations and most frequent exceedances were

generally recorded in the headwaters of Ōpāwaho-Heathcote and Nottingham Stream, including sites that have also shown poor water outcomes in previous years.

- Revisions to the updated Gadd et al. (2023) guideline approach means that exceedance patterns may differ from previous reporting years, even where contaminant concentrations are similar. This is because updated copper, lead and zinc guidelines account for bioavailability and can be more stringent at some sites and less at others. These changes are important when interpreting compliance outcomes and deciding whether further investigations are warranted.
- Over the latest three-year state assessment period, no sites exceeded the relevant targets for TSS or dissolved lead. However, exceedances were recorded for dissolved zinc and dissolved copper, with zinc remaining the contaminant of the greatest concern.
- Trend results displayed improvements across multiple sites for dissolved copper and lead, while trends for TSS and dissolved zinc were more variable. Most increasing containment trends were associated with dissolved zinc, although the magnitude of change was generally low. Zinc trends remain of particular concern at some sensitive receiving environments, including Cashmere at Sutherlands Road and Stream Reserve Drain.

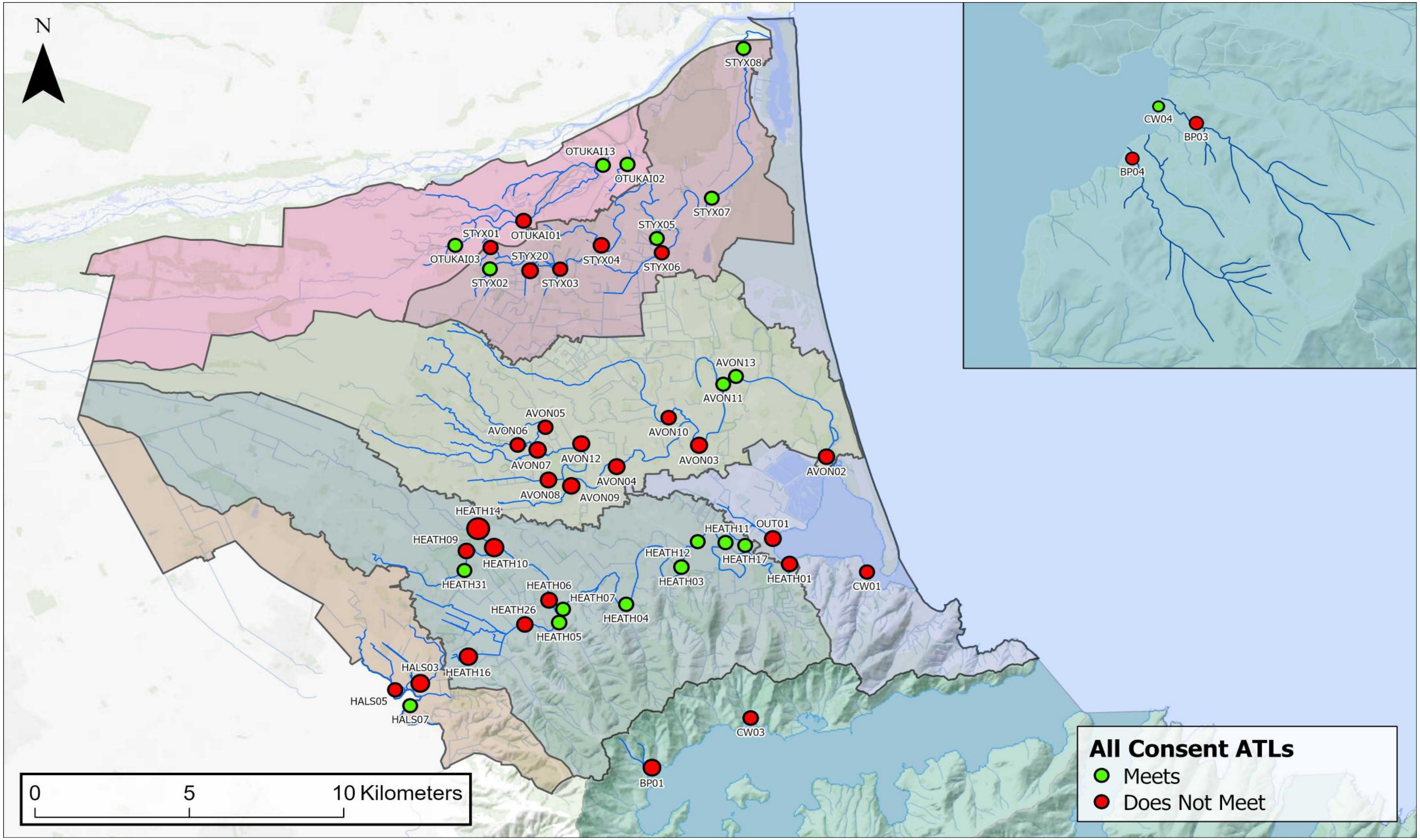

Figure 2: Compliance with consent Attribute Target Levels (ATLs) for key stormwater contaminants (total suspended solids (TSS), dissolved copper, dissolved zinc and dissolved lead). Points are scaled by number of exceedances, with larger points shown for higher exceedances. CW02 (Lyttleton Port) is omitted as it is excluded from compliance. Credit: Instream Consulting.

Metals

- Metals commonly found in stormwater, in particular, copper, lead and zinc, can be toxic to aquatic organisms, negatively affecting such things as fecundity, maturation, respiration, physical structure and behaviour (Harding, 2005). The toxicity of copper, lead and zinc in freshwater, and therefore the risk of adverse biological effects, alters depending on several abiotic factors. These toxicity modifying factors (TMFs) include, but are not limited to, organic carbon, hardness, pH, temperature, alkalinity and inorganic ligands (Gadd et al., 2023; Warne et al., 2018).
- The LWRP refers to default ANZG (2022) guidelines for metals, but current recommendations are to modify these default guideline levels by relevant TMFs (Gadd et al., 2023; ANZG, 2022; Warne et al., 2018). Prior to 2025, CCC used hardness modified guideline values for lead and zinc. These "bioavailability" adjusted guidelines were based on catchment medians for hardness that were recalculated every five years.
- Following the recommendations of Gadd et al. (2023), from 2025 CCC will measure hardness, dissolved organic carbon and pH at all the freshwater monitoring sites to calculate toxicity based on TMFs per sample. For coastal sites, the ANZG (2022) guidelines detail values of 0.0013 mg/L for copper, 0.0044 mg/L for lead, and 0.008 mg/L for zinc.

Dissolved Copper

- In the 2024 54% Ōtākaro-Avon, 67% of Ōpāwaho-Heathcote and 88% Pūharakekenui-Styx sites met their respective guidelines for dissolved copper. Only one site in Huritini – Halswell, two in Ōtūkaikino River and one in Banks Peninsula catchments did not meet the guideline. Compliance was mixed at coastal sites with Cass Bay and Ihutai/Avon-Heathcote Esti full compliance.
- During 2024 the highest number of sites that exceeded consent Attribute Target Levels were Lyttleton Port (8), Stream Reserve Drain (8), Curlett at Motorway (10) and Curlett U/S of Heathcote (6).
- In the 2025 83% of Ōtākaro-Avon, 93% of Ōpāwaho-Heathcote and 89% Pūharakekenui-Styx sites met their respective guidelines for dissolved copper. Only one site in Huritini – Halswell, Ōtūkaikino River and Banks Peninsula catchments did not meet the guideline. Compliance was mixed at coastal sites with only Akaroa Harbour exhibiting full compliance.
- During 2025 the highest number of sites that exceeded consent Attribute Target Levels were Avon at Lyttleton Port (4), Mona Vale (3), Curlett at Motorway (4) and Cashmere Stream at Sutherlands Road (5)
- Trend and state analysis for dissolved copper displayed 36 sites that were 'very likely improving' and seven 'likely improving'. This was observed across multiple catchments. In contrast, Curletts Stream U/S of Heathcote and Styx River at Gardiners Road exhibited very likely degrading trend. Stream Reserve Drain was

noted to be likely degrading (Figure 3).

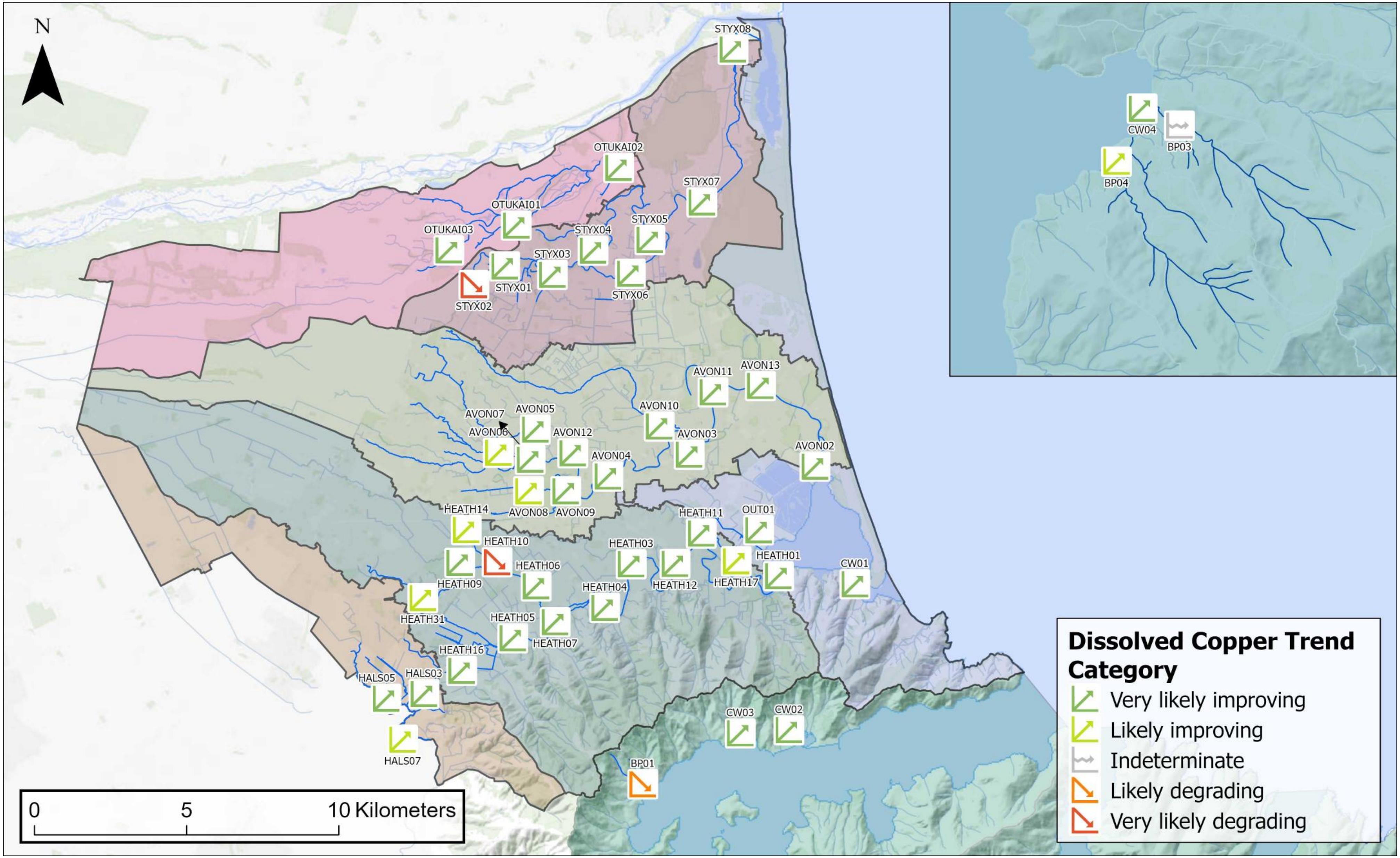

Figure 3: Dissolved copper trends over time A combination of 10-year and 6-year trends (at sites with less than 10 years of data) are shown. OTUKAI13, STYX20 and HEATH26 are omitted due to insufficient data (< 5 years) to assess trends.

Dissolved Lead

- General site compliance was observed across 2024 and 2025 for lead concentrations. The only non-compliance incidents were recorded during May 2024 at Akaroa Harbour (57% exceedance) and Lyttelton Port (52% exceedance). There were no incidents of non-compliance during 2025.
- Concentrations were generally consistent between catchments, and between waterway and coastal sites.
- 35 sites across multiple catchments displayed a long-term confidence trend of 'very likely improving' (Figure 4). In contrast long-term trend output indicates increasing lead concentrations at Stream Reserve Drain (Figure 4).

Dissolved Zinc

- In the 2024 calendar year, 83% of sites in Ōtākaro-Avon River catchment met their respective guidelines for dissolved zinc. On the Ōpāwaho-Heathcote River 73% and 77% for the Pūharakekenui-Styx complied. Only 1 site within the Banks Peninsula and Huritini – Halswell did not fully comply. There was full compliance at all sites on the Ōtūkaikino River. At the four coastal and estuarine sites only 24% exhibited compliance during 2024.
- During 2024 the highest number of sites that exceeded consent Attribute Target Levels were Addington Brook (4), Akaroa Harbour (4), Lyttleton Port (5), Stream Reserve Drain (10), Curletts at Motorway (9), Curlett U/S Heathcote (5) and Linwood Canal (7).
- In the 2025 calendar year, no sites in the Banks Peninsula and only two sites (Horseshoe Lake & Avon at Avondale) in the Ōtākaro-Avon River fully complied. In the Pūharakekenui-Styx catchment 55% of sites exhibited exceedances. Only one site each in the Huritini – Halswell and Pūharakekenui-Styx catchments exceeded the guideline. Compliance at the coastal and estuarine sites for 2025 remained the same as the previous year.
- For both 2024 and 2025 exceedances were generally higher in the coastal and estuarine sites, Ōpāwaho-Heathcote River, Ōtākaro-Avon River and Pūharakekenui-Styx catchments. In 2025, exceedance was higher at all Banks Peninsula sites than the previous year.
- During 2025 the highest number of sites that exceeded consent Attribute Target Levels were Avon at Bridge Street (4), Avon at Dallington Terrace (6), Avon at Manchester St (4), Riccarton Main Drain (4), Addington Brook (6), Stream Reserve Drain (6), Balguerie Stream (4), Nottingham at Candys Rd (11), Heathcote at Rose St (5), Curtlett U/S of Heathcote (9), Curlett at Motorway (11), Cashmere at Sutherlands Rd (4), Linwood Canal (5) and Styx Drain (4).
- Trend and state analysis displayed 19 sites with improving trends in dissolved zinc concentrations. The largest improvements were Ōtūkaikino at Groynes (-8%), Hayton Stream (-8.6) and Heathcote at Warren Cres (-7%). In contrast, 14

sites demonstrated in increases in concentrations with the highest being Stream Reserve Drain (23%) (Figure 5)

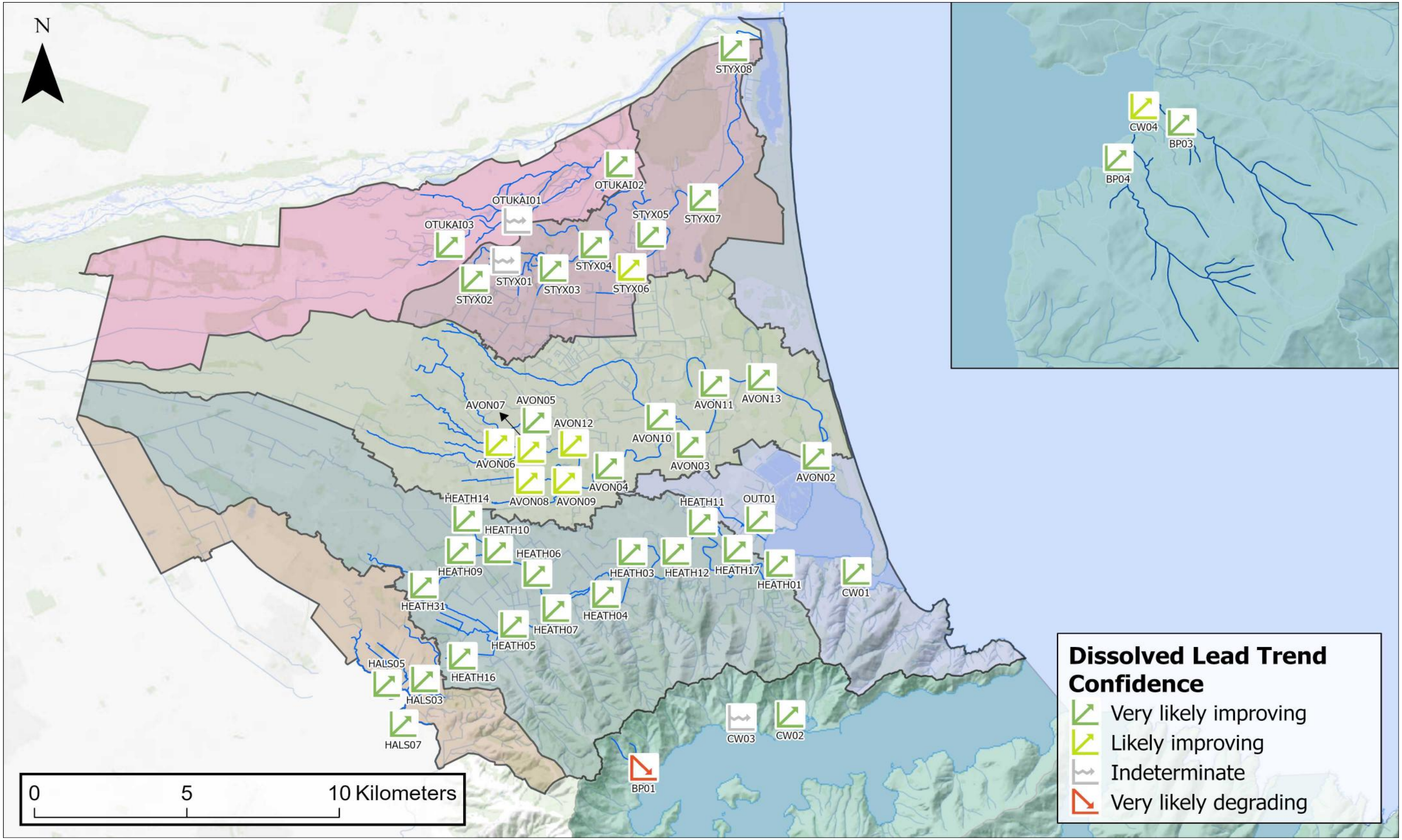

Figure 4: Dissolved lead trends over time A combination of 10-year and 6-year trends (at sites with less than 10 years of data) are shown. OTUKAI13, STYX20 and HEATH26 are omitted due to insufficient data (< 5 years) to assess trends. Credit: Instream Limited.

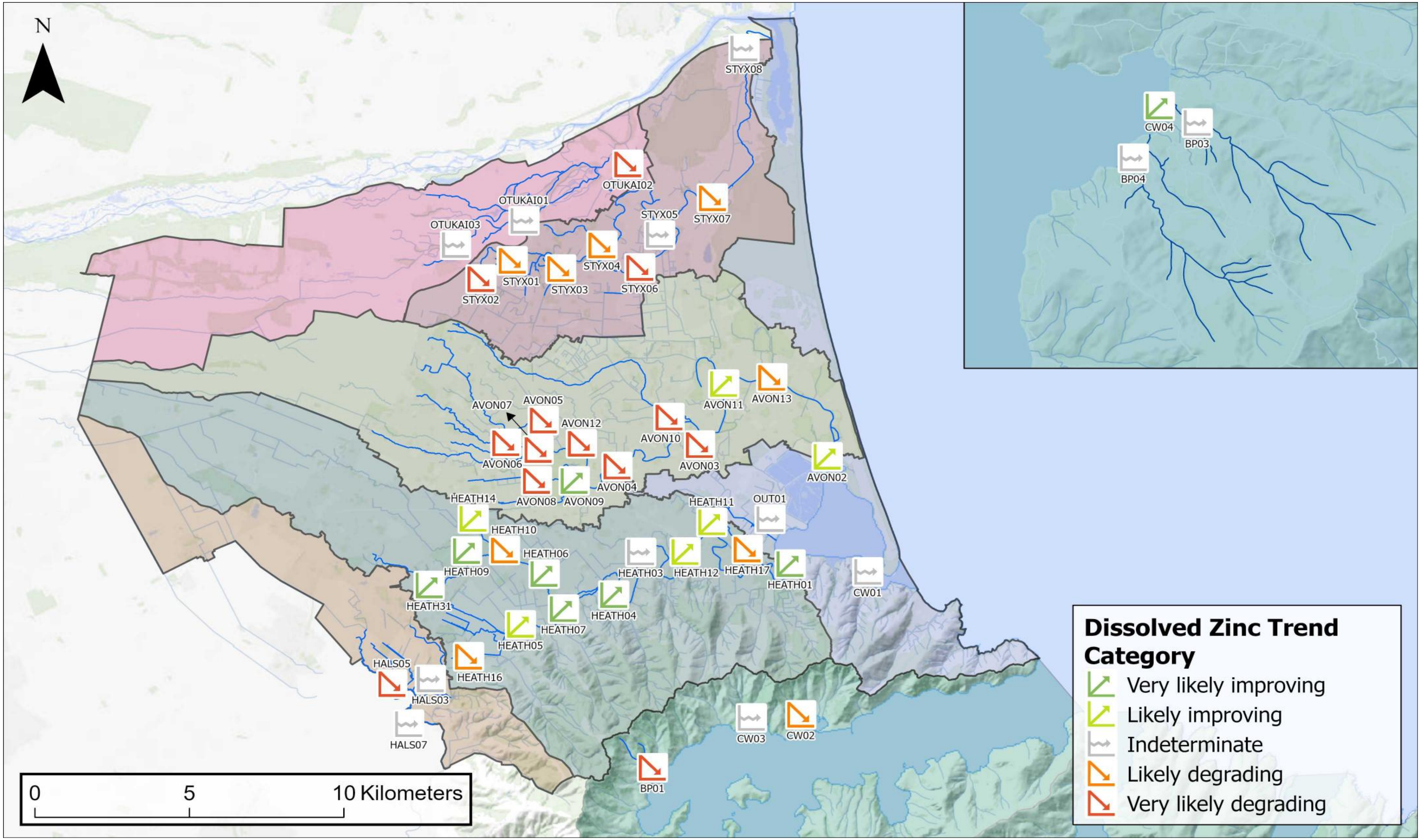

Figure 5:Dissolved zinc trends over time. A combination of 10-year and 6-year trends (at sites with less than 10 years of data) are shown. OTUKAI13, STYX20 and HEATH26 are omitted due to insufficient data (< 5 years) to assess trends. Credit: Instream Limited.

Total Suspended Solids (TSS)

- TSS solids can reduce water clarity, limit light penetration and affect aquatic plants and algae. High levels can also interfere with fish gills and movement. When sediment settles, it can smother streambed habitat, fill gaps between gravels, and reduce habitat quality for macroinvertebrates and fish. Suspended solids can also carry other contaminants, such as metals and nutrients, contributing to wider water quality degradation.
- In 2024, 76% of sites in Ōtākaro-Avon River, 71% in the Ōpāwaho-Heathcote River and 85% of Pūharakekenui-Styx sites met their respective guidelines for TSS concentrations. Only one site in each of the Banks Peninsula, Huritini – Halswell and Ōtūkaikino River catchments did not fully comply. Compliance was observed at 33% of the four coastal and estuarine sites for the 2024 calendar year. TSS concentrations were higher at these sites which is likely attributed to suspension and settlement typical of these habitat types.
- Exceedances were recorded at 13 sites with the largest number of exceedances recorded at Akaroa Harbour (5), Lyttelton Port (4) and Curlett U/S of Heathcote (3).
- In 2025, 58% of sites in Ōtākaro-Avon River catchment, 35% Ōpāwaho-Heathcote River and 88% for the Pūharakekenui-Styx met their respective guidelines for TSS concentrations. Only one site within Huritini – Halswell and Ōtūkaikino River catchments did not fully comply. Banks Peninsula presented mixed results with all sites not exhibiting full compliance. No coastal and estuarine sites fully complied with intermittent adherence observed. Concentrations remained high at these sites in comparison to waterway counterparts.
- Exceedances were recorded at 16 sites with the largest number of exceedances recorded at Curlett at Motorway (7) & Cashmere at Penruddock Rise (3).
- Trend analysis displayed 13 sites that were ‘very likely improving’ and 6 that were likely improving. The largest improvements in TSS concentrations were Halswell at Wroots Road (-47.4%), Cass Bay (-9.4%) and Balguerie Stream (-5.3%)
- Trend and state analysis displayed 13 sites that were ‘very likely degrading’ and 8 that were ‘likely degrading’. The largest changes were Aylmers Stream (13%), Akaroa Harbour (15%) and Wilsons Stream (4.2%) Figure xx

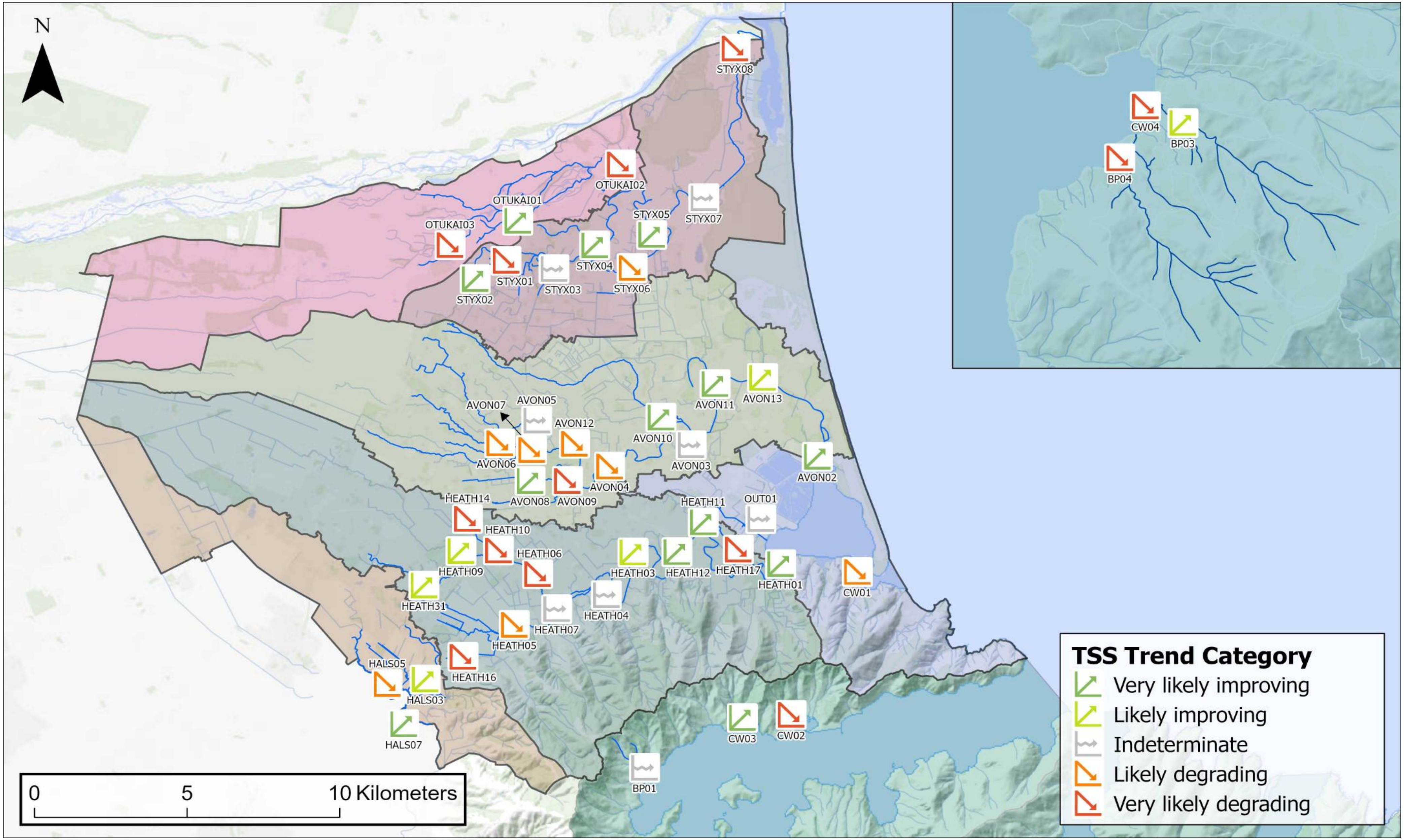

Figure 6: Total suspended solids (TSS) trends over time. A combination of 10-year and 6-year trends (at sites with less than 10 years of data) are shown. OTUKAI13, STYX20 and HEATH26 are omitted due to insufficient data (< 5 years) to assess trends. Credit: Instream Limited.

Additional Water Quality Parameters

Additional water quality parameters were assessed to provide a broader indication of waterway conditions, alongside the key stormwater contaminants. Parameters without specific guideline values across all catchments included conductivity, turbidity, dissolved reactive phosphorus, dissolved inorganic nitrogen and *E coli*. These were consistent with contaminants or indicators of concern identified in previous monitoring years.

Elevated results reflect the influence of both urban and rural land use. High conductivity may indicate dissolved ions, which can be associated with saline influence, dissolved metals or other sources. High turbidity indicates suspended sediment, potentially from erosion, rainfall run-off or point-source discharges, and can be exacerbated where fine sediments are easily resuspended. Elevated dissolved inorganic nitrogen and dissolved reactive phosphorus indicate nutrient enrichment, which can promote aquatic algal growth, macrophyte growth, reduced channel capacity and flood risk.

E coli is used as an indicator of faecal contamination and potential recreational contact risk. Elevated levels are often associated with rainfall, runoff and animal or human sources. Previous faecal source tracking in the Avon and Heathcote catchments identified birds as a dominant source, with smaller contributions from humans, dogs and ruminants. In catchments where source tracking has not been undertaken, likely sources can generally be inferred from surrounding land use.

Conductivity

- Conductivity indicates the concentration of dissolved ions in the water. Elevated conductivity can reflect inputs from urban runoff, saline influence, wastewater, dissolved metals, nutrients or other contaminants. High or changing conductivity can affect freshwater organisms by altering water chemistry and may indicate broader water quality pressures across the catchments.
- In 2024, 9 sites met the guideline with compliance largely observed in Pūharakekenui-Styx and Ōtūkaikino catchments. However, compliance was not consistent and presented sporadic results even within these catchments. Coastal and tidal sites presented the highest values, likely attributed to saline influence. This was the case for all sites during 2024 and 2025.
- The highest values recorded were Heathcote at Ferrymead in May (110000 µS/cm), Stream Reserve Drain in the Banks Peninsula in March (34000 µS/cm) and Avon at Bridge Street in April (16100 µS/cm). The March and May readings were not associated with rainfall, however, the April sample at Bridge Street recorded 12.6mm of rainfall, likely influencing this elevation.
- In 2025, 13 sites met the guideline with compliance largely observed in

Pūharakekenui-Styx and Ōtūkaikino catchments. Compliance was intermittent with only one site (Ōtūkaikino D/S of Dickeys Road) exhibiting compliance throughout the calendar year.

- The highest values recorded were Heathcote at Ferrymead (25100 µS/cm), and Avon at Bridge Street both in October (9630 µS/cm). None of these readings were associated with rainfall events.
- Median values covering 2022-25 indicate non-compliance for most sites in the Ōtākaro-Avon River, Ōpāwaho-Heathcote and Pūharakekenui-Styx catchments. Adherence was largely observed in the Ōtūkaikino Catchment.

Turbidity

- Turbidity reflects the cloudiness of water caused by suspended particles such as fine sediment, organic matter or algae. Elevated turbidity can reduce light penetration, affecting aquatic plants and algae, fish feeding, movement and habitat use. It may also indicate sediment run-off, erosion, rainfall impacts and other contaminant inputs in the waterway.
- In 2024, full compliance for the calendar year was observed at Avon at Bridge Street, Linwood Canal, Cashmere at Sutherland Street and Ōtūkaikino at Groynes. Compliance was observed at 25% of the four coastal and estuarine sites. Turbidity concentrations were generally higher at these sites in comparison to waterway sites.
- The Ōpāwaho-Heathcote River catchment recorded higher turbidity concentrations compared to the other catchments. The highest turbidity readings were recorded at Hayton Stream (910 FNU in December), Curlett U/S of Heathcote (66 FNU in July), and Curlett at Motorway (53 FNU in October). The Hayton Stream reading was the only site associated with rainfall (6.6mm on the 16th December).
- In 2025, full compliance for the calendar year was observed at Ōtūkaikino at Groynes with sporadic and episodic incidents of exceedances at all remaining sites across the catchments. This was a similar case for coastal and estuarine sites.
- The Ōpāwaho-Heathcote River catchment recorded higher turbidity concentrations compared to the other catchments. The highest turbidity readings were recorded at Cashmere at Penruddock Rise (63 FNU in January) and Curlett at Motorway (140 FNU in October and 84 FNU in November). None of these recordings were associated with rainfall events.
- Median values covering 2022-25 indicate non-compliance for most sites in the Ōtākaro-Avon River, Ōpāwaho-Heathcote and Pūharakekenui-Styx catchments. Adherence was largely observed in the Ōtūkaikino Catchment.

Dissolved Reactive Phosphorus (DRP)

- Dissolved reactive phosphorus is a readily available form of phosphorus that can contribute to nutrient enrichment in waters. Elevated concentrations can promote excessive algal and aquatic plant growth which may reduce habitat quality and ecosystem function.
- In 2024 and 2025 the median concentrations of DRP at over half the sites did not comply with their respective guidelines, and only the Ōtūkaikino River catchment presented the strongest compliance rate (2/3 sites). The highest concentrations were observed in sites in the Ōtākaro-Avon, Ōpāwaho-Heathcote and Huritini-Halswell catchments.
- Median values over the period 2022-25 indicated mixed outcomes with the full compliance observed in Ōtūkaikino River catchment. The largest exceedances were concentrated in the Ōtākaro-Avon, Ōpāwaho-Heathcote rivers, Pūharakekenui-Styx and Banks Peninsula.

Nitrate & Dissolved Inorganic Nitrogen

- Nitrate and dissolved inorganic nitrogen are forms of nitrogen that can contribute to nutrient enrichment in waterways. Elevated concentrations can promote excessive algal and aquatic plant growth, which may reduce habitat quality, alter ecosystem balance and contribute to low dissolved oxygen when plant or algal material breaks down. High nitrogen levels may indicate inputs from urban runoff, wastewater, groundwater, fertilizers or rural land use.
- In 2024 most sites exhibited compliance with the nitrate guidelines with the exceptions of being Halswell at Wroots Road, Halswell at Tai Tapu Road, Halswell at Knights at Saby Road and Heathcote at Warren Cresent.
- In 2025, most sites exhibited compliance with the nitrate guidelines with the exceptions being Riccarton Main Drain, Halswell at Sabys Road, Halswell at Wroots Road and Heathcote at Warren Cresent.
- Higher nitrate concentrations in 2024 and 2025 were centred in the Ōpāwaho-Heathcote and Huritini – Halswell rivers.
- In 2024, 31% of sites in Ōtākaro-Avon River, 43% in the Ōpāwaho-Heathcote River and 63% of Pūharakekenui-Styx sites met their respective guideline for DIN concentrations. One site fully complied in the Huritini – Halswell catchment, one in the Ōtūkaikino River catchment and none in the Banks Peninsula. The highest concentrations were observed in Heathcote at Warren Cresent (5.6 mg/L in March, June, September and October), Knights at Sabys (4.7 mg/L in April) and Halswell at Wroots Road (3.9 mg/L in June, July & October). Only the June recording at Wroots Road was associated with a rainfall event (4mm on 20th June).

- In 2025, 62% of sites in Ōtākaro-Avon River, 38% in the Ōpāwaho-Heathcote River and 89% of Pūharakekenui-Styx sites met their respective guideline for DIN concentrations. One site fully complied in the Huritini – Halswell catchment, two in the Ōtūkaikino River catchment and none in the Banks Peninsula. The highest concentrations were observed in Riccarton Main Drain (8.8 mg/L in February, Heathcote at Warren Cresent (5.3 mg/L in March) and Knights at Sabys (3.8 mg/L in May). Only the March recording at Warren Cresent was associated with a rainfall event (1.8mm at Canterbury Agricultural Park).
- Median values over the period 2022-25 indicated mixed outcomes with the full compliance observed in the Huritini – Halswell and Pūharakekenui-Styx catchment. The largest exceedances were concentrated in the Ōtākaro-Avon, Ōpāwaho-Heathcote rivers and Banks Peninsula.

***E coli*, Enterococci & Faecal Coliforms**

- *E coli*, enterococci and faecal coliforms are indicators of faecal contamination in water. Elevated levels can indicate inputs from human wastewater and livestock with impacts pronounced during high rainfall events. High concentrations can reduce water quality, create health and recreational risks and signal wider catchment contamination issues.
- Over the period 2022-25 the only sites to comply with the 95th percentile *E. coli* guideline level were Avon at Bridge Street, Heathcote at Ferrymead Bridge, Cashmere at Sutherlands Road, Heathcote at Warren Cresent, Ōtūkaikino at Scout Camp, Ōtūkaikino at Groynes, Otukaikino D/S of Dickeys Road, Styx at Main North Rd and Styx at Harbour Road.
- In 2024, the highest concentrations of *E coli* were recorded at Addington Brook (20,000 CFU/100ml in October), Riccarton Main Drain (20,000 CFU/100ml in February) and Heathcote at Ferrymead (24,000 CFU/100ml in August). Only the Addington Brook recording was associated with a rainfall event (5.8mm at Hagley Park).
- In 2025, the highest concentrations of *E coli* were recorded at Addington Brook (24,000 CFU/100ml in March), Styx at Harbour Road (24,000 CFU/100ml in April) and Heathcote at Ferniehurst Street (24,000 CFU/100ml in December). None of these recordings were associated with rainfall events.
- No enterococci samples were collected from coastal sites in 2024. For 2025, Akaroa Harbour was the only site to fully comply with guidelines. Linwood Canal and Heathcote at Ferrymead recorded higher concentrations, with 1800 CFU/100ml at Linwood (February) and 870 CFU/100ml at Ferrymead (December). None of these recordings were associated with rainfall events.
- Faecal coliform concentrations at Akaroa Harbour were generally low across the 2025 monitoring period, with a calculated 90th percentile of approximately

19 CFU/100 ml. However, one elevated result of 250 CFU/100ml was recorded, indicating an isolated high reading relative to the remainder of the dataset.

- Faecal coliform concentrations did not change over time at the Akaroa Harbour site.

Dissolved Oxygen (DO)

- Low dissolved oxygen can place stress on aquatic organisms, particularly fish and macroinvertebrates that rely on oxygen in the water to survive. Prolonged low oxygen levels can reduce habitat quality, affect feeding and movement. In severe cases low DO can lead to fish kills. Low DO may be caused by high organic matter, excessive plant or algal growth, slow flows, warm water temperatures or poor mixing.
- In 2024, 53% of sites in Ōtākaro-Avon River, 42% in the Ōpāwaho-Heathcote River and 22% of Pūharakekenui-Styx sites met their respective guideline for dissolved oxygen concentrations. Two sites fully complied in the Huritini – Halswell catchment, one in the Ōtūkaikino River catchment and one in the Coastal sites. No sites fully complied with the guideline in the Banks Peninsula.
- Dissolved oxygen concentrations were typically lower in the Ōpāwaho-Heathcote River catchment, particularly in the upper reaches. DO concentrations were higher in coastal and estuarine sites.
- In 2025, 75% of sites in the Ōtūkaikino River catchment, 33% in Huritini – Halswell catchment and 31% of sites in Ōtākaro-Avon River met their respective guideline for DO. For the remaining sites, results were mixed with no site achieving full compliance.
- Dissolved oxygen concentrations were lower in the Ōpāwaho-Heathcote River catchment, with the lowest readings present at Curlett U/S of Heathcote (DO saturation of 13% recorded in October).
- Median values covering 2022-25 indicate compliance for most sites, however lower dissolved oxygen concentrations were most pronounced in the Ōpāwaho-Heathcote River catchment.

Water Temperature

- Elevated water temperature can stress aquatic organisms by increasing metabolic demand and reducing the amount of dissolved oxygen in the water. Warmer water can affect fish and macroinvertebrate survival, growth, reproduction and movement. Higher temperatures may also promote excessive algae or plant growth and worsen the effects of other water quality pressures.
- In 2024, 38% of sites in Ōtākaro-Avon River, 92% in the Ōpāwaho-Heathcote River and 77% of Pūharakekenui-Styx sites met their respective guideline for water temperature. Three sites fully complied in the Huritini – Halswell catchment, one in the Ōtūkaikino River catchment and one in the Banks Peninsula.
- Compliance was observed at 75% of the four coastal and estuarine sites for the 2024 calendar year.
- Temperature was typically observed to be more stable in the upper reaches of the Ōtākaro-Avon River and Ōpāwaho-Heathcote River catchments compared to the more downstream and coastal sites. The three highest readings were from Linwood Canal (24.5°C in January 2024), Steamwharf Stream (19°C in December 2024) and Cass Bay (23°C in December 2024). None of these events were associated with rainfall events.
- In 2025, 92% of sites in Ōtākaro-Avon River, 80% in the Ōpāwaho-Heathcote River and 89% of Pūharakekenui-Styx sites met their respective guideline for water temperature. Two sites fully complied in the Huritini – Halswell catchment, three in the Ōtūkaikino River catchment and two in the Banks Peninsula.
- Compliance was mixed at the four coastal and estuarine sites for the 2025 calendar year, with Akaroa Harbour demonstrating the highest rate of compliance.
- Temperature was typically observed to be more stable in the upper reaches of the Ōtākaro-Avon River and Ōpāwaho-Heathcote River catchments compared to the more downstream and coastal sites. The three highest readings were from Ihutai/Avon-Heathcote Estuary (23°C in January 2024), Linwood Canal (22°C in February 2025) and Steamwharf Stream (19°C in November 2025). None of these events were associated with rainfall events.
- Median values over the period 2022-25 indicated compliance across all sites and catchments with values concentrated between 11-15 (°C). Sites that exhibited the highest median values were all the coastal sites.

Biological Oxygen Demand (BoD5)

- Biological Oxygen Demand (BoD5) is an indicator of the amount of biodegradable organic material in the water and the amount of oxygen required by bacteria to break down this material. High BOD5 values are due to plant matter, nitrogen and phosphorus, and indicate the potential for bacteria to deplete oxygen levels in the water. The LWRP does not have a guideline level for this parameter. The Ministry for the Environment (1992) and RCEP (2012) guideline level is 2 mg/L, although this is for filtered samples and samples are currently tested for total levels therefore comparisons to the guideline will be conservative.
- In 2024, 54% of sites in Ōtākaro-Avon River, 53% in the Ōpāwaho-Heathcote River and 87% of Pūharakekenui-Styx sites met their respective guideline for BOD5. Two sites fully complied in the Huritini – Halswell catchment, one in the Ōtūkaikino River catchment and one in the Banks Peninsula.
- Compliance was observed at 50% of the four coastal and estuarine sites for the 2024 calendar year.
- Hayton and Curlett Stream (Motorway & U/S of Heathcote) recorded higher concentrations than other sites. High levels were recorded at Hayton Stream (5.7 mg/L in May 2024 & 8.7 mg/L in December 2024) and Nottingham Stream at Candys Road (6.5 mg/L in April 2024). None of these exceedances were associated with rainfall events.
- In 2025, 47% of sites in the Ōpāwaho-Heathcote River and 2/3 sites in Huritini – Halswell catchment met their respective guideline for BOD. The remainder of sites presented mixed results for Ōtākaro-Avon River, Ōtūkaikino River, Pūharakekenui-Styx and the Banks Peninsula with no overall compliance observed.
- Compliance presented a mixed results at the four coastal and estuarine sites for the 2025 calendar year, with Akaroa Harbour demonstrating the highest rate of compliance.
- Like the previous year, Hayton and Curlett Stream recorded higher concentrations than other sites. High levels were recorded at Cashmere at Sutherlands Road (5.7 mg/L in March 2025), Akaroa Harbour (5.6 mg/L in February 2025), and Heathcote at Opawa Road (5.3 mg/L in September 2025).
- Median values over the period 2022-25 indicated compliance across most sites and catchments. The only site with a consistent exceedance was Hayton Stream (2.2 mg O_2/L).

Total Ammonia

- Total ammonia (ammoniacal nitrogen) is typically a minor component of the nitrogen available for plant growth, but at high levels can have toxic effects on aquatic ecosystems. The toxicity of ammonia varies with pH (ANZECC, 2000). Therefore, the LWRP water quality standards also vary depending on pH, ranging from 2.57 mg/L at pH 6 to 0.18 mg/L at pH 9 (Environment Canterbury, 2018). The water quality standard for this monitoring shall be adjusted based on the median pH levels for the relevant catchments. The exception to this is for Banks Peninsula waterways which have a set guideline value regardless of pH (0.32 mg/L; Environment Canterbury, 2018). Ammoniacal nitrogen is not required to be sampled at coastal sites.
- In 2024, all sites complied with the respective guideline for Total Ammonia, except for Stream Reserve Drain which exceeded the guideline of 0.32 mg/L, with an excursion of 2.44 mg/L.
- In 2025, the 95th percentiles at all sites complied with their respective guidelines.
- The 95th percentiles over the period 2022-25 indicated compliance across most sites and catchments. Stream Reserve Drain was the only site that exhibited consistent exceedance (0.352 mg /L).

pH

- pH indicates how acidic or alkaline the water is. Most aquatic organisms are adapted to a relatively narrow pH range, therefore elevated or reduced pH can cause stress, affect growth and reproduction. Changes in pH can also influence the toxicity of and availability of other contaminants including metals and nutrients.
- Median pH values generally complied with ATL guideline levels during 2024 and 2025. Several incidents were recorded at individual sites during 2024, and full compliance was observed at all sites during 2025.
- Incidents of non-compliance during 2024 were recorded at Stream Reserve Drain in March (5.7), Avon at Avondale Road in November (8.6), and Wilsons Stream in the Ōtūkaikino catchment which recorded a value of 8.7 in October and 8.6 in November. These values represented the highest and lowest values of the calendar year.
- The lowest recorded pH values during 2025 were recorded at Heathcote at Warren Cresent (6.5), Curletts U/S of Heathcote (6.6) and Curlett at Motorway (6.6) and highest recorded was Linwood Canal (8.3), French Bay (8.1) and Cass Bay (8.1).
- Waterway sites were generally similar to each other, with coastal sites recording

generally higher pH than waterway/freshwater counterparts.

Salinity

- No relevant guidelines currently exist for salinity.
- No salinity samples were collected during 2024. This did resume for sites during 2025.
- Salinity was higher at coastal sites than tidal influenced waterways.
- The highest salinity values recorded in 2025 were Akaroa Harbour (35 during April, July & September), Ihutai/Avon-Heathcote Estuary (35 during March, June and August) and Cass Bay (35 during February, March, April & November).

3.3 Water Quality Index

- Annual Water Quality Index (WQI) results for 2024 showed that most monitoring sites were rated as Good or Fair. Of the sites assessed three were rated 'Very Good' nineteen 'Good', fifteen 'Fair', nine 'Poor', and one 'Very Poor'.
- The highest scoring sites were Ōtūkaikino at Groynes, Ōtūkaikino at Scout Camp, and Heathcote at Bowenvale Avenue, while the lowest scoring site was Stream Reserve Drain in the Zephyr Stream catchment.
- Poorer performing sites were mainly located in the Ōpāwaho-Heathcote, Ōtākaro-Avon, Linwood Canal, Huritini-Halswell and Zephyr Stream catchment catchments. In contrast, the Ōtūkaikino sites performed particularly well, with both sites rated 'Very Good'.
- Significant temporal trends were limited, with improving WQI trends recorded at Haytons Stream and Halswell at Wroots Road, while Dudley Creek showed a declining trend.
- Annual Water Quality Index (WQI) results for 2025 indicated generally improved water quality compared to previous years, with fewer sites rated 'poor' and none classified as 'very poor'. However, much of the improvement reflects methodological changes to WQI, particularly the inclusion of bioavailable copper, as scores remained broadly consistent with previous years when adjusted copper concentrations were applied.
- As in previous monitoring periods, the highest WQI scores occurred within the Styx and Ōtūkaikino catchments, while lower scores occurred in the Heathcote catchments.
- The revised WQI methodology resulted in notable score changes at several sites, including Smacks Creek, Addington Brook and Dudley Creek, highlighting influence of bioavailable copper on water quality interpretation.
- Trend analysis across 41 sites displayed mixed outcomes, with 13 sites exhibiting improving or likely improving trends, 19 showing no clear trend, and 9 displaying declining trends.

Table 2: The 2025 Water Quality Index (WQI) and trend results. There was insufficient data to calculate trends at HEATH26, OTIKAI13 and STYX20 as these sites were added to the monitoring network in 2025.

Site ID	Catchment	WQI Score	Water Quality Category	Trend Period (Years)	WQI Temporal Trend
AVON03	Ōtākaro-Avon	81	Good	10	Indeterminate
AVON04	Ōtākaro-Avon	86	Good	10	Likely improving
AVON05	Ōtākaro-Avon	87	Good	10	Indeterminate
AVON06	Ōtākaro-Avon	78	Fair	10	Likely degrading
AVON07	Ōtākaro-Avon	86	Good	10	Likely degrading
AVON08	Ōtākaro-Avon	74	Fair	10	Indeterminate

AVON09	Ōtākaro-Avon	71	Fair	10	Indeterminate
AVON10	Ōtākaro-Avon	77	Fair	10	Likely degrading
AVON11	Ōtākaro-Avon	82	Good	10	Indeterminate
AVON12	Ōtākaro-Avon	86	Good	10	Indeterminate
AVON13	Ōtākaro-Avon	83	Good	10	Indeterminate
BP01	Zephyr Stream	67	Poor	6	Very likely degrading
BP03	Balguerie Stream	71	Fair	6	Likely degrading
BP04	Aylmers Stream	66	Poor	6	Indeterminate
HALS03	Huritini-Halswell	75	Fair	10	Indeterminate
HALS05	Huritini-Halswell	82	Good	10	Indeterminate
HALS07	Huritini-Halswell	86	Good	6	Very likely improving
HEATH03	Ōpāwaho-Heathcote	76	Fair	10	Indeterminate
HEATH04	Ōpāwaho-Heathcote	81	Good	10	Very likely improving
HEATH05	Ōpāwaho-Heathcote	81	Good	10	Indeterminate
HEATH06	Ōpāwaho-Heathcote	71	Fair	10	Indeterminate
HEATH07	Ōpāwaho-Heathcote	80	Good	10	Likely improving
HEATH09	Ōpāwaho-Heathcote	64	Poor	10	Very likely improving
HEATH10	Ōpāwaho-Heathcote	60	Poor	10	Likely degrading
HEATH11	Ōpāwaho-Heathcote	76	Fair	10	Likely improving
HEATH12	Ōpāwaho-Heathcote	85	Good	10	Very likely improving

HEATH14	Ōpāwaho-Heathcote	50	Poor	10	Very likely degrading
HEATH16	Ōpāwaho-Heathcote	76	Fair	10	Likely degrading
HEATH17	Ōpāwaho-Heathcote	84	Good	6	Indeterminate
HEATH26	Ōpāwaho-Heathcote	77	Fair	1	-
HEATH31	Ōpāwaho-Heathcote	87	Good	6	Very likely improving
OTUKAI01	Ōtūkaikino	86	Good	10	Likely degrading
OTUKAI02	Ōtūkaikino	86	Good	10	Likely degrading
OTUKAI03	Ōtūkaikino	96	Excellent	10	Indeterminate
OTUKAI13	Ōtūkaikino	100	Excellent	1	-
STYX01	Pūharakekenui-Styx	90	Excellent	10	Indeterminate
STYX02	Pūharakekenui-Styx	90	Good	10	Indeterminate
STYX03	Pūharakekenui-Styx	82	Good	10	Very likely degrading
STYX04	Pūharakekenui-Styx	81	Good	10	Likely improving
STYX05	Pūharakekenui-Styx	80	Fair	10	Indeterminate
STYX06	Pūharakekenui-Styx	80	Good	10	Likely degrading
STYX07	Pūharakekenui-Styx	89	Good	10	Likely improving
STYX08	Pūharakekenui-Styx	79	Fair	10	Indeterminate
STYX20	Pūharakekenui-Styx	77	Fair	1	-

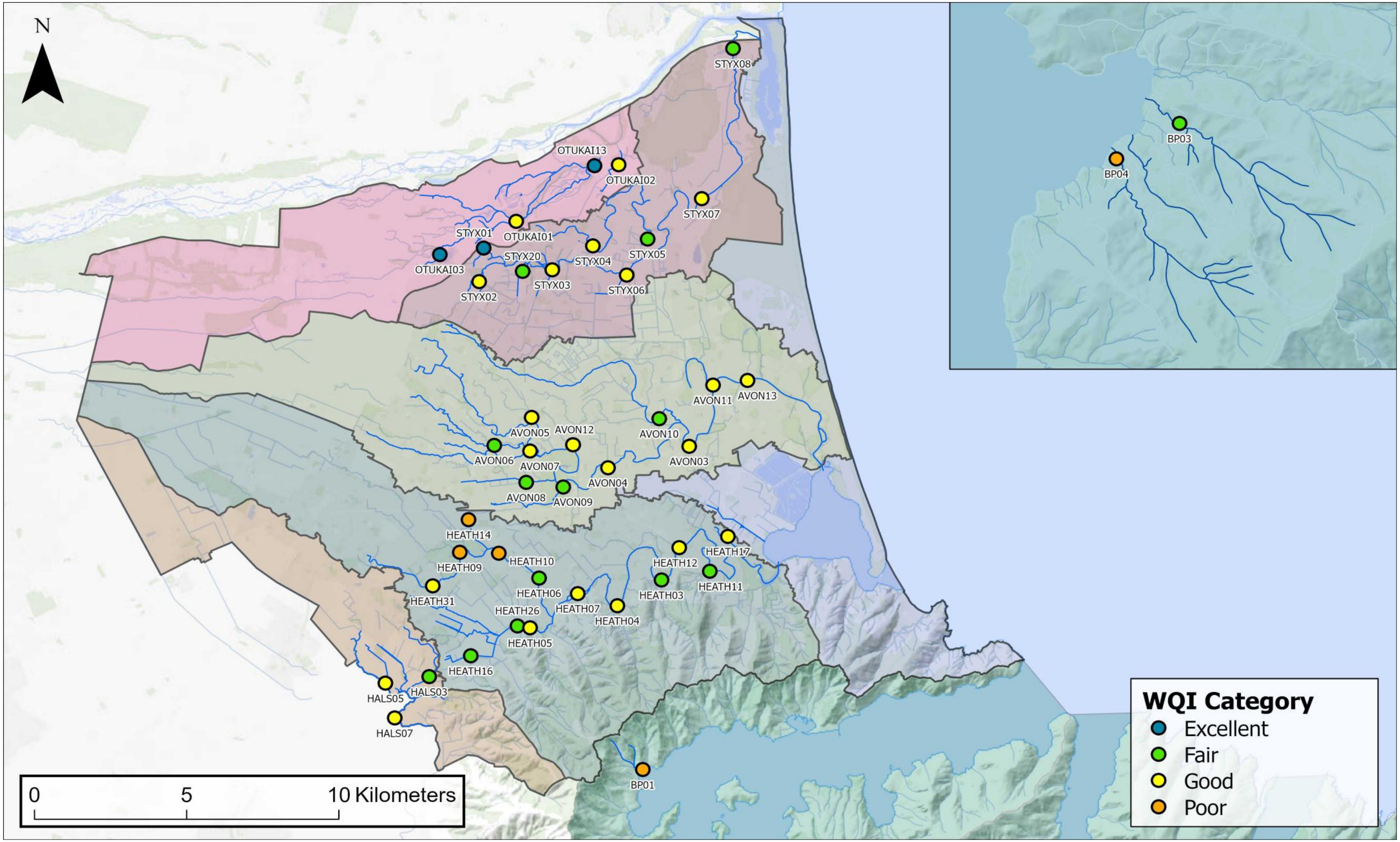

Figure 7: Water Quality Index (WQI) categories for 2025. Coastal and strongly tidally influenced sites are omitted as the WQI is not calculated at these sites. Credit: Instream Consulting.

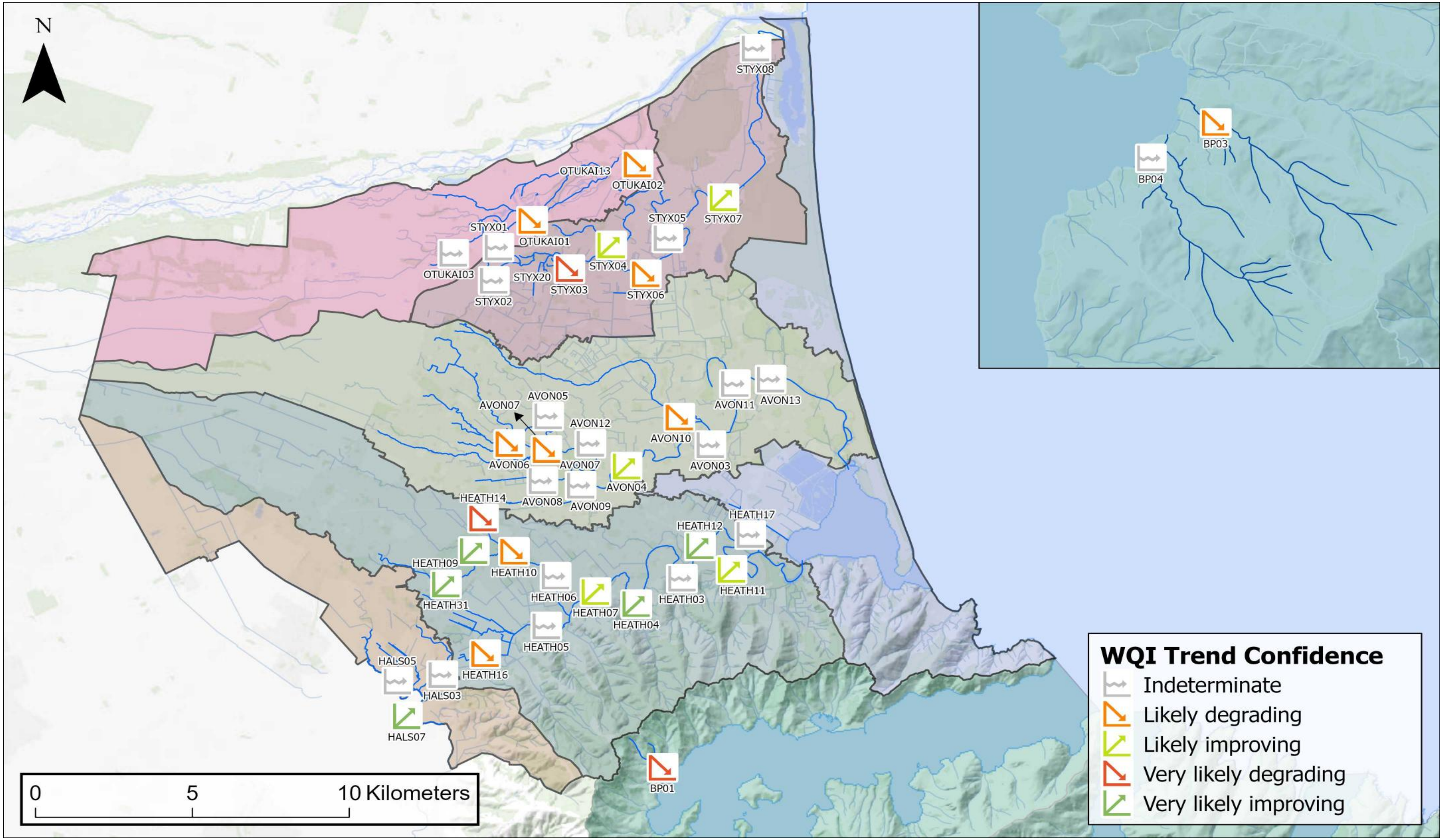

Figure 8: Water Quality Index trends over time. A combination of 10-year and 6-year trends (at sites with less than 10 years of data) are shown. Credit: Instream Consulting

4.0 Recommendations & Conclusions

The 2024 monitoring results indicate surface water quality across Christchurch remains variable, with most sites rated ‘Fair’ or ‘Good’ under the Water Quality Index (WQI). Three sites were rated ‘Very Good’, while one site, Stream Reserve Drain, was rated ‘Very Poor’. Ōtūkaikino was the best-performing catchment overall, while Linwood Canal was the poorest-performing.

Several emerging declining trends were identified, including increasing dissolved inorganic nitrogen at Aylmers Stream, suspended solids at Akaroa Harbour, turbidity at Curlett Road Stream and Steamwharf Stream, and salinity at Linwood Canal. These trends may indicate nutrient enrichment, sedimentation pressures and localised salinity effects. Some sites, particularly those with ecological sensitivities such as inanga spawning habitat, may require closer monitoring.

Positive trends were recorded, including decreasing dissolved copper and dissolved lead at selected sites. However, 25 sites did not meet Attribute Target Levels, indicating that further investigation and targeted management may be required. Priority investigation sites include Nottingham Stream at Candys Road, Heathcote at Ferrymead Bridge and Stream Reserve Drain.

The 2025 monitoring results indicate mixed outcomes for stormwater contaminant compliance and overall water quality. Full compliance with all consent Attribute Target Levels was achieved at 38% of sites, with most compliant sites generally located in less urbanised Ōtūkaikino catchments. However, many sites exceeded at least one contaminant target, most commonly dissolved zinc. Zinc remained the main contaminant of concern, accounting for the highest number of exceedances and the greatest portion of declining trends, although most annual increases were small. In contrast, dissolved copper and dissolved lead generally showed improving trends, and overall contaminant concentrations were broadly similar to previous years.

The highest numbers of exceedances occurred at Nottingham Stream, Curletts upstream of Heathcote and Curletts Road Stream at Southern Motorway. These sites have also been identified in previous monitoring as areas of concern. Further investigation and treatment options have already been progressed for some of these locations, including floodplain and stormwater treatment works, while additional treatment facilities are being planned for Nottingham Stream and Addington Brook.

Some differences in compliance outcomes are due to the adoption of updated methods for copper and zinc, which account for toxicity modifying factors and provide a more accurate indication of risk to aquatic life. As further data is collected using this approach, confidence in the assessment is expected to improve.

Broader water quality results were generally consistent with previous years. The main parameters of concern were conductivity, turbidity, dissolved reactive phosphorus, dissolved inorganic nitrogen and *E. coli.* Water Quality Index scores improved compared to with 2024, with notable improvements recorded at Addington Brook and Dudley Creek, although both sites have historically been poor.

Further investigation is recommended for Stream Reserve Drain and Cashmere Stream at Sutherlands Road. These sites failed multiple consent targets, showing declining trends for dissolved zinc, have not previously been investigated, and are located within sensitive receiving environments.

Table 3: Sites recommended for further investigation due to high numbers of exceedances to monthly guidelines. Results are out of 12 samples with the percentage of exceedances in brackets. Dissolved lead is omitted as it had no exceedances. Sites in bold are the highest priority.

Site ID	Site	Total Suspended Solid (TSS)	Dissolved Copper	Dissolved Zinc	Dissolved Zinc Trend[1]
HALSO03	Nottingham at Candys Rd	0	0	11 (92%)	
HEATH10	Curletts Road Stream upstream of Heathcote River	1 (8%)	2 (17%)	9 (75%)	
HEATH14	Curletts Road Stream at Southern Motorway	7 (58%)	4 (33%)	11 (92%)	
HEATH16	**Cashmere at Sutherlands Rd**	**1 (8%)**	**5 (42%)**	**4 (33%)**	
BP01	**Stream Reserve Drain**	**1 (8%)**	**1 (8%)**	**6 (50%)**	
STYX04	Kā Pūtahi at Blakes Rd	0	0	4 (33%)	

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Appendix 1: Consent Attribute target levels and guideline levels

The updated 2025 consent Attribute Target Levels (ATLs) for dissolved copper, dissolved zinc and dissolved lead are shown in Table 4. There were no changes to the consent ATLs for total suspended solids (TSS) or to the guideline levels for other water quality parameters in Table 5 of the Environmental Monitoring Plan (EMP). A copy of this table is provided below(Table 5). As this table has not yet been updated to include the revised copper and zinc guidance, it retains the same guideline values as earlier versions of the EMP (i.e., EMP v9). Compliance at coastal sites and three-year ('state') summaries are compared against these earlier guideline levels in Table 5. See Appendix 4 for further details on the updates to consent ATLs.

Table 4: 2025 consent Attribute Target Levels (ATLs) for dissolved copper, dissolved zinc and dissolved lead at freshwater surface water quality monitoring sites. All other guideline levels remain unchanged from previous years.

Parameter	Non-Tidal Waterway Guideline Level (consent ATL)
Dissolved copper	**Gadd et al. (2023) Default Guideline Value (Annual 95th Percentile):** Ōtākaro-Avon and Opāwaho-Heathcote River catchments (90% species protection): ≤0.00073mg/L Huritini-Halswell, Pūharakekenui-Styx and Ōtūkaikino River catchments (95% species protection): ≤0.00047 mg/L; Cashmere Stream and Banks Peninsula waterways (99% species protection): ≤0.0002 mg/L
Dissolved lead	**ANZG (2018) Default Guideline Value (Annual 95th Percentile) :** Ōtākaro-Avon and Opāwaho-Heathcote River catchments (90% species protection): ≤0.0056 mg/L; Cashmere Stream (99% species protection): ≤0.001 mg/L; Huritini-Halswell River, Pūharakekenui-Styx River, and Ōtūkaikino River catchments (95% species protection): ≤0.0034 mg/L; Banks Peninsula: ≤0.001 mg/L;
Dissolved zinc	**Gadd et al (2023) (Monthly exceedances):** Guidance is still under development and there is currently no approved method for calculating bioavailable zinc. As a result, a variable monthly guideline adjusted for toxicity-modifying factors as recommended by Gadd et al (2023) was used. See **Error! Reference source not found.** 3 for an illustration.

Table 5: A copy of Table 5 from the Environmental Monitoring Programme (EMP) for the Christchurch Stormwater Network Discharge Consent (CSNDC). Consent compliance at coastal and tidally influenced sites, and three-year 'state' summaries for water quality parameters were compared to these guideline levels.

Parameter	Non-Tidal Waterway Guideline Level	Coastal and Tidal Waterway Guideline Level
Dissolved copper	ANZG (2022) (95th percentile, not medians): Ōtākaro-Avon and Opāwaho-Heathcote River catchments (90% species protection: ≤0.0018 mg/L Huritini-Halswell, Pūharakekenui-Styx and Ōtūkaikino River catchments (95% species protection): ≤0.0014 mg/L Cashmere Stream and Banks Peninsula waterways (99% species protection): ≤0.001 mg/L	ANZG (2022) (95th percentile, not medians): ≤0.0013 mg/L
Dissolved lead	ANZG (2022) HMGV (95th percentile, not medians): Ōtākaro-Avon River catchment (90% species protection): ≤0.0154 mg/L Opāwaho-Heathcote River catchment (90% species protection): ≤0.0239 mg/L Cashmere Stream (99% species protection): ≤0.0043 mg/L Huritini-Halswell River catchment (95% species protection): ≤0.0109 mg/L Pūharakekenui-Styx River catchment (95% species protection): ≤0.006 mg/L Ōtūkaikino River catchment (95% species protection): ≤0.0041 mg/L Stream Reserve Drain & Aylmers Stream (Banks Peninsula): ≤0.0014 mg/L Balguerie Stream (Banks Peninsula): ≤0.0011mg/L	ANZG (2022) (95th percentile, not medians): ≤0.0044 mg/L
Dissolved zinc	ANZG (2022) HMGV (95th percentile, not medians): Ōtākaro-Avon River catchment (90% species protection): ≤0.0295 mg/L Opāwaho-Heathcote River catchment (90% species protection): ≤0.0396 mg/L Cashmere Stream (99% species protection: ≤0.0063 mg/L Huritini-Halswell River catchment (95% species protection): ≤0.0174 mg/L Pūharakekenui-Styx River catchment (95% species protection): ≤0.0117 mg/L Ōtūkaikino River catchment (95% species protection): ≤0.0091 mg/L Stream Reserve Drain & Aylmers Stream (Banks Peninsula): ≤0.0029 mg/L Balguerie Stream (Banks Peninsula): ≤0.0025mg/L	ANZG (2022) (95th percentile, not medians): ≤0.008 mg/L

pH	LWRP (Environment Canterbury, 2015): All waterways: 6.5–8.5;	ANZECC (2000): 7.0–8.5
Conductivity	ANZG (2022) (Cool Dry Low-elevation rivers (medians)): 116 µS/cm	Nonapplicable for naturally saline coastal and tidal waters in New Zealand
Salinity	Not relevant to waterway sites	Nonapplicable for naturally saline coastal and tidal waters in New Zealand
Total Suspended Solids (TSS)	Hayward et al., 2009; Stevenson et al., 2010: All waterways: ≤25 mg/L	Lyttelton Port: 29.7 mg/L; Akaroa Harbour: 13 mg/L; Ihutai-Avon-Heathcote Estuary: 17.7 mg/L; Cass Bay: 30.1 mg/L; Ōtākaro-Avon River at Bridge Street: 23 mg/L; Opāwaho-Heathcote River at Ferrymead Bridge: 50 mg/L; Linwood Canal-City Outfall Drain: 13 mg/L
Turbidity	ANZECC (2000): All waterways: ≤1.3 NTU	Ihutai-Avon-Heathcote Estuary: 9.8 FNU; Lyttelton Port: 22.3 FNU; Akaroa Harbour: 5.5 FNU; Cass Bay: 23.4 FNU; Ōtākaro-Avon River at Bridge Street: 16.3 FNU; Opāwaho-Heathcote River at Ferrymead Bridge: 29.9 FNU; Linwood Canal-City Outfall Drain: 12.3 FNU)
Dissolved Oxygen (DO)	LWRP (Environment Canterbury, 2015): 'Spring-fed – plains – urban' and 'spring-fed – plains' waterways: ≥70%; Banks Peninsula waterways: ≥90%	RCEP (Environment Canterbury, 2012): ≥80%
Water temperature	LWRP (Environment Canterbury, 2015): All waterways: ≤20°C	RCEP (Environment Canterbury, 2012): ≤25°C
Biochemical Oxygen Demand (BOD5)	Ministry for the Environment (1992): All waterways: ≤2 mg/L	RCEP (Environment Canterbury, 2012): ≤2 mg/L (excluding operational area of Lyttelton Port)
Total ammonia (ammoniacal nitrogen)	LWRP (Environment Canterbury, 2015): Banks Peninsula waterways: ≤0.32 mg/L; all other waterways: determined by median catchment pH	Not required to be sampled

Nitrate nitrogen / Dissolved Inorganic Nitrogen (DIN)	LWRP (Environment Canterbury, 2015): Banks Peninsula waterways: Median ≤1.0 mg/L; 95th percentile ≤1.5 mg/L; NPS-FM (2023): Median ≤2.4 mg/L; 95th percentile ≤3.5 mg/L; LWRP: 'Spring-fed – plains' waterways: ≤1.5 mg/L; Banks Peninsula: ≤0.09 mg/L	Not required to be sampled
Nitrite nitrogen	No New Zealand guidelines currently exist; should they become available these will be used	Not required to be sampled
Dissolved Reactive Phosphorus (DRP)	LWRP (Environment Canterbury, 2015): 'Spring-fed – plains – urban' and 'spring-fed – plains' waterways: ≤0.016 mg/L; Banks Peninsula waterways: ≤0.025 mg/L	Not required to be sampled
Escherichia coli	LWRP (Environment Canterbury, 2015): All waterways: ≤550 CFU/100 mL (95th percentile)	No New Zealand guidelines currently exist; only tested at Ihutai-Avon-Heathcote Estuary
Enterococci	Ministry for the Environment (2013): ≤500 CFU/100 mL (95th percentile)	Ihutai-Avon-Heathcote Estuary, Cass Bay, Akaroa Harbour: 140 CFU/100 mL (alert level, single sample); Lyttelton Harbour: ≤500 CFU/100 mL (95th percentile)
Faecal coliforms	Not relevant to waterway sites	Ministry for the Environment (2013): Akaroa Harbour: 14/100 mL (median) and 43/100 mL (not exceeded in more than 10% of samples); not required at other coastal sites

Appendix 2: EMP Methods

Note: section numbering and text are extracted from the EMP.

Methods

The sample collection and laboratory analysis methods detailed in this section are consistent with past sampling undertaken by the CCC (primarily for stormwater consenting requirements). Samples from tidal sites shall be taken during low tide, with sampling within catchments starting at the most downstream site. The exception to this is the Beachville Road Ihutai-Avon-Heathcote Estuary and Cass Bay sites, which shall be sampled at high tide, due to high tide samples better representing outfall inputs. Tide times for Lyttelton and Akaroa sites shall be based on their respective harbour tide times, while tide times for the Ōtākaro / Avon River, Ōpāwaho-Heathcote River and the Ihutai-Avon-Heathcote Estuary shall be one hour after the respective tide in Lyttelton Harbour. Monthly sampling will take place on a routine basis regardless of the weather, which will allow for some of those samples to be taken during rainfall events.

Samples of water from each site shall be collected and analysed as follows:

- Samples should be collected from an area most representative of the site and should be in approximately the same location each time sampling is undertaken;
- Samples may be collected in a bucket before transfer to an appropriate, correctly labelled bottle, provided the bucket is rinsed twice beforehand with water from the site;
- Bottles (and lids) that do not have preservative should be rinsed with a small amount of water from the site immediately prior to sample collection and the rinsate discarded away from the sampling site; any bottles with preservative in them must not be rinsed, nor filled to overflowing as the preservative will be lost;
- Never allow the inner surface of a sample container or lid to be contacted by any material other than the sample water;
- Samples shall be dispatched in bottles prepared by an International Accreditation New Zealand (IANZ) accredited laboratory4 and as such will follow a Quality Assurance Plan; samples shall be immediately stored on ice and delivered to the laboratory within 24 hours, and a completed chain of custody form shall accompany all samples;
- At each site, in situ measurements of conductivity/salinity, temperature and dissolved oxygen shall be recorded using a calibrated meter at the same representative location as water samples were taken;
- The occurrence of rainfall at the time of sampling and within the 24-hours previous should be recorded, with rain defined as stormwater being seen flowing along gutters or out of stormwater pipes; and Samples shall be analysed for the parameters in Table 5 by an IANZ accredited laboratory; detection limits for each parameter shall be suitable to enable comparison of the results with relevant guidelines for reporting purposes.

The parameters to be tested were chosen specifically due to the following potential effects on instream biota, determined by whether the following guidelines are being met, as detailed in Table 5:

- Metals commonly found in stormwater, in particular, copper, lead and zinc, can be toxic to aquatic organisms, negatively affecting such things as fecundity, maturation, respiration, physical structure and behaviour (Harding, 2005). The toxicity of copper, lead and zinc in freshwater, and therefore the risk of adverse biological effects, alters depending on several abiotic factors. These toxicity modifying factors (TMFs) include, but are not limited to, organic carbon, hardness, pH, temperature, alkalinity and inorganic ligands (Gadd et al., 2023; Warne et al., 2018). The LWRP refers to default ANZG (2022) guidelines for metals, but current recommendations are to modify these default guideline levels by relevant TMFs (Gadd et al., 2023; ANZG, 2022; Warne et al., 2018). Prior to 2025, CCC used hardness modified guideline values for lead and zinc. These “bioavailability” adjusted guidelines were based on catchment medians for hardness that were recalculated every five years. Following the recommendations of Gadd et al. (2023), from 2025 CCC will measure hardness, dissolved organic carbon and pH at all the freshwater monitoring sites to calculate toxicity based on TMFs per sample. For coastal sites, the ANZG (2022) guidelines detail values of 0.0013 mg/L for copper, 0.0044 mg/L for lead, and 0.008 mg/L for zinc.
- *pH* is a measure of acidity or alkalinity, on a scale from 0 to 14; a pH value of seven is neutral, less than seven is acidic and greater than seven is alkaline. Appropriate pH levels are essential for the physiological functions of biota, such as respiration and excretion (Environment Canterbury, 2009). Aquatic species typically have tolerances for certain pH levels and alteration of pH can result in changes in the composition of fish and invertebrate communities, with generally a positive relationship between pH and the number of species present (Collier et al, 1990). The guidelines in the Land and Water Regional Plan (LWRP; Environment Canterbury, 2015) for all waterways are a lower limit of 6.5 and an upper limit of 8.5. The ANZECC (2000) guidelines have a guideline value for estuaries of 7.0 - 8.5.
- *Conductivity* is a measure of how well water conducts an electrical current. Pure water has very low conductivity, but dissolved ions in the water (e.g. contaminants such as metals and nutrients) increase conductivity. ANZG (2022) have a guideline value for Cool Dry Low elevation rivers of 116 µS/cm. There are no New Zealand guidelines for conductivity in coastal environments, and it is more relevant to measure salinity in any case. Salinity is naturally high in coastal water and salinity levels can provide an indication of the relative contribution of fresh and coastal waters within tidally influenced areas such as estuaries and the lower reaches of rivers.
- Elevated levels of suspended sediment (*Total Suspended Solids*, TSS) in the water column decrease the clarity of the water and can adversely affect aquatic plants, invertebrates and fish (Crowe & Hay, 2004; Ryan, 1991). For example, sediment can affect photosynthesis of plants and therefore primary productivity within streams, interfere with feeding through the smothering of food supply, and can clog suitable habitat for species (Crowe & Hay, 2004; Ryan, 1991). The LWRP details in Rule 5.95 standards for TSS in stormwater prior to discharge but does not detail specifically a guideline value within waterways (Environment

Canterbury, 2018). The WRRP also does not detail a guideline level. A guideline level of 25 mg/L is considered an appropriate threshold to indicate potential detrimental effects on biota (Hayward et al.,2009; Stevenson et al., 2010) and is therefore used in this report. Additional site-specific guidelines have been developed for tidal waterway and coastal sites following consultation with ECan (Michele Stevenson and Melanie Burns, ECan, personal communication, June 2023). These are based on the 80th percentile data for each site, following the approach outlined in Dudley et al. (2019), as detailed in Table 5.

- *Turbidity* is a measure of the transmission of light through water. Suspended matter in the water column causes light to be scattered or absorbed as is travels through the water. As for TSS, turbidity decreases the clarity of the water and can negatively affect stream biota (Ryan, 1991). A guideline level for this parameter is not provided in the LWRP. ANZG (2022) provides a guideline of 1.3 Nephelometric Turbidity Units (NTU) for Cool Dry Low-elevation rivers and ANZECC (2000) provides a value of <10 NTU which has been applied to the Ihutai site. Additional site-specific guidelines have been developed for tidal waterway and coastal sites following consultation with ECan (Michele Stevenson and Melanie Burns, ECan, personal communication, June 2023). These are based on the 80th percentile data for each site following the approach outlined in Dudley et al. (2019), as detailed in Table 5. Turbidity has historically been analysed at the laboratory using NTU, but since December 2020 has been analysed using Formazin Nephelometric Units (FNU), in accordance with the requirements of the National Environmental Monitoring Standards (NEMS, 2019). Turbidity NTU values prior to December 2020 have been converted to FNU at the catchment scale, using a conversion factor calculated from 12 months of concurrent testing of both methods (NEMS, 2019). However, the NTU guideline values are still used for direct comparison against this FNU data (Michele Stevenson, ECan, personal communication, May 2021).
- *Dissolved Oxygen (DO)* is the concentration of oxygen dissolved or freely available in water and is commonly expressed as percent saturation. Adequate DO levels are essential for aquatic animals, such as fish and invertebrates, and can be influenced by many factors, including temperature, velocity, decomposition of organic material, and the photosynthesis and respiration of aquatic plants. The LWRP details a minimum DO level of 70% for 'spring-fed-plains' and 'spring-fed- plains urban' waterways, and 90% for Banks Peninsula waterways. The RCEP (2012) guidelines are a minimum of 80 % DO for the selected coastal sample locations.
- High water temperature can affect aquatic biota, with some studies showing that the presence of sensitive macroinvertebrates decreases with increasing temperature (Wahl et al, 2013). The LWRP water quality standard for waterway temperatures is a maximum of 20°C; the RCEP (2012) details a maximum of 25°C for the coastal sites, with no more than a 3°C change because of discharge of contaminant or water.
- *Biochemical Oxygen Demand (BOD5)* is an indicator of the amount of biodegradable organic material in the water and the amount of oxygen required by bacteria to break down this material. High BOD5 values are due to plant matter, nitrogen and phosphorus, and indicate the potential for bacteria to deplete oxygen levels in the water. The LWRP

does not have a guideline level for this parameter. The Ministry for the Environment (1992) and RCEP (2012) guideline level is 2 mg/L, although this is for filtered samples and samples are currently tested for total levels, so comparisons to the guideline will be conservative.

- *Total ammonia (ammoniacal nitrogen)* is typically a minor component of the nitrogen available for plant growth, but at high levels can have toxic effects on aquatic ecosystems. The toxicity of ammonia varies with pH (ANZECC, 2000). Therefore, the LWRP water quality standards also vary depending on pH, ranging from 2.57 mg/L at pH 6 to 0.18 mg/L at pH 9 (Environment Canterbury, 2015). The water quality standard for this monitoring shall be adjusted based on the median pH levels for the relevant catchments. The exception to this is for Banks Peninsula waterways which have a set guideline value regardless of pH (0.32 mg/L; Environment Canterbury, 2015). Ammoniacal nitrogen is not required to be sampled at coastal sites.
- *Nitrate* can also be toxic to stream biota and specific guidelines for this parameter have recently been developed to protect freshwater species (Hickey, 2013). Guidelines are available for different species protection levels: 99% (pristine environment with high biodiversity and conservation values), 95% (environments which are subject to a range of disturbances from human activities, but with minor effects), 90% (environments which have naturally seasonally elevated concentrations for significant periods of the year (1-3 months)), 80% (environments which are measurably degraded and which have seasonally elevated concentrations for significant periods of the year (1-3 months)), and acute (environments which are significantly degraded; probable chronic effects on multiple species). Based on these descriptions and the predominantly urban nature of the waterways monitored, most of the waterways would fall under the 80% to acute species description (i.e. Ōtākaro-Avon, Ōpāwaho-Heathcote and Huritini- Halswell River catchments). However, the Pūharakekenui-Styx and Ōtūkaikino River catchments (and Cashmere Stream) likely fall under the 90% species protection. To be conservative, the 90% species protection shall be used as the guideline level for all waterways. Within this 90% level of species protection there are two guideline values: the ‘grading’ guideline (3.8 mg/L) that provides for ecosystem protection for average long-term exposure (measured against medians) and the ‘surveillance’ guideline (5.6 mg/L) that assesses seasonal maximum concentrations (measured against annual 95% percentiles). Nitrate is not required to be sampled at coastal sites.
- *Dissolved Inorganic Nitrogen (DIN),* which is the sum of ammonia, nitrite and nitrate, provides a measure of the risk of eutrophication and toxicity (Environment Canterbury, 2015). The LWRP details a value of 1.5 mg/L for 'spring-fed-plains' and 'spring-fed-plains urban' waterways, and 0.09 mg/L for Banks Peninsula waterways. DIN is not required to be sampled at coastal sites.
- *Dissolved Reactive Phosphorus (DRP)* is a soluble form of phosphorus that is readily available for use by plants. Phosphorus is an essential nutrient for plant growth and can limit primary production at low levels but can cause proliferation of algae and aquatic plants at high levels. The guideline levels in the LWRP for 'spring-fed - plains' and 'spring-fed plains urban' waterways are 0.016 mg/L, and 0.025 mg/L for Banks Peninsula

waterways. DRP is not required to be sampled at coastal sites.

- *Escherichia coli* is a bacterium that is commonly used as an indicator of faecal contamination in freshwater and therefore health risk from contact recreation (Ministry for the Environment, 2003). The guideline level in the LWRP for 'spring-fed-plains', spring-fed plains-urban' and Banks Peninsula waterways is 550 E. coli per 100ml (for 95% of samples). There are no New Zealand guidelines for coastal environments.
- *Enterococci* is a faecal streptococci bacterium that is used as an indicator of faecal contamination in saline environments and therefore health risk from contact recreation (Ministry for the Environment, 2003). This parameter is not relevant to non-tidal waterway sites, only tidal waterway and coastal sites. There are guideline levels for coastal sites in the RCEP, but these are considered difficult to measure, with the requirement for running medians not to exceed certain values, as well as maximum values for any given sample. These guidelines are also only in relation to some of the site classifications and only during the summer months. Instead, enterococci shall be compared against the Ministry for the Environment (2013) guidelines, with more stringent levels adopted for those sites where contact recreation is more likely to occur (Cass Bay and Akaroa Harbour; 200 CFU/100 ml), compared to those where contact recreation is less likely to occur (500 CFU/100 ml).
- *Faecal coliforms* are also to be monitored in surface water at the Akaroa coastal site, to allow comparisons to the Ministry for the Environment (2003) guidelines for shellfish consumption.

Appendix 3: Detailed Analysis Methods

Raw water quality data for the full monitoring period (2007-2025) were retrieved from Council on 13 February 2026. All subsequent data quality control (QC), manipulations, analysis, and graphical outputs were completed in R (R Core Team 2025).

The raw water quality data underwent initial QC checks that included:

- Spelling and data input error corrections
- Omission of datapoints for calculated parameters that were not equal to the sum of their constituents
- Extreme outliers were identified using boxplots, regression for correlated parameters, and site metadata. Outliers that could not be explained were omitted from the dataset.

Following QC, the dataset was saved and all further analysis was conducted using the resultant 'clean' dataset.

2025 Annual Compliance and State

The data period for the annual compliance assessment was January to December 2025. Annual compliance was assessed by comparing the annual median total suspended solids (TSS), the 95th percentiles for bioavailable copper and bioavailable lead, and any monthly exceedances for dissolved zinc against the guideline levels in Appendix 1, Table 4 and Table 5. This is different to previous years as the new default guideline values from Gadd et al (2023) were used as consent ATLs. Zinc was also assessed at a different frequency (monthly rather than annually) as the new methodology does not currently recommend that the annual 95th percentile for zinc is compared to a fixed guideline value, due to limitations in the underlying science (see Gadd et al 2023 for full explanation). This creates ambiguity (and an internal inconsistency in the EMP) as to whether compliance should be based on monthly exceedances or 95th percentiles calculated from annual data. To ensure both approaches were covered, we compared annual summaries with updated guideline values where possible and calculated monthly exceedances for all stormwater contaminants at each site.

Current state was calculated using the latest three-years of data (January 2023 to December 2005). Laboratory detection limits were assumed consistent between 2023 and 2025. To enable statistical analysis, data values that were below the lower laboratory detection limit were set to half the detection limit (0.5 x detection limit) and data that were above the upper laboratory detection limit were set to the detection limit. This approach is consistent with standard national practice.

Summary compliance and state and trend statistics were calculated for the relevant water quality parameters at applicable sites, following the methodology, guideline and standards outlined in Section 5 of the Environmental Monitoring Plan v11 (EMP). All percentile-based sample statistics were calculated using the Hazen method.

Attribute Target Level Calculations

The Environmental Monitoring Plan v11 (EMP) incorporates updated guidance on copper and zinc. For the 2025 period, copper and zinc were assessed in line with the new guidance in Gadd et al (2023). The new approach uses monthly dissolved organic carbon (DOC), hardness, and pH, collectively referred to as toxicity-modifying factors (TMF data), to determine 'bioavailability' of dissolved copper and to calculate an adjustable guideline value for zinc. This provides a more accurate reflection of the risk posed by these metal contaminants to aquatic biota. The collection of TMF data, also enabled bioavailable lead to be calculated monthly, in line with the guidance in Warne et al (2018). These assessment approaches differ for each metal contaminant due differences in the underlying science. The methods used to assess copper, zinc and lead are outlined below:

Copper

Dissolved copper concentrations were adjusted for toxicity-modifying factors on a per-sample basis, following the equation below (adapted from Gadd et al (2023)):

$$Bioavailable\ copper = Dissolved\ copper \div (\frac{DOC}{0.5})^{0.977}$$

Gadd et al. (2023) provides updated default guideline values (DGVs) for dissolved copper. These DGVs have been derived for different levels of species protection (e.g., 90th percentile) and are listed in Appendix 1 (Table 4). These DGVs were used as the consent ATLs for compliance. Compliance was assessed by comparing the 95th percentile from the 2025 data period to the updated DGVs. The number of monthly exceedances to the updated DGV were also assessed. For the three-year 'state' assessments the 95th percentile dissolved copper values were compared to guideline values from an earlier version of the Environmental Monitoring Plan (EMP v9) as there were insufficient toxicity modifying factor data (only one year available and three years are required) to use the updated method Appendix 1 (Table 4).

Lead

Lead concentrations were adjusted for toxicity-modifying factors on a per-sample basis, following the equation below (adapted from (Warne *et al.* 2018)):

$$Bioavailable\ lead = Dissolved\ lead \div (\frac{Hardness}{30})^{1.27}$$

These DGVs were used as the consent ATLs for compliance (Appendix 2,Table 1. Compliance was assessed by comparing the 95th percentile from the 2025 data period to the updated DGVs. The number of monthly exceedances of bioavailable lead to the updated DGV were also assessed. For the three-year state assessments, the 95th percentile dissolved lead concentrations were compared to the ANZG (2018) guideline values in an earlier version of the Environmental Monitoring Plan (EMP v9) Appendix 1 (Table 4).

Zinc

The derivation of bioavailable zinc is more complex than for copper and lead. The updated method options in Gadd et al. (2023) have caveats as the science is still developing. At the time of writing there was no approved method for calculating 'bioavailable zinc'. Therefore, it was not possible to compare and annual 95th percentile for bioavailable zinc to a fixed ATL, as was done for copper and lead. Rather, each month dissolved zinc concentrations were compared to a guideline value (i.e., consent ATL) that had been adjusted for toxicity-modifying factors on a per-sample basis.

This method was complicated and required the use of a dedicated R script[1] with multiple dependencies. Compliance was assessed by comparing monthly dissolved zinc against the variable guideline value (i.e., consent ATL) and counting the number of exceedances over the year. For the three-year state assessments, the 95th percentile dissolved zinc concentrations were compared to the ANZG (2018) guideline values in an earlier version of the Environmental Monitoring Plan (EMP v9) (Appendix 1).

Water Quality Index

A Water Quality Index (WQI) was developed in 2016 for Council's monthly monitoring sites, based on the Canadian Council of Ministers of the Environment framework (CCME 2017). The index assesses water quality using three components: scope (the proportion of parameters exceeding guideline values), frequency (the proportion of samples exceeding guidelines), and amplitude (the extent to which guidelines are exceeded). Scores range from 0 to 100, with higher values indicating better water quality.

The Council's WQI includes dissolved copper, dissolved zinc, pH, total suspended solids (TSS), dissolved oxygen (DO), temperature, biochemical oxygen demand (BOD_5), total ammoniacal-nitrogen, nitrate-nitrogen, dissolved reactive phosphorus (DRP), and *E. coli*.

WQI values have been calculated annually since 2016 to enable analysis of trends. In 2025, WQI scores were calculated for 44 of 51 sites. WQI scores were not calculated for the four coastal sites (CW01-CW04), nor the four tidally influenced sites (AVON02, HEATH01, and OUT1), as a WQI for coastal and tidal waterways has not yet been developed.

Scores were classified as 'very poor' (0–39.99), 'poor' (40–69.99), 'fair' (70–79.99), 'good' (80–89.99), or 'very good' (90–100), based on local and national context.

Temporal Trend Analysis

Temporal trend analysis was undertaken to assess changes in the concentration of key stormwater contaminants (copper, lead, zinc, and TSS), as well as the Water Quality Index (WQI) over time. Trends were analysed over two periods; the full data period (typically 2007- 2025, or shorter at sites with greater than five, but less than 10 years of data), and the most recent 10-year period (2016–2025). This allowed comparison of both long-term and more recent water quality trends at each site.

Trend analysis was undertaken following the methodology outlined in (Fraser and Snelder 2025), which is consistent with national trend analysis methodology[2] used by Land Air Water Aotearoa (LAWA). A dedicated R script[3] was used to carry out the analysis. The following criteria

[1] https://github.com/niwa/CuZn_DGV_adjusters

[2] https://www.lawa.org.nz/learn/factsheets/calculating-water-quality-trends-in-rivers-and-lakes

[3] https://landwaterpeople.co.nz/pdf-reports/

and methods were applied:

- Minimum data requirements: site-parameter records that did not include 90% of the time increments (e.g., monthly observations) or 90% of years in the specified trend-period were omitted.
- Seasonality tests: Kruskal Wallis tests were used to determine whether each site-parameter combination was influenced by seasonality (i.e., regular, repeating patterns in the data at certain times of the year).
- Temporal trend analysis.
    - Temporal trends in data for site-parameter combinations assigned as 'non-seasonal' were analysed using a Mann Kendall tests and non-parametric regression between observations and time.
    - Temporal trends in data for site-parameter combinations assigned as 'seasonal' were analysed using seasonal Kendall tests and seasonal non-parametric regression between observations and time.
    - Flow adjustment was not applied to either of the analyses, as concurrent discharge data were not consistently available across all monitoring sites.

Results were interpreted so that decreasing concentrations of key stormwater contaminants (e.g., dissolved copper) were categorised as 'improving' trends. In contrast, the WQI scores that were decreasing over time, were categorised as 'degrading' trends. This difference is because a high WQI score indicates better water quality while high concentrations of stormwater contaminants have a negative effect on water quality.

The analysis produced estimates of the likelihood that the trends were increasing or decreasing for each site-parameter combination. These likelihoods were used to assign qualitative trend categories following the LAWA methodology and symbology (Figure 1). Trends were categorised based on the confidence in the direction of change. 'Very likely improving' (90–100% confidence) and 'likely improving' (67–<90% confidence) indicate decreasing concentrations of a stormwater contaminant, while 'very likely degrading' (90–100% confidence) and 'likely degrading' (67–<90% confidence) indicate increasing concentrations. Results with low confidence (less than 67%) in either direction were classified as 'indeterminate'.

Figure 9: Symbology used to illustrate trend direction and confidence. Source: Land Air Water Aotearoa (LAWA).

Appendix 4: Detailed Results Table

Stormwater Discharge Contaminants

Table 6: Number and percentage of monthly samples that exceeded consent Attribute Target Levels (ATLs) for stormwater contaminants in 2025. Coastal and strongly tidally influenced sites are excluded from compliance as indicated by section 9 of the Environmental Monitoring Plan-EMP v11). CW02 Lyttleton Paort is omitted as it is excluded from compliance for all consent ATLs (EMPv11).

Site Code	Site	Total Suspended Soils (TSS)	Dissolved Copper	Dissolved Zinc	Dissolved Lead	Total
AVON02	Avon at Bridge St	-	0	4 (33%)	0	4 (11%)
AVON03	Avon at Dallington Tce	0	0	6 (50%)	0	6 (13%)
AVON04	Avon at Manchester St	0	1 (8%)	4 (33%)	0	5 (10%)
AVON05	Wairarapa Stream	0	0	1 (8%)	0	1 (2%)
AVON06	Waimairi Stream	1 (8%)	0	1 (8%)	0	2 (4%)
AVON07	Avon at Mona Vale	0	3 (25%)	4 (33%)	0	7 (15%)
AVON08	Riccarton Main Drain	0	1	4	0	5

			(8%)	(33%)		(10%)
AVON09	Addington Brook	1 (8%)	0	6 (50%)	0	7 (15%)
AVON10	Dudley Creek	0	0	2 (18%)	0	2 (5%)
AVON11	Horseshoe Lake	0	0	0	0	0
AVON12	Avon at Carlton Mill	2 (17%)	0	3 25%)	0	5 (10%)
AVON13	Avon at Avondale Rd	0	0	0	0	0
BP01	Stream Reserve Drain	1 (8%)	1 (8%)	6 (50%)	0	8 (17%)
BP03	Balguerie Stream	1 (8%)	0	4 (33%)	0	5 (10%)
BP04	Aylmers Stream	2 (17%)	1 (8%)	1 (8%)	0	4 (8%)
CW01	Ihutai/Avon-Heathcote Estuary	-	0	1 (8%)	0	1 (3%)
CW03	Cass Bay	-	0	2 (17%)	0	2 (5%)
CW04	Akaroa Harbour	-	0	0	0	0

HALS03	Nottingham at Candys Rd	0	0	11 (92%)	0	11 (23%)
HALS05	Knights at Sabys Rd	0	1 (8%)	0	0	1 (2%)
HALS07	Halswell at Wroots Rd	0	0	0	0	0
HEATH01	Heathcote at Ferrymead Bridge	-	1 (8%)	3 (25%)	0	4 (8%)
HEATH03	Heathcote at Opawa Rd	2 (17%)	0	0	0	2 (4%)
HEATH04	Heathcote at Bowenvale Ave	1 (8%)	0	0	0	1 (2%)
HEATH05	Cashmere at Worsleys Rd	2 (17%)	0	0	0	2 (4%)
HEATH06	Heathcote at Rose St	0	0	5 (45%)	0	5 (11%)
HEATH07	Heathcote at Ferniehurst St	0	0	0	0	0
HEATH09	Hayton Stream	1 (8%)	0	3 (25%)	0	4 (8%)
HEATH10	Curlett U/S of Heathcote	1 (8%)	2 (17%)	9 (75%)	0	12 (25%)

HEATH11	Heathcote at Catherine St	1 (8%)	0	0	0	1 (2%)
HEATH12	Heathcote at MacKenzie Ave	0	0	0	0	0
HEATH14	Curlett at Motorway	7 (58%)	4 (33%)	11 (92%)	0	22 (46%)
HEATH16	Cashmere at Sutherlands Rd	1 (8%)	5 (42%)	4 (33%)	0	10 (21%)
HEATH17	Steamwharf Stream	0	0	0	0	0
HEATH26	Cashmere at Penruddock Rise	3 (25%)	0	1 (8%)	0	4 (8%)
HEATH31	Heathcote at Warren Cres	0	0	0	0	0
OTUKAI01	Ōtūkaikino at Scout Camp	0	1 (8%)	2 (18%)	0	3 (7%)
OTUKAI02	Wilsons Stm	1 (8%)	0	0	0	1 (2%)
OTUKAI03	Ōtūkaikino at Groynes	0	0	0	0	0
OTUKAI13	Otukaikino D/S of Dickeys Road	0	0	0	0	0
OUT01	Linwood Canal	-	0	5 (42%)	0	5 (14%)
STYX01	Smacks at Gardiners Rd	0	0	1	0	1

				(8%)		(2%)
STYX02	Styx at Gardiners Rd	0	0	0	0	0
STYX03	Styx at Main North Rd	0	0	1 (8%)	0	1 (2%)
STYX04	Kā Pūtahi at Blakes Rd	0	0	4 (33%)	0	4 (8%)
STYX05	Kā Pūtahi at Belfast Rd	0	0	0	0	0
STYX06	Styx at Marshland Rd	0	0	1 (8%)	0	1 (2%)
STYX07	Styx at Richards Bridge	0	0	0	0	0
STYX08	Styx at Harbour Rd	0	0	0	0	0
STYX20	Styx Drain	0	1 (9%)	4 (36%)	0	5 (11%)

Table 7: Summary of 2025 data for total suspended solids (TSS), bioavailable copper, bioavailable lead and dissolved zinc. Exceedances of consent attribute target levels (ATLs) are shown in bold, except for dissolved zinc, where the annual 95th percentile is not directly comparable to a fixed consent ATL under the new Gadd et al. (2023) methods.

Site ID	Site	Median Total Suspended Solids (mg/L)	95th Percentile Bioavailable Copper (mg/L)	95th Percentile Dissolved zinc (mg/L)	95th Percentile Bioavailable Lead (mg/L)
AVON02	Avon at Bridge St	-	0.00128	0.01750	0.00017
AVON03	Avon at Dallington Tce	1.80	0.00035	0.02660	0.00003
AVON04	Avon at Manchester St	3.35	**0.00078**	0.02080	0.00002
AVON05	Wairarapa Stm	1.55	0.00052	0.01910	0.00002
AVON06	Waimairi Stm	1.50	0.00063	0.01965	0.00002
AVON07	Avon at Mona Vale	1.75	**0.00091**	0.02330	0.00048
AVON08	Riccarton Main Drain	1.90	**0.00085**	0.06500	0.00014
AVON09	Addington Brook	8.00	0.00048	0.10440	0.00005
AVON10	Dudley Creek	5.30	0.00029	0.05530	0.00015
AVON11	Horseshoe Lake	3.00	0.00006	0.01314	0.00002
AVON12	Avon at Carlton Mill	2.05	0.00070	0.02140	0.00002
AVON13	Avon at Avondale Rd	2.45	0.00029	0.01670	0.00010
BP01	Stream Reserve Drain	5.70	**0.00025**	0.00867	0.00017
BP03	Balguerie Stream	2.75	0.00012	0.00461	0.00026
BP04	Aylmers Stream	2.20	**0.00128**	0.00275	0.00014
CW01	Ihutai/Avon-Heathcote Estuary	-	0.00057	0.02577	0.00065
CW03	Cass Bay	-	0.00118	0.07465	0.00023
CW04	Akaroa Harbour	-	0.00054	0.00452	0.00005
OUT01	Linwood Canal	-	0.00097	0.06390	0.00010
HALS03	Nottingham at Candys Rd	3.25	0.00013	0.02500	0.00002
HALS05	Knights at Sabys Rd	2.85	**0.00063**	0.00299	0.00002

HALS07	Halswell at Wroots Rd	2.15	0.00018	0.00810	0.00002
HEATH01	Heathcote at Ferrymead Bridge	-	**0.00156**	0.03220	0.00019
HEATH03	Heathcote at Opawa Rd	5.40	0.00020	0.01190	0.00006
HEATH04	Heathcote at Bowenvale Ave	6.90	0.00027	0.01400	0.00007
HEATH05	Cashmere at Worsleys Rd	12.5	0.00008	0.00405	0.00005
HEATH06	Heathcote at Rose St	5.00	0.00033	0.05520	0.00010
HEATH07	Heathcote at Ferniehurst St	7.85	0.00018	0.02540	0.00006
HEATH09	Hayton Stream	8.00	0.00025	0.03760	0.00015
HEATH10	Curlett U/S of Heathcote	14.5	**0.00084**	0.23390	0.00044
HEATH11	Heathcote at Catherine St	7.40	0.00022	0.01370	0.00008
HEATH12	Heathcote at MacKenzie Ave	3.75	0.00019	0.01280	0.00006
HEATH14	Curlett at Motorway	**37.0**	**0.00141**	0.41900	0.00083
HEATH16	Cashmere at Sutherlands Rd	2.35	**0.00043**	0.00941	0.00001
HEATH17	Steamwharf Stream	3.95	0.00008	0.00693	0.00002
HEATH26	Cashmere at Penruddock Rise	10.5	0.00008	0.00609	0.00004
HEATH31	Heathcote at Warren Cres	1.60	0.00020	0.00757	0.00001
OTUKAI01	Ōtūkaikino at Scout Camp	0.50	**0.00277**	0.01300	0.00010
OTUKAI02	Wilsons Stm	6.30	0.00014	0.00522	0.00003
OTUKAI03	Ōtūkaikino at Groynes	1.40	0.00034	0.00411	0.00008
OTUKAI13	Otukaikino D/S of Dickeys Road	1.85	0.00017	0.00244	0.00004
STYX01	Smacks at Gardiners Rd	1.00	0.00039	0.00932	0.00004
STYX02	Styx at Gardiners Rd	1.10	0.00033	0.00289	0.00003
STYX03	Styx at Main North Rd	2.50	0.00025	0.01025	0.00004
STYX04	Kā Pūtahi at Blakes Rd	2.70	0.00029	0.01200	0.00003
STYX05	Kā Pūtahi at Belfast Rd	4.45	0.00014	0.00467	0.00003
STYX06	Styx at Marshland Rd	4.25	0.00019	0.01325	0.00009
STYX07	Styx at Richards Bridge	4.70	0.00012	0.00484	0.00006
STYX08	Styx at Harbour Rd	3.35	0.00007	0.00573	0.00008

STYX20	Styx Drain	5.90	**0.00101**	0.03400	0.00005

Table 8: Summary of unadjusted concentrations of total suspended solids (TSS), dissolved copper, dissolved zinc, and dissolved lead in 2025.

Site code	Site	Median Total suspended soils (mg/L)	95th percentile dissolved zinc (mg/L)	95th percentile dissolved copper (mg/L)	95th percentile dissolved lead (mg/L)
AVON02	Avon at Bridge St	13.5	0.0175	0.0013	0.00017
AVON03	Avon at Dallington Tce	1.80	0.0266	0.0010	0.00005
AVON04	Avon at Manchester St	3.35	0.0208	0.0007	0.00005
AVON05	Wairarapa Stm	1.55	0.0191	0.0007	0.00005
AVON06	Waimairi Stm	1.50	0.0197	0.0011	0.00005
AVON07	Avon at Mona Vale	1.75	0.0233	0.0007	0.00127
AVON08	Riccarton Main Drain	1.90	0.0650	0.0016	0.00010
AVON09	Addington Brook	8.00	0.1044	0.0024	0.00005
AVON10	Dudley Creek	5.30	0.0553	0.0020	0.00024
AVON11	Horseshoe Lake	3.00	0.0131	0.0009	0.00005
AVON12	Avon at Carlton Mill	2.05	0.0214	0.0007	0.00005
AVON13	Avon at Avondale Rd	2.45	0.0167	0.0016	0.00017
BP01	Stream Reserve Drain	5.70	0.0087	0.0031	0.00024
BP03	Balguerie Stream	2.75	0.0046	0.0006	0.00032

BP04	Aylmers Stream	2.20	0.0028	0.0017	0.00017
CW01	Ihutai/Avon-Heathcote Estuary	16.5	0.0258	0.0006	0.00065
CW02	Lyttelton Port	22.0	0.0173	0.0028	0.00032
CW03	Cass Bay	22.5	0.0746	0.0012	0.00023
CW04	Akaroa Harbour	9.25	0.0045	0.0005	0.00005
OUT01	Linwood Canal	8.80	0.0639	0.0010	0.00010
HALS03	Nottingham at Candys Rd	3.25	0.0250	0.0004	0.00005
HALS05	Knights at Sabys Rd	2.85	0.0030	0.0003	0.00005
HALS07	Halswell at Wroots Rd	2.15	0.0081	0.0005	0.00005
HEATH01	Heathcote at Ferrymead Bridge	25.0	0.0322	0.0016	0.00019
HEATH03	Heathcote at Opawa Rd	5.40	0.0119	0.0014	0.00022
HEATH04	Heathcote at Bowenvale Ave	6.90	0.0140	0.0016	0.00022
HEATH05	Cashmere at Worsleys Rd	12.5	0.0041	0.0011	0.00017
HEATH06	Heathcote at Rose St	5.00	0.0552	0.0024	0.00015
HEATH07	Heathcote at Ferniehurst St	7.85	0.0254	0.0016	0.00020
HEATH09	Hayton Stream	8.00	0.0376	0.0014	0.00018
HEATH10	Curlett U/S of Heathcote	14.5	0.2339	0.0062	0.00022
HEATH11	Heathcote at Catherine St	7.40	0.0137	0.0014	0.00028
HEATH12	Heathcote at MacKenzie Ave	3.75	0.0128	0.0013	0.00021

HEATH14	Curlett at Motorway	37.0	0.4190	0.0137	0.00068
HEATH16	Cashmere at Sutherlands Rd	2.35	0.0094	0.0012	0.00005
HEATH17	Steamwharf Stream	3.95	0.0069	0.0002	0.00005
HEATH26	Cashmere at Penruddock Rise	10.5	0.0061	0.0010	0.00015
HEATH31	Heathcote at Warren Cres	1.60	0.0076	0.0002	0.00005
OTUKAI01	Ōtūkaikino at Scout Camp	0.50	0.0130	0.0024	0.00015
OTUKAI02	Wilsons Stm	6.30	0.0052	0.0005	0.00005
OTUKAI03	Ōtūkaikino at Groynes	1.40	0.0041	0.0003	0.00010
OTUKAI13	Otukaikino D/S of Dickeys Road	1.85	0.0024	0.0002	0.00005
STYX01	Smacks at Gardiners Rd	1.00	0.0093	0.0003	0.00005
STYX02	Styx at Gardiners Rd	1.10	0.0029	0.0003	0.00005
STYX03	Styx at Main North Rd	2.50	0.0103	0.0006	0.00005
STYX04	Kā Pūtahi at Blakes Rd	2.70	0.0120	0.0003	0.00005
STYX05	Kā Pūtahi at Belfast Rd	4.45	0.0047	0.0004	0.00005
STYX06	Styx at Marshland Rd	4.25	0.0133	0.0006	0.00014
STYX07	Styx at Richards Bridge	4.70	0.0048	0.0006	0.00009
STYX08	Styx at Harbour Rd	3.35	0.0057	0.0006	0.00014
STYX20	Styx Drain	5.90	0.0340	0.0020	0.00012

Table 9: Stormwater contaminant (total suspended solids (TSS), dissolved copper, dissolved zinc, and dissolved lead) state over the latest 3-year period (2022-2025). Bold underlined values indicate exceedance of Attribute Target Levels (ATLs) as defined in an earlier version of the Environmental Monitoring Plan (EMP v9).

Site code[1]	Site	Median total suspended soils (mg/L)	95th percentile dissolved zinc (mg/L)	95th percentile dissolved copper (mg/L)	95th percentile dissolved lead (mg/L)
AVON02	Avon at Bridge St	13.0	**<u>0.0147</u>**	0.00103	0.00020
AVON03	Avon at Dallington Tce	1.8	0.0230	0.00107	0.00010
AVON04	Avon at Manchester St	2.9	0.0280	0.00107	0.00005
AVON05	Wairarapa Stm	1.8	0.0173	0.00068	0.00005
AVON06	Waimairi Stm	1.8	0.0180	**<u>0.00183</u>**	0.00011
AVON07	Avon at Mona Vale	1.7	**<u>0.0324</u>**	0.00082	0.00029
AVON08	Riccarton Main Drain	1.9	**<u>0.0615</u>**	0.00145	0.00009
AVON09	Addington Brook	5.0	**<u>0.1080</u>**	**<u>0.00274</u>**	0.00005
AVON10	Dudley Creek	5.5	**<u>0.0546</u>**	**<u>0.00232</u>**	0.00032
AVON11	Horseshoe Lake	3.3	0.0111	0.00088	0.00010
AVON12	Avon at Carlton Mill	3.1	0.0195	0.00078	0.00005
AVON13	Avon at Avondale Rd	2.0	0.0161	0.00137	0.00016
BP01	Stream Reserve Drain	5.4	**<u>0.0124</u>**	**<u>0.00320</u>**	0.00030
BP03	Balguerie Stream	2.3	**<u>0.0043</u>**	0.00060	0.00005
BP04	Aylmers Stream	2.3	**<u>0.0056</u>**	**<u>0.00278</u>**	0.00026
CW01	Ihutai/Avon-Heathcote Estuary	12.0	0.0071	0.00056	0.00068
CW02	Lyttelton Port	23.0	**<u>0.0174</u>**	**<u>0.00304</u>**	0.00175
CW03	Cass Bay	19.5	**<u>0.0198</u>**	0.00098	0.00046
CW04	Akaroa Harbour	11.0	**<u>0.0125</u>**	**<u>0.00260</u>**	0.00117
OUT01	Linwood Canal	6.6	**<u>0.0498</u>**	0.00097	0.00009
HALS03	Nottingham at Candys Rd	3.2	**<u>0.0580</u>**	0.00065	0.00020
HALS05	Knights at Sabys Rd	2.9	0.0030	0.00040	0.00005
HALS07	Halswell at Wroots Rd	2.7	0.0080	0.00047	0.00005
HEATH01	Heathcote at Ferrymead Bridge	22.0	**<u>0.0331</u>**	**<u>0.00157</u>**	0.00029
HEATH03	Heathcote at Opawa Rd	4.5	0.0184	**<u>0.00181</u>**	0.00020
HEATH04	Heathcote at Bowenvale Ave	6.4	0.0207	**<u>0.00188</u>**	0.00019

HEATH05	Cashmere at Worsleys Rd	10.0	0.0041	**0.00107**	0.00018
HEATH06	Heathcote at Rose St	5.0	**0.0558**	**0.00258**	0.00015
HEATH07	Heathcote at Ferniehurst St	6.9	0.0217	0.00174	0.00019
HEATH09	Hayton Stream	7.8	**0.0481**	0.00140	0.00018
HEATH10	Curlett U/S of Heathcote	12.5	**0.2320**	**0.00698**	0.00029
HEATH11	Heathcote at Catherine St	7.1	0.0190	0.00137	0.00022
HEATH12	Heathcote at MacKenzie Ave	3.8	0.0157	0.00151	0.00020
HEATH14	Curlett at Motorway	13.0	**0.6150**	**0.01850**	0.00062
HEATH16	Cashmere at Sutherlands Rd	1.4	**0.0070**	**0.00107**	0.00005
HEATH17	Steamwharf Stream	6.0	0.0091	0.00036	0.00005
HEATH26	Cashmere at Penruddock Rise	10.5	0.0061	0.00095	0.00015
HEATH31	Heathcote at Warren Cres	1.7	0.0076	0.00025	0.00005
OTUKAI01	Ōtūkaikino at Scout Camp	0.5	**0.0120**	0.00042	0.00011
OTUKAI02	Wilsons Stm	6.3	0.0070	0.00070	0.00011
OTUKAI03	Ōtūkaikino at Groynes	1.1	0.0036	0.00035	0.00017
OTUKAI13	Otukaikino D/S of Dickeys Road	1.9	0.0024	0.00025	0.00005
STYX01	Smacks at Gardiners Rd	1.7	0.0094	0.00056	0.00005
STYX02	Styx at Gardiners Rd	1.1	0.0044	0.00045	0.00005
STYX03	Styx at Main North Rd	2.2	0.0051	0.00042	0.00005
STYX04	Kā Pūtahi at Blakes Rd	1.9	**0.0183**	0.00038	0.00005
STYX05	Kā Pūtahi at Belfast Rd	5.4	0.0047	0.00040	0.00005
STYX06	Styx at Marshland Rd	4.6	0.0097	0.00062	0.00005
STYX07	Styx at Richards Bridge	3.9	0.0043	0.00060	0.00005
STYX08	Styx at Harbour Rd	4.3	0.0040	0.00061	0.00014
STYX20	Styx Drain	5.9	**0.0340**	**0.00200**	0.00012

[1]Results for AVON01 Avon River at Pages Road, HALS04 Halswell River at Akaroa Highway (Tai Tapu Road), and HEATH02 Heathcote River at Tunnel Road are not shown as these sites were removed from the network following the recent Environmental Monitoring Plan updates (see EMP v11, Appendix D).

Table 10: Summary of stormwater contaminant trend results for total suspended solids (TSS), dissolved copper, dissolved zinc and dissolved lead over the full monitoring period (2007-2025). Monitoring of total suspended solids started in 2007, while monitoring of metals (dissolved copper, zinc and lead) started in 2011. The same trend period applies for all metals. Percent (%) annual change shows the magnitude of change per year, with negative values reflecting decreasing concentrations of a contaminant (i.e., improving trends) and positive values reflecting increasing contaminant concentrations (i.e., degrading trends). Trend confidence (0-1) indicates the confidence in a given trend direction.

Site ID	TSS Trend Period (years)	TSS % Annual Change	TSS Trend Confidence	TSS Trend	Metals Trend Period (years)	Zinc % Annual Change	Zinc Trend Confidence	Zinc Trend	Lead % Annual Change	Lead Trend Confidence	Lead Trend	Copper % Annual Change	Copper Trend Confidence	Dissolved Copper Trend
AVON02	19	-0.7	0.93	Very likely improving	15	0.0	0.61	Indeterminate	0.0	1.00	Very likely improving	0.0	1.00	Very likely improving
AVON03	19	0.0	0.98	Very likely improving	15	0.8	0.75	Likely degrading	0.0	1.00	Very likely improving	0.0	0.99	Very likely improving
AVON04	17	0.0	0.90	Very likely degrading	15	2.3	0.97	Very likely degrading	0.0	1.00	Very likely improving	0.0	0.99	Very likely improving
AVON05	19	0.0	0.50	Indeterminate	15	-2.8	0.99	Very likely improving	0.0	0.99	Very likely improving	0.0	0.96	Very likely improving
AVON06	19	0.0	0.72	Likely degrading	15	0.0	0.60	Indeterminate	0.0	0.96	Very likely improving	0.0	0.75	Likely improving
AVON07	19	0.0	0.80	Likely degrading	15	0.0	0.57	Indeterminate	0.0	0.97	Very likely improving	0.0	0.97	Very likely improving
AVON08	18	0.0	0.89	Likely improving	15	1.1	0.78	Likely degrading	0.0	0.93	Very likely improving	0.0	0.91	Very likely improving
AVON09	18	0.0	0.86	Likely degrading	15	0.7	0.65	Indeterminate	0.0	0.88	Likely improving	0.0	1.00	Very likely improving
AVON10	18	-0.3	0.93	Very likely improving	15	0.6	0.65	Indeterminate	0.0	1.00	Very likely improving	0.0	0.82	Likely improving
AVON11	18	-3.1	1.00	Very likely improving	15	-6.3	1.00	Very likely improving	0.0	1.00	Very likely improving	0.0	0.95	Very likely improving
AVON12	18	0.0	0.66	Indeterminate	12	2.4	0.95	Very likely degrading	0.0	0.81	Likely improving	0.0	1.00	Very likely improving
AVON13	18	0.0	0.98	Very likely improving	12	0.8	0.70	Likely degrading	0.0	1.00	Very likely improving	0.0	0.98	Very likely improving
BP01	6	1.1	0.59	Indeterminate	6	22.8	1.00	Very likely degrading	0.0	0.72	Likely degrading	15.8	0.99	Very likely degrading
BP03	6	-5.3	0.73	Likely improving	6	1.4	0.57	Indeterminate	0.0	0.50	Indeterminate	-9.4	0.97	Very likely improving
BP04	6	12.9	0.98	Very likely degrading	6	0.0	0.60	Indeterminate	0.0	0.81	Likely improving	-12.8	1.00	Very likely improving
CW01	6	3.8	0.84	Likely degrading	6	-1.2	0.64	Indeterminate	0.0	1.00	Very likely improving	-18.5	1.00	Very likely improving
CW02	6	18.9	1.00	Very likely degrading	6	3.3	0.75	Likely degrading	0.0	0.99	Very likely improving	-6.7	0.90	Very likely improving
CW03	6	-9.4	0.94	Very likely improving	6	0.0	0.63	Indeterminate	0.0	0.94	Very likely improving	1.4	0.65	Indeterminate
CW04	6	14.9	1.00	Very likely degrading	6	-7.0	0.91	Very likely improving	0.0	0.99	Very likely improving	-2.4	0.68	Likely improving

HALS03	18	0.0	0.90	Likely improving	15	4.2	1.00	Very likely degrading	0.0	0.99	Very likely improving	0.0	1.00	Very likely improving
HALS05	14	0.0	0.59	Indeterminate	14	-0.8	0.91	Very likely improving	0.0	0.95	Very likely improving	0.0	0.96	Very likely improving
HALS07	6	-47.4	1.00	Very likely improving	6	1.7	0.66	Indeterminate	0.0	0.88	Likely improving	-11.4	0.99	Very likely improving
HEATH01	19	-3.5	1.00	Very likely improving	15	2.3	0.95	Very likely degrading	0.0	1.00	Very likely improving	0.0	1.00	Very likely improving
HEATH03	19	-0.9	1.00	Very likely improving	15	0.0	0.59	Indeterminate	0.0	0.99	Very likely improving	0.0	0.98	Very likely improving
HEATH04	19	0.0	0.57	Indeterminate	15	-3.0	0.97	Very likely improving	0.0	0.99	Very likely improving	0.0	0.99	Very likely improving
HEATH05	19	0.0	0.56	Indeterminate	15	-0.6	0.88	Likely improving	0.0	0.95	Very likely improving	0.0	0.98	Very likely improving
HEATH06	18	0.0	0.85	Likely degrading	15	-4.2	1.00	Very likely improving	0.0	0.99	Very likely improving	0.0	0.98	Very likely improving
HEATH07	18	0.0	0.77	Likely degrading	15	-3.6	1.00	Very likely improving	0.0	0.96	Very likely improving	0.0	0.94	Very likely improving
HEATH09	19	0.7	0.96	Very likely degrading	15	-8.6	1.00	Very likely improving	-	-	-	-	-	-
HEATH10	18	4.0	1.00	Very likely degrading	15	-2.2	0.84	Likely improving	0.0	0.99	Very likely improving	0.0	0.80	Likely improving
HEATH11	18	-3.2	1.00	Very likely improving	12	-1.9	0.81	Likely improving	0.0	1.00	Very likely improving	0.0	0.97	Very likely improving
HEATH12	18	-1.0	1.00	Very likely improving	12	-3.2	0.94	Very likely improving	0.0	0.95	Very likely improving	0.0	0.94	Very likely improving
HEATH16	16	0.0	0.96	Very likely degrading	15	-1.8	0.92	Very likely improving	0.0	0.94	Very likely improving	0.0	0.97	Very likely improving
HEATH17	6	13.6	1.00	Very likely degrading	6	3.3	0.73	Likely degrading	0.0	0.82	Likely improving	-20.6	1.00	Very likely improving
HEATH31	6	-3.7	0.83	Likely improving	6	-7.1	0.92	Very likely improving	0.0	0.86	Likely improving	-17.5	1.00	Very likely improving
OTUKAI01	12	0.0	0.67	Indeterminate	12	0.0	0.73	Likely degrading	0.0	0.51	Indeterminate	0.0	0.91	Very likely improving
OTUKAI02	13	4.2	1.00	Very likely degrading	13	0.0	0.76	Likely degrading	0.0	0.98	Very likely improving	0.0	0.81	Likely improving
OTUKAI03	18	0.0	0.72	Likely improving	15	-8.2	1.00	Very likely improving	0.0	0.99	Very likely improving	0.0	0.97	Very likely improving
OUT01	19	-1.5	1.00	Very likely improving	15	0.3	0.60	Indeterminate	0.0	1.00	Very likely improving	0.0	0.99	Very likely improving
STYX01	19	0.0	0.92	Very likely degrading	15	-4.3	1.00	Very likely improving	0.0	0.84	Likely improving	0.0	1.00	Very likely improving
STYX02	19	0.0	0.84	Likely improving	15	-1.9	0.97	Very likely improving	0.0	0.94	Very likely improving	0.0	0.94	Very likely degrading

STYX03	19	0.0	0.59	Indeterminate	15	0.0	0.70	Likely degrading	0.0	0.95	Very likely improving	0.0	0.99	Very likely improving
STYX04	19	0.0	0.56	Indeterminate	15	-0.8	0.79	Likely improving	0.0	0.86	Likely improving	0.0	0.97	Very likely improving
STYX05	19	0.0	0.72	Likely improving	15	0.0	0.69	Likely improving	0.0	0.98	Very likely improving	0.0	0.99	Very likely improving
STYX06	19	0.0	0.68	Likely degrading	15	1.8	0.92	Very likely degrading	0.0	0.77	Likely improving	0.0	0.93	Very likely improving
STYX07	18	0.0	0.93	Very likely degrading	15	0.0	0.66	Indeterminate	0.0	0.84	Likely improving	0.0	0.96	Very likely improving
STYX08	18	0.0	0.98	Very likely degrading	15	0.0	0.81	Likely improving	0.0	0.99	Very likely improving	0.0	0.97	Very likely improving

Table 11: Summary of stormwater contaminant trend results for total suspended solids (TSS), dissolved copper, dissolved zinc and dissolved lead over the latest 10-year data period (2015-2025). Percent (%) annual change shows the magnitude of change per year, with negative values reflecting decreasing concentrations of a contaminant (i.e., improving trends) and positive values reflecting increasing contaminant concentrations (i.e., degrading trends). Trend confidence (0-1) indicates the confidence in a given trend direction.

Site ID	TSS% Annual Change	TSS Trend Confidence	TSS Trend	Dissolved Zinc % Annual Change	Dissolved Zinc Trend Confidence	Dissolved Zinc Trend	Dissolved Lead % Annual Change	Dissolved Lead Trend Confidence	Dissolved Lead Trend	Dissolved Copper % Annual Change	Dissolved Copper Trend Confidence	Dissolved Copper Trend
AVON02	-2.9	1.00	Very likely improving	-2.4	0.88	Likely improving	-1.7	1.00	Very likely improving	-2.1	1.00	Very likely improving
AVON03	0.0	0.65	Indeterminate	4.1	0.99	Very likely degrading	0.0	1.00	Very likely improving	-0.8	1.00	Very likely improving
AVON04	0.0	0.81	Likely degrading	2.7	0.95	Very likely degrading	0.0	0.99	Very likely improving	-1.3	1.00	Very likely improving
AVON05	0.0	0.64	Indeterminate	3.3	0.97	Very likely degrading	0.0	0.98	Very likely improving	0.0	1.00	Very likely improving
AVON06	0.0	0.82	Likely degrading	5.2	1.00	Very likely degrading	0.0	0.81	Likely improving	0.0	0.86	Likely improving
AVON07	0.0	0.82	Likely degrading	2.7	0.94	Very likely degrading	0.0	0.89	Likely improving	-1.0	1.00	Very likely improving
AVON08	0.0	0.95	Very likely improving	2.6	0.91	Very likely degrading	0.0	0.77	Likely improving	0.0	0.87	Likely improving
AVON09	2.6	0.95	Very likely degrading	-2.8	0.92	Very likely improving	0.0	0.81	Likely improving	-3.4	1.00	Very likely improving
AVON10	-4.8	1.00	Very likely improving	3.6	0.96	Very likely degrading	0.0	0.99	Very likely improving	0.0	0.96	Very likely improving
AVON11	-5.5	1.00	Very likely improving	-1.4	0.74	Likely improving	0.0	1.00	Very likely improving	-2.5	1.00	Very likely improving

AVON12	0.0	0.76	Likely degrading	2.9	0.98	Very likely degrading	0.0	0.79	Likely improving	-2.5	1.00	Very likely improving
AVON13	0.0	0.79	Likely improving	1.2	0.75	Likely degrading	0.0	1.00	Very likely improving	-0.9	1.00	Very likely improving
HALS03	0.0	0.77	Likely improving	-0.2	0.57	Indeterminate	0.0	0.99	Very likely improving	-2.5	1.00	Very likely improving
HALS05	0.0	0.67	Likely degrading	3.1	0.97	Very likely degrading	0.0	0.97	Very likely improving	0.0	1.00	Very likely improving
HEATH01	-7.7	1.00	Very likely improving	-5.4	0.99	Very likely improving	0.0	1.00	Very likely improving	-4.2	1.00	Very likely improving
HEATH03	0.0	0.71	Likely improving	-0.3	0.54	Indeterminate	0.0	0.99	Very likely improving	0.0	0.94	Very likely improving
HEATH04	-0.3	0.64	Indeterminate	-4.2	0.98	Very likely improving	0.0	0.98	Very likely improving	-1.2	0.99	Very likely improving
HEATH05	2.3	0.84	Likely degrading	-2.6	0.89	Likely improving	0.0	0.98	Very likely improving	0.0	0.97	Very likely improving
HEATH06	5.1	0.99	Very likely degrading	-10.0	1.00	Very likely improving	0.0	1.00	Very likely improving	-1.2	0.98	Very likely improving
HEATH07	0.3	0.64	Indeterminate	-3.9	0.99	Very likely improving	0.0	0.99	Very likely improving	0.0	0.93	Very likely improving
HEATH09	-2.6	0.90	Likely improving	-25.2	1.00	Very likely improving	0.0	1.00	Very likely improving	-16.2	1.00	Very likely improving
HEATH10	11.1	1.00	Very likely degrading	2.3	0.75	Likely degrading	0.0	0.93	Very likely improving	2.1	0.96	Very likely degrading
HEATH11	-3.7	0.97	Very likely improving	-1.7	0.78	Likely improving	0.0	1.00	Very likely improving	-0.8	0.99	Very likely improving
HEATH12	-3.0	0.98	Very likely improving	-2.8	0.87	Likely improving	0.0	0.98	Very likely improving	0.0	0.98	Very likely improving
HEATH14	7.3	1.00	Very likely degrading	-1.2	0.79	Likely improving	-6.3	1.00	Very likely improving	-2.4	0.86	Likely improving
HEATH16	0.0	0.95	Very likely degrading	1.1	0.75	Likely degrading	0.0	0.99	Very likely improving	-2.4	1.00	Very likely improving
OTUKAI01	0.0	0.97	Very likely improving	0.0	0.66	Indeterminate	0.0	0.54	Indeterminate	0.0	0.99	Very likely improving
OTUKAI02	4.8	0.98	Very likely degrading	3.8	0.98	Very likely degrading	0.0	0.99	Very likely improving	0.0	0.95	Very likely improving

OTUKAI03	0.0	0.92	Very likely degrading	0.0	0.58	Indeterminate	0.0	1.00	Very likely improving	-1.3	1.00	Very likely improving
OUT01	-0.3	0.65	Indeterminate	-0.7	0.62	Indeterminate	0.0	1.00	Very likely improving	-4.9	1.00	Very likely improving
STYX01	0.0	0.96	Very likely degrading	1.3	0.81	Likely degrading	0.0	0.63	Indeterminate	-2.9	1.00	Very likely improving
STYX02	0.0	1.00	Very likely improving	3.0	0.92	Very likely degrading	0.0	0.92	Very likely improving	0.0	1.00	Very likely degrading
STYX03	0.0	0.61	Indeterminate	1.5	0.84	Likely degrading	0.0	1.00	Very likely improving	-2.6	1.00	Very likely improving
STYX04	-2.6	0.98	Very likely improving	1.2	0.79	Likely degrading	0.0	0.92	Very likely improving	0.0	1.00	Very likely improving
STYX05	-2.5	0.93	Very likely improving	0.0	0.66	Indeterminate	0.0	0.92	Very likely improving	-1.5	1.00	Very likely improving
STYX06	0.0	0.83	Likely degrading	2.7	0.92	Very likely degrading	0.0	0.87	Likely improving	0.0	0.95	Very likely improving
STYX07	0.0	0.56	Indeterminate	2.3	0.89	Likely degrading	0.0	0.95	Very likely improving	-0.9	1.00	Very likely improving
STYX08	2.8	0.99	Very likely degrading	0.0	0.64	Indeterminate	0.0	1.00	Very likely improving	-1.4	1.00	Very likely improving

Water Quality Index

Table 12: The 2025 Water Quality Index (WQI) and trend results. There were insufficient data to calculate trends at HEATH26, OTUKAI13 and STYX20 as these sites were added to the monitoring network in 2025.

Site ID	Catchment	WQI Score	Water Quality Category	Trend Period (Years)	WQI Temporal Trend
AVON03	Ōtākaro-Avon	81	Good	10	Indeterminate
AVON04	Ōtākaro-Avon	86	Good	10	Likely improving
AVON05	Ōtākaro-Avon	87	Good	10	Indeterminate
AVON06	Ōtākaro-Avon	78	Fair	10	Likely degrading
AVON07	Ōtākaro-Avon	86	Good	10	Likely degrading
AVON08	Ōtākaro-Avon	74	Fair	10	Indeterminate
AVON09	Ōtākaro-Avon	71	Fair	10	Indeterminate
AVON10	Ōtākaro-Avon	77	Fair	10	Likely degrading
AVON11	Ōtākaro-Avon	82	Good	10	Indeterminate
AVON12	Ōtākaro-Avon	86	Good	10	Indeterminate
AVON13	Ōtākaro-Avon	83	Good	10	Indeterminate
BP01	Zephyr Stream	67	Poor	6	Very likely degrading
BP03	Balguerie Stream	71	Fair	6	Likely degrading
BP04	Aylmers Stream	66	Poor	6	Indeterminate
HALS03	Huritini-Halswell	75	Fair	10	Indeterminate
HALS05	Huritini-Halswell	82	Good	10	Indeterminate
HALS07	Huritini-Halswell	86	Good	6	Very likely improving
HEATH03	Ōpāwaho-Heathcote	76	Fair	10	Indeterminate
HEATH04	Ōpāwaho-Heathcote	81	Good	10	Very likely improving
HEATH05	Ōpāwaho-Heathcote	81	Good	10	Indeterminate
HEATH06	Ōpāwaho-Heathcote	71	Fair	10	Indeterminate
HEATH07	Ōpāwaho-Heathcote	80	Good	10	Likely improving

HEATH09	Ōpāwaho-Heathcote	64	Poor	10	Very likely improving
HEATH10	Ōpāwaho-Heathcote	60	Poor	10	Likely degrading
HEATH11	Ōpāwaho-Heathcote	76	Fair	10	Likely improving
HEATH12	Ōpāwaho-Heathcote	85	Good	10	Very likely improving
HEATH14	Ōpāwaho-Heathcote	50	Poor	10	Very likely degrading
HEATH16	Ōpāwaho-Heathcote	76	Fair	10	Likely degrading
HEATH17	Ōpāwaho-Heathcote	84	Good	6	Indeterminate
HEATH26	Ōpāwaho-Heathcote	77	Fair	1	-
HEATH31	Ōpāwaho-Heathcote	87	Good	6	Very likely improving
OTUKAI01	Ōtūkaikino	86	Good	10	Likely degrading
OTUKAI02	Ōtūkaikino	86	Good	10	Likely degrading
OTUKAI03	Ōtūkaikino	96	Excellent	10	Indeterminate
OTUKAI13	Ōtūkaikino	100	Excellent	1	-
STYX01	Pūharakekenui-Styx	90	Excellent	10	Indeterminate
STYX02	Pūharakekenui-Styx	90	Good	10	Indeterminate
STYX03	Pūharakekenui-Styx	82	Good	10	Very likely degrading
STYX04	Pūharakekenui-Styx	81	Good	10	Likely improving
STYX05	Pūharakekenui-Styx	80	Fair	10	Indeterminate
STYX06	Pūharakekenui-Styx	80	Good	10	Likely degrading
STYX07	Pūharakekenui-Styx	89	Good	10	Likely improving
STYX08	Pūharakekenui-Styx	79	Fair	10	Indeterminate
STYX20	Pūharakekenui-Styx	77	Fair	1	-

Table 13: 2025 water quality index calculated with unadjusted copper and zinc (i.e., 'old' methods). Results are comparable to previous years reporting.

Site ID	Catchment	WQI Score	Water Quality Category
AVON03	Ōtākaro-Avon	83	good
AVON04	Ōtākaro-Avon	94	very good
AVON05	Ōtākaro-Avon	89	good
AVON06	Ōtākaro-Avon	79	fair

AVON07	Ōtākaro-Avon	94	very good
AVON08	Ōtākaro-Avon	75	fair
AVON09	Ōtākaro-Avon	63	poor
AVON10	Ōtākaro-Avon	69	poor
AVON11	Ōtākaro-Avon	79	fair
AVON12	Ōtākaro-Avon	89	good
AVON13	Ōtākaro-Avon	80	good
BP01	Zephyr Stream	58	poor
BP03	Balguerie Stream	66	poor
BP04	Aylmers Stream	66	poor
HALS03	Huritini-Halswell	73	fair
HALS05	Huritini-Halswell	84	good
HALS07	Huritini-Halswell	83	good
HEATH03	Ōpāwaho-Heathcote	72	fair
HEATH04	Ōpāwaho-Heathcote	78	fair
HEATH05	Ōpāwaho-Heathcote	73	fair
HEATH06	Ōpāwaho-Heathcote	62	poor
HEATH07	Ōpāwaho-Heathcote	77	fair
HEATH09	Ōpāwaho-Heathcote	63	poor
HEATH10	Ōpāwaho-Heathcote	54	poor
HEATH11	Ōpāwaho-Heathcote	72	fair
HEATH12	Ōpāwaho-Heathcote	82	good
HEATH14	Ōpāwaho-Heathcote	42	poor
HEATH16	Ōpāwaho-Heathcote	72	fair
HEATH17	Ōpāwaho-Heathcote	81	good
HEATH26	Ōpāwaho-Heathcote	73	fair
HEATH31	Ōpāwaho-Heathcote	85	good
OTUKAI01	Ōtūkaikino	84	good
OTUKAI02	Ōtūkaikino	84	good
OTUKAI03	Ōtūkaikino	95	very good
OTUKAI13	Ōtūkaikino	100	very good
STYX01	Pūharakekenui-Styx	93	very good
STYX02	Pūharakekenui-Styx	88	good
STYX03	Pūharakekenui-Styx	84	good
STYX04	Pūharakekenui-Styx	77	fair
STYX05	Pūharakekenui-Styx	76	fair
STYX06	Pūharakekenui-Styx	77	fair
STYX07	Pūharakekenui-Styx	88	good
STYX08	Pūharakekenui-Styx	75	fair
STYX20	Pūharakekenui-Styx	73	fair

Additional Water Quality Parameters

Table 14: Summary of additional water quality parameters over the last 3-years (2022-2025). Bold underlined values indicate exceedance of Guideline Levels from Table 5 of the Environmental Monitoring Plan v11. All values are medians unless otherwise stated. Biochemical Oxygen Demand (BOD), Conductivity (Cond.), Dissolved Inorganic Nitrate (DIN), Dissolved Organic Carbon (DOC), Dissolved Oxygen (DO and DO sat.), Dissolved Reactive Phosphorus (DRP), Nitrate Nitrogen (NO3-N), total ammoniacal nitrogen (TAN) and Temperature (Temp.).

Site ID	BOD (mg O_2/L)	Cond. (µs/cm)	DIN (mg/L)	DOC (mg/L)	DO (mg/L)	DO sat. (%)	DRP (mg/L)	*Enterococci* (cfu/100 mL)		95th percentile *E. coli* (cfu/100 mL)	Faecal coliforms (cfu/100 mL)		NO_3-N (mg/L)		pH	95th percentile TAN (mg/L)	Hardness	Turbidity (FNU)	Temp. (°C)
								Max	95th Percentile		Median	90th percentile	Median	95th percentile					
AVON02	0.5	6010	0.74	1.90	9.15	90	0.0285	**160**	-	2250	-	-	0.67	1.27	7.7	0.097	330	9.55	14.7
AVON03	0.5	**188**	1.20	0.79	8.15	80	**0.0190**	-	-	**1092**	-	-	1.10	1.70	7.5	0.074	69	**1.40**	13.6
AVON04	0.5	**188**	1.45	0.59	9.15	87	0.0120	-	-	**3510**	-	-	1.30	1.63	7.4	0.070	69	1.25	13.1
AVON05	0.5	**177**	1.10	0.41	8.20	78	0.0068	-	-	**835**	-	-	1.10	1.50	7.0	0.021	65	0.97	13.4
AVON06	0.5	**180**	**2.00**	0.29	8.45	81	0.0074	-	-	**779**	-	-	2.00	2.84	7.1	0.026	64	1.20	13.3
AVON07	0.5	**191**	**2.30**	0.34	9.00	87	0.0074	-	-	**2620**	-	-	2.20	3.15	7.1	0.051	64	1.20	13.3
AVON08	0.5	**267**	**2.55**	0.67	9.00	89	0.0160	-	-	**17900**	-	-	**2.55**	3.11	7.3	0.105	100	**1.40**	14.2
AVON09	0.5	**294**	1.05	2.70	7.60	72	**0.0200**	-	-	**16820**	-	-	0.93	1.28	7.4	0.238	110	**7.65**	14.4
AVON10	0.5	**163**	0.37	2.40	7.95	75	**0.0510**	-	-	**8750**	-	-	0.28	0.57	7.5	0.186	63	**4.30**	12.6
AVON11	0.5	**186**	0.32	3.85	6.35	**61**	**0.0430**	-	-	**2670**	-	-	0.25	0.68	7.2	0.130	70	**3.40**	13.8
AVON12	0.5	**184**	**1.65**	0.48	8.90	86	0.0081	-	-	**827**	-	-	1.65	2.10	7.3	0.040	64	1.15	13.3
AVON13	0.5	**203**	0.93	1.50	8.35	83	**0.0245**	-	-	**1367**	-	-	0.90	1.47	7.5	0.083	62	**1.85**	14.7
BP01	0.5	**235**	**0.15**	6.80	8.10	**72**	0.0225	-	-	**4100**	-	-	0.09	0.60	7.1	**0.352**	46	**5.05**	12.2
BP03	0.5	**164**	**0.20**	1.55	9.80	96	**0.0460**	-	-	**4380**	-	-	0.19	0.51	7.6	0.037	31	**2.15**	11.3
BP04	0.5	**172**	**0.22**	1.60	9.90	97	**0.0460**	-	-	**4250**	-	-	0.22	0.69	7.6	0.028	31	**2.10**	11.4
CW01	0.5	51800	-	-	9.65	99	-	**190**	-	110	-	-	-	-	8.0	-	-	5.95	13.8
CW02	0.5	51200	-	-	9.50	95	-	**320**	-	-	-	-	-	-	7.9	-	-	13.00	15.8
CW03	0.5	52000	-	-	9.45	98	-	-	183	-	-	-	-	-	8.0	-	-	11.00	14.9
CW04	0.8	52000	-	-	9.60	99	-	**660**	-	-	4	29	-	-	8.0	-	-	4.60	14.8
HALS03	0.5	**230**	1.30	1.15	8.10	78	**0.0235**	-	-	**6560**	-	-	1.20	1.97	7.4	0.057	86	**1.80**	13.4
HALS05	0.5	**223**	**4.00**	0.51	8.95	85	0.0053	-	-	**1550**	-	-	**4.00**	**4.70**	7.2	0.046	70	**2.20**	13.3
HALS07	0.5	**231**	**3.40**	0.97	9.40	89	**0.0170**	-	-	**933**	-	-	**3.40**	**3.90**	7.4	0.068	76	**1.90**	12.9
HEATH01	0.5	13000	0.87	1.65	9.10	89	0.0355	**4100**	-	4720	-	-	0.77	1.37	7.7	0.127	1650	15.5	15.4
HEATH03	0.5	**276**	**1.60**	1.80	7.45	72	**0.0245**	-	-	**2330**	-	-	1.50	1.90	7.4	0.134	94	**4.20**	14.0
HEATH04	0.5	**250**	**1.65**	2.20	8.90	83	**0.0200**	-	-	**3180**	-	-	1.60	2.00	7.5	0.124	88	**4.95**	13.6
HEATH05	0.5	**233**	1.20	2.40	8.05	77	0.0145	-	-	**2020**	-	-	1.20	1.40	7.3	0.194	79	**7.85**	13.3
HEATH06	0.5	**246**	**2.20**	2.20	8.70	81	**0.0210**	-	-	**3275**	-	-	2.10	3.45	7.2	0.089	78	**3.60**	13.5
HEATH07	0.5	**243**	**1.85**	2.40	8.40	80	**0.0180**	-	-	**2140**	-	-	1.75	2.20	7.3	0.134	80	**7.60**	13.4
HEATH09	**2.2**	**128**	0.19	4.10	6.30	**63**	**0.0335**	-	-	**3027**	-	-	0.13	**4.40**	6.8	0.166	40	**6.10**	14

HEATH10	1.6	**204**	0.33	4.65	3.40	**33**	**0.0440**	-	-	**6020**	-	-	0.10	1.67	6.8	0.377	61	**16.0**	13.5
HEATH11	0.5	**632**	1.30	2.05	8.60	79	**0.0280**	-	-	**1830**	-	-	1.25	1.70	7.5	0.117	170	**6.05**	14.4
HEATH12	0.5	**280**	1.50	1.95	7.80	77	**0.0260**	-	-	**3150**	-	-	1.40	1.80	7.4	0.140	92	**3.70**	14.1
HEATH14	1.7	**270**	0.50	4.10	6.20	**58**	**0.0560**	-	-	**7500**	-	-	0.18	0.79	7.0	0.813	74	**14.0**	14.5
HEATH16	0.5	**291**	**1.80**	0.98	4.90	**48**	0.0038	-	-	94	-	-	1.80	2.17	6.8	0.027	99	0.58	14.6
HEATH17	0.5	**194**	0.66	0.70	7.90	77	**0.0335**	1400	-	**3180**	-	-	0.62	0.76	7.6	0.066	68	**3.30**	14.7
HEATH26	0.5	**249**	1.30	2.70	7.75	73	0.0115	-	-	**2284**	-	-	1.30	1.49	7.3	0.199	80	**6.45**	13.6
HEATH31	0.5	**301**	**4.65**	0.53	5.20	**51**	0.0042	-	-	451	-	-	**4.60**	**5.60**	6.7	0.026	100	0.92	14.0
OTUKAI01	0.5	95	0.23	0.61	7.80	75	0.0041	-	-	287	-	-	0.20	0.71	6.9	0.016	40	0.36	12.9
OTUKAI02	0.5	**137**	**2.10**	0.82	9.50	93	0.0130	-	-	**1298**	-	-	2.10	2.18	7.7	0.073	51	**4.50**	14.1
OTUKAI03	0.5	91	0.21	0.62	8.30	78	0.0043	-	-	540	-	-	0.20	0.54	7.1	0.034	35	0.50	12.7
OTUKAI13	0.5	103	0.51	0.71	9.60	97	0.008	-	-	296	-	-	0.49	0.72	7.4	0.019	38	1.10	14.3
OUT01	1.0	6855	0.42	3.70	5.70	**55**	0.0610	**1800**	-	2540	-	-	0.10	0.59	7.5	0.612	665	6.25	14.7
STYX01	0.5	**126**	0.46	0.39	6.05	**59**	0.0070	-	-	**779**	-	-	0.45	1.07	6.8	0.022	44	0.65	13.8
STYX02	0.5	**126**	0.53	0.52	6.10	**59**	0.0077	-	-	**1588**	-	-	0.52	0.78	6.9	0.012	45	0.54	13.8
STYX03	0.5	**133**	0.38	0.89	7.35	**70**	0.0120	-	-	546	-	-	0.35	0.59	7.1	0.038	45	1.02	13.7
STYX04	0.5	**153**	1.45	0.86	7.40	74	**0.0190**	-	-	**1010**	-	-	1.40	1.70	7.1	0.141	55	**1.65**	13.9
STYX05	0.5	**153**	1.10	1.00	7.85	75	**0.0230**	-	-	**3280**	-	-	1.00	1.30	7.4	0.078	51	**2.95**	14.3
STYX06	0.5	**136**	0.66	0.87	8.30	84	**0.0190**	-	-	**1410**	-	-	0.64	0.96	7.4	0.047	51	**2.85**	13.8
STYX07	0.5	**138**	0.57	1.15	8.00	81	**0.0230**	-	-	**566**	-	-	0.53	0.93	7.5	0.068	50	**2.45**	14.3
STYX08	0.5	**212**	0.53	1.55	7.75	76	**0.0260**	-	-	458	-	-	0.47	0.75	7.4	0.164	57	**3.30**	14.2
STYX20	0.5	**169**	0.56	1.10	8.80	81	0.0100	-	-	**3640**	-	-	0.52	0.70	7.1	0.106	63	**5.40**	14.0