Comprehensive Stormwater Network Discharge Consent Annual Report 2023

Prepared to meet the requirements of CRC231955

Christchurch City Council

June 2024

Christchurch City Council

Internal Document Review and Approval

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Acronyms and Abbreviations

ATL	Attribute Target Level
CBA	Cost-Benefit Analysis
CLM	Contaminant Load Model
Council	Christchurch City Council
CSNDC	Comprehensive Stormwater Network Discharge Consent
ECan	Environment Canterbury Regional Council
EMP	Environmental Monitoring Programme
ESCP	Erosion Sediment Control Plan
ICCM	Instream Contaminant Concentration Model
IDS	Infrastructure Design Standards
IGSC	Interim Global Stormwater Consent
LWRP	Land and Water Regional Plan
MEDUSA	Modelled Estimates of Discharges for Urban Stormwater Assessments
MUSIC	Model for Urban Stormwater Improvement Conceptualisation
PAH	Polycyclic aromatic hydrocarbons
QMCI	Quantitative Macroinvertebrate Index
SDMP	Sediment Discharge Management Plan
SMP	Stormwater Management Plan
TPRP	Technical Peer Review Panel
TSS	Total Suspended Solids
TWWM	Targeted Wet Weather Monitoring
WWDG	Waterways Wetlands Design Guide

1. Purpose of the Annual Report

In December 2019, Environment Canterbury Regional Council (ECan), granted the Comprehensive Stormwater Network Discharge Consent (CSNDC) CRC231955, to the Christchurch City Council (Council). As per Condition 61, the Council must produce an Annual Report on 30 June each year, reporting on the previous calendar year of consent activities undertaken. The Annual Report is provided to ECan, Banks Peninsula and Christchurch West-Melton Zone Committees, Papatipu Rūnanga (via Mahaanui Kurataiao Limited), and is published on the Council's website.

This third CSNDC Annual Report primarily covers the period 1 January to 31 December 2023.

Due to technical issues processing and analysing surface water quality data, Council did not have sufficient information to complete the "Surface Water Quality "and "Response to Monitoring" sections (and supplementary reports) of this Annual Report by the 30 June deadline. As a result, these sections and reports are missing from this 2023 Annual Report at the time of submission (30 June 2024). To address this matter Council will provide Environment Canterbury with a summary memo and reports for these missing sections no later than the 30 August 2024.

2. Summary of Developments Authorised under this Consent

The Council has authorised stormwater discharges under consent CRC231955, since 20 December 2019, when the consent order was issued. This occurs when an applicant (e.g. developer or customer building a new residential dwelling) applies for a resource consent, building consent, or subdivision consent; and is required to ensure that the discharge of stormwater from the building or site is legally authorised. An applicant may then choose to request authorisation from the Council to discharge stormwater under consent CRC231955 or to obtain their own resource consent from ECan.

The authorisations given by the Council to applicants have been for sites including subdivisions, redevelopment of commercial and industrial sites, residential housing units, schools, and individual house lots. Appendix A provides the list of sites that were authorised in 2023 to discharge under the CSNDC, as required by Condition 61(h).

ECan are notified of sites authorised to discharge under the consent monthly. The Council requests advice from ECan on applications for discharge approval which might hold unacceptably high risk. In accordance with Condition 2(d), those sites which ECan advise should be considered to hold unacceptably high risk, are not provided with stormwater approval by Council. Rather their discharge is managed via resource consent with ECan.

3. Changes to Regulatory Framework Affecting Stormwater Management Plans (SMPs)

Plan change 7 of the LWRP became operative on 1 September 2023, this plan changes dealt with several stormwater related issues such as river classifications, surface water quality limits, Salmon spawning and bathing sites within the Christchurch district, particularly relating to the Waimakariri sub-chapter.

4. Alignment with Christchurch-West Melton Sub-Regional Section of the Canterbury Land and Water Regional Plan (LWRP)

As stated above, Plan Change 7 of the LWRP came into effect in September 2023, while these changes do apply to the Christchurch-West Melton sub-regional section and will influence future SMPs (or when they are up for review) they are unlikely to have significant impact on the CSNDC implementation in their current form.

5. Complaints or Observations regarding Spring Flow

There have been no specific complaints received by the Council regarding spring flow and/or quality. However, it is common to receive complaints regarding low waterway flow in the Waimairi and Wai-iti Streams, mainly during summer months when groundwater level is expected to be lower.

6. Canterbury Regional Council – Consent Compliance Reviews for 2023

ECan undertook three compliance monitoring reviews of the CSNDC and sent through reports to the Council on 5 October, 10 November, and 21 December 2023, sighting seven non-compliances. While most of the non-compliance matters have been subsequently addressed, the key matters identified were (italics):

- *Re-submission of the Huritīni/Halswell, and Ōpāwaho/Heathcote SMPs. These SMPs were submitted to ECan on 29 February 2024.*
- *The projected development and associated discharge of stormwater outlined in the Ōtūkaikino SMP may not achieve all the outcomes required by the CSNDC. The Council shall provide an update on the Ōtūkaikino CLM review and re-submit the Ōtūkaikino SMP. An update on the Ōtūkaikino CLM progress was provided to ECan on 28 March 2024 and the SMP is to be submitted July 2024.*
- *To address wide-scale poor implementation of Erosion and Sediment Control measures on building sites across the city, the Council shall produce a Remediation Action Plan (RAP) outlining how it plans to remedy this issue. A RAP was submitted to ECan on 9 October 2023 and has been in use since then.*

7. Stormwater Management Plans

7.1. Background and Purpose

Stormwater Management Plans (SMPs) are required to be developed and updated for each river catchment, as per CSNDC Conditions 4 and 5. Condition 6 and Schedule 2 provide the purpose and requirements of SMPs. These SMPs provide commentary on the future approach of the Council for these catchments in relation to flood protection, ecology and water quality, and hydrogeology (groundwater).

7.2. Progress to-date on SMP Programme

Table 1. Status of the SMPs including key submission dates.

SMP Area	Date	Action
Ōtākaro - Avon River Area	April 2024	Public Consultation and Submissions
	May 2024	Technical Peer Review
	19 June 2024	Adopted by Council
	25 June 2024	Lodged with ECan
Pūharakekenui - Styx River Area	September 2023	Public Consultation and Submissions
	12 December	Adopt by Council
	14 December 2023	Lodged with ECan
	30 June 2024	ECan have since requested TPRP comments to be addressed (Water Quality and Ecology)
Huritini - Halswell River Area	30 June 2016	SMP Operative
		Public Consultation and Submissions
		Adopted by Council
	December 2021	Submitted to ECan
		ECan requested more information on treatment facility catchments
	28 February 2024	Re-submitted to ECan
Ōpāwaho - Heathcote River Area		Public Consultation and Submissions
		Adopted by Council
	December 2021	Submitted to ECan
		ECan requested more information on treatment facility catchments
	28 February 2024	Re-submitted to ECan
Ihutai -Estuary and Coastal Area	April 2022	Public Consultation and Submissions
	9 June 2022	Adopted by Council
	30 June 2022	Lodged with ECan
		ECan subsequently provided further technical comment
	December 2022	Re-submitted to ECan
		Approved
Ōtukaikino - Outer Area		Public Consultation and Submissions

		Adopted by Council
	2 October 2023	Submitted to ECan
		ECan have rejected the zinc contaminant reduction plan, therefore we are currently working on a revised contaminant reduction strategy. Contaminant modelling requires updating and additional investigations.
	11 July 2024	Re-submitted to ECan
Te Pātaka o Rākaihautū / Banks Peninsula Settlements	October 2024	Public Consultation and Submissions
	November 2024	To be Adopted by Council
	22 December 2024	Due to be Lodged with ECan, Council are likely to apply for a variation to the delivery date (June 2025)

7.3. Implementation Plan

The Implementation Plan (Condition 11) is designed to give effect to certified SMPs, and to connect the budgets and programmes of work in the City's Long Term Plan. Currently, one SMP has been certified, Ihutai-Estuary and Coastal Area. All the SMPs that have been lodged have concurrent "City-wide" objectives and goals. The Implementation Plan demonstrates the progress that has been made on these objectives and those specific to the Ihutai-Estuary and Coastal SMP.

The Long Term Plan Hearings are now complete, with budgets finalised we will be able to submit the Implementation Plan 2024, post-consultation with MKT and DoC.

7.4. Summary of Contaminant Load Reduction Targets in SMPs

Condition 19 requires Council to specify target contaminant load reductions which will largely be achieved by proposed facilities and devices. The Auckland Regional Council's contaminant load model was adapted to Christchurch conditions by Golder Limited and run for the four major catchments, Christchurch Contaminant Load Model (C-CLM). A separate model was created for the Ihutai-Estuary and Coastal Catchment, and Ōtukaikino. Table 2 summarises the numerical targets proposed within the respective SMPs at the 10 year term, these reductions are derived from the contaminant load models mentioned above.

Table 2. Respective SMP contaminant load target reductions (tonnes/year) associated with proposed treatment facilities compared to the consent application base year 2018.

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Contaminants	Ōtākaro - Avon River Area	Pūharakekenui - Styx River Area	Huritini - Halswell River Area	Ōpāwaho - Heathcote River Area	Ihutai Estuary and Coastal Area	Ōtukaikino / Outer Area
TSS	11.2%	22.3%	14.4%	18.5%	3.40%	In proportion to development up to 69% reduction on present day
Total Zinc	9.3%	29.0%	13.7%	12.7%	5%	In proportion to development up to 53% increase on present day
Total Copper	10.6%	34.5%	15.5%	17.9%	5.30%	In proportion to development up to 14% reduction on present day

The Council is currently in the initial process of updating the C-CLM which involves the changes listed in Table 7-3. Once the information has been received, comments will be provided in the five-yearly interval update as per Condition 21, with recommendations and reasons for any changes to be made.

Table 3 Task list and process of the update of the C-CLM.

No.	Task	Description	Status
1	Audit and partial completion of SW Basin Reclassification Project	The Asset System and Information team identified the need to improve the stormwater basin dataset information. Firstly, the current dataset does not contain attributes that correlate with the assets as part of a stormwater treatment system making it difficult to understand from the data which assets are part of a specific system. Also, other important information as the facility purpose and treatment type, are not currently present in the dataset. There are also inaccuracies in basin types that need correction. This project is to undertake this audit and update the SW Basin dataset.	Complete
2	Catchment to treatment basin link verification	This project requires an update of the current treatment catchment layer based on the updated basin classification information. The entire dataset needs to be reviewed to confirm the correct linkage between qualifying catchments and each treatment facility.	Complete
3	Update C-CLM	This update incorporates changes in projected land use and treatment facility type and coverage to allow progress to be tracked against Table 2 outcomes.	In Progress

8. Environmental Monitoring Programme (EMP)

The EMP, as per Condition 49, has been developed and implemented to determine whether receiving environment objectives and attribute target levels (ATLs) are being met. The monitoring carried out under this programme includes monitoring of soil quality at infiltration facilities; groundwater; surface water levels and flows; sea level, and rainfall levels; surface water quality; instream sediment quality; aquatic ecology; and mana whenua values.

The current EMP Version 9 was approved in 2022 (Appendix B) and the Council is working on EMP Version 10 to be submitted for approval shortly.

8.1. Soil Quality Monitoring at Infiltration Facilities

Chapter 2 of the EMP requires the sampling of soil from six different infiltration facilities, on a five-yearly basis. Monitoring was undertaken in 2010, 2015, and 2020. Sampling will be undertaken again in 2025 and reported on in the 2026 annual report.

8.2. Groundwater

The new Drinking Water Quality Assurance Rules 2021(DWQAR) prepared by Taumata Arowai in accordance with section 49 of the Water Services Act 2021 do not require the Council to monitor Zinc from source water, while Copper and Lead will be monitored annually and Escherichia coli *(E. coli)* will be monitored fortnightly.

In total, there were 321 *E. coli* samples taken from 15 water supply wells that are in either Aquifer 1 or Aquifer 2, in the 2023 calendar year. There were no exceedances recorded. In addition, the annual report also includes a summary of the groundwater related investigation projects that provide support to the ongoing groundwater quality and quantity work (Appendix C).

For the 2023 calendar year, the report serves as an interim report until the new version of the Environment Monitoring Programme (Groundwater Section) has been approved. Once the new version of the EMP groundwater chapter is finalised, the Council will have a clearer direction on the specific data quality requirements to focus on. With a finalised EMP, the Council can determine the key parameters and metrics that need to be monitored in both aquifers. This will enable the Council to establish precise guidelines for data collection, analysis, and ongoing monitoring. The draft groundwater monitoring chapter has been submitted to Environment Canterbury.

8.3. Stormwater Quantity Models

Sub-chapter 4.3 of the EMP requires the Council to report on stormwater quantity models on a five-yearly basis. The following water quantity modelling projects were completed in the past year:

- Ōpāwaho/Heathcote River Catchment model calibration and updates;
- Huritīni/Halswell River Catchment model build (ED2020)

The following water quantity modelling projects are currently underway:

- Huritīni/Halswell River Catchment (ED2023 and future development)
- Pūharakekenui/Styx River Catchment; and
- Matuku Takotako/Sumner build.

Sub-chapter 4.3 of the EMP also requires the Council to report on the following regarding stormwater quantity models on a five-yearly basis, starting in 2021:

- Any significant changes made to the input parameters of the models;
- Any significant changes to development patterns (greenfield or brownfield);
- Any significant updates to model hydraulics (bridges, culverts, etc.);
- Any significant calibration or validation exercises undertaken;

Catchment-specific information is summarised in the table below. Updates that are being applied across all catchments are:

- Updating the vertical datum from NZVD 2016 from Christchurch Drainage Datum (CDD)
- Updating the infiltration module to include depth to groundwater;
- Updating network data and incorporation of near-term subdivision developments;
- Updating imperviousness using an improved method;
- Updating downstream boundary conditions to reflect new tidal statistics and pairings;
- Models are being permitted to be developed in MIKE or TUFLOW. MIKE is the software that has been used for all models to date, but TUFLOW will be used for the Styx and Sumner models. The TUFLOW schematisation will largely follow that used for MIKE models.

A discussion of progress toward meeting the flood mitigation targets set in Schedule 10 of the consent is also required, and this is included in a subsequent section.

Table 4. Current Status of Water Quantity Models by Catchment

Catchment/SMP Area	Current Model	Status/Current Work Plan
Ōtākaro/ Avon	MIKE Flood ED2020 and future scenarios completed July 2022	- Network schematisation issues in Riccarton are currently being improved - Validation against previous calibration is underway - Updated model results as a result of these changes will be released late 2024 - A major update is planned FY28.
Ōpāwaho/ Heathcote	MIKE Flood ED2020 and future scenarios completed July 2023	- Currently being scoped for updating to include NZVD, revised management of basins and updated hillside hydrology - The previous calibration to July 2017 will be relied upon - It is anticipated this will be completed late 2025
Huritīni/ Halswell	MIKE Flood ED2021	- Currently being updated to reflect latest schematisation, NZVD, ED2024 and future development scenarios - ED2021 calibration will be checked and it is currently expected no additional calibration will be required - Completion expected late 2024
Pūharakekenui/ Styx	MIKE Flood ED2011/ ED2014	- Currently being built in TUFLOW and will represent ED2024 and future development scenarios - Calibration to July 2022 - Completion expected late 2024
Matuku Takotako/ Sumner	MIKE Flood ED2014	- Currently being built in TUFLOW and will represent ED2024 and future development scenarios - Calibration to March 2014 - Completion expected late 2024
Banks Peninsula	Grehan Stream ED2014	- The Grehan Stream model is a single catchment model validated to ED2014. This DHI MIKE 11 model is described in the final report (June 2015). - Grehan Stream was a one-off model to inform SW flood mitigation capital works projects. There is not an ongoing programme of model updates for this model.

8.4. Waterway and Coastal Waters Monitoring

8.4.1. Surface Water Quality

Surface water quality monitoring was carried out for the 2023 monitoring year in accordance with Chapter 5 of the EMP. The reporting was not complete prior to submission of this annual report. A summary memo and report will be provided to Environment Canterbury on 30 August 2024 with the latest surface water quality information.

8.4.2. Instream Sediment Quality and Aquatic Ecology

For the 2023 monitoring year, the following instream sediment quality and aquatic ecology monitoring was carried out in accordance with Chapters 6 and 7 of the EMP:

- Five-yearly aquatic ecology (habitat, macroinvertebrates, and fish) and instream sediment monitoring in the Pūharakekenui – Styx River (14 sites) (Appendix D);
- Monthly fine sediment monitoring (17 sites) (Appendix F); and
- Annual aquatic ecology monitoring in Cashmere Stream (two sites), Wilsons Stream (2 sites), and Balguerie Steam (one site, desktop assessment of ECan data only) (Appendix D).

Of note from the monitoring:

- Riparian habitat largely comprised of exotic trees and grasses in the Pūharakekenui - Styx River catchment. Riparian conditions had improved at some sites with willow removal occurring and being replaced with native planting, however, at some sites willow cover had increased since 2018;
- Instream habitat quality in the Pūharakekenui - Styx River catchment was moderate and variable across sites. Sediment depth and cover was higher in 2023 with substrates being dominated by fine sediments, larger substrates were present at most sites but were covered by fine sediment. Instream habitat conditions remained the same over time, however, some sites were wider and deeper with higher cover of fine sediment than previous years;
- Riparian and instream habitat conditions in Cashmere Stream and Wilsons Stream catchment sites were largely unchanged over time;
- Macrophyte cover at Pūharakekenui - Styx River sites was low at most sites, with one site exceeding the consent target level. There were no obvious changes in macrophyte cover at the annual sites;

- Filamentous algae were rare, or absent from most five-yearly and annual sites in 2023;
- Concentrations of common stormwater contaminants in sediments generally met the guideline levels at most sites in the Pūharakekenui - Styx River catchment, apart from a marked increase in zinc at Richards Bridge (STYX07);
- The macroinvertebrate community was dominated by pollution-tolerant taxa at most five-yearly and annual sites. The presence of sensitive EPT taxa has reduced over time. Of note is the loss of notable EPT taxa from the upper catchment;
- Quantitative Macroinvertebrate Community Index (QMCI) scores declined over time at some at Pūharakekenui - Styx River sites. This was largely attributed to changes in instream physical habitat from increases in sediment depth and cover, resulting in a change in macroinvertebrate communities;
- Macroinvertebrate communities remained similar over time at the Cashmere Stream and Wilsons Stream annual sites;
- A single kēkēwai (freshwater crayfish) was caught in one of the Pūharakekenui - Styx River sites. This species has an At-Risk Declining conservation status;
- The fish community in both the Pūharakekenui - Styx River, Wilsons Drain and Cashmere Stream catchments were dominated by indigenous species that are commonly found in Christchurch's waterways. Common bullies and shortfin eels were the most commonly encountered species, but longfin eels, inanga, upland bully, giant bully and brown trout were also found. Of note Kanakaka – lamprey was found at one Pūharakekenui – Styx River site; and
- Overall, some measures of ecosystem health (e.g., sediment depth, macrophyte cover, Macroinvertebrate Community Index, QMCI, and Average Score Per Metric) at sites in the Pūharakekenui – Styx River, Wilsons and Cashmere Stream catchments are worse than previous years, indicating degradation. Macroinvertebrate indices at the Balguerie Stream site on Banks Peninsula showed increasing or stable trends, indicating no degradation in ecosystem health.

8.4.3. Fine Sediment

Fine sediment cover monitoring was carried out for the 2023 monitoring year, in accordance with Chapter 7 of the EMP. A full report is attached in Appendix F.

This was the third year of fine sediment cover monitoring. Overall, fine sediment cover was high and exceeded consent target levels at 11 of the 17 monitoring sites. Curlett Road Stream Upstream of the Ōpāwaho-Heathcote River confluence had the highest median cover across all 17 sites. Pūharakekenui-Styx River at Main North Road had the lowest median cover across all 17 sites.

Trend analysis showed that 13 of the 17 sites did not have any meaningful trends identified over the last three years. However, four sites had meaningful decreasing trends recorded. These were the Pūharakekenui-Styx River at Styx Mill Conservation Reserve, Ōpāwaho-Heathcote River at Rose Street & at Ferniehurst Street and Huritini-Halswell River Nottingham Stream at Candys Road. No increasing trends were recorded.

The following recommendations were made:

- Continuation of long-term monitoring to establish if sediment cover changes over time;
- Stormwater treatment facilities are prioritised in catchments that do not have stormwater treatment in place and are showing high sediment levels.
- Working with industry to prevent sediment runoff from individual sites from getting into the stormwater system and then into waterways;
- Continuing to implement tasks under the CSNDC to reduce sediment discharges, such as:
    - Implementing the Risk Matrix and Transition Plan for Excluded Sites (Condition 3)
    - Ensuring site-specific Erosion and Sediment Control Plans (Condition 41);
    - Instigating the Sediment Discharge Management Plan (Conditions 43-46);
    - Embedding a Building Consent approval and inspection process with respect to erosion and sediment control (Schedule 4i); and
    - Implementing the sustainable behaviour change programme (Schedule 4m).
- Implementation of tasks in the Healthy Waterbodies Action Plan such as:

- Reducing sediment discharges in conjunction with other stake holders, such as Environment Canterbury (e.g., by instigating the CSNDC, Stormwater and Land Drainage Bylaw, Building Act, Community Waterways Partnership, and Surface Water Implementation Plan);
- Carrying out education/behaviour change campaigns via the Community Water Partnership to reduce sediment inputs to waterways;
- Removing excessive fine bed sediment where appropriate; and
- Reviewing Council maintenance practices to ensure effects on water quality are mitigated as far as possible (e.g., preventing sediment discharge due to macrophyte removal).

8.4.4. Mana Whenua Values

For the 2023 monitoring year, mana whenua values monitoring was carried out at eight sites within the Pūharakekenui – Styx River catchment in accordance with Chapter 8 of the EMP. The monitoring report can be viewed in Appendix G.

Overall, this monitoring indicated that the Pūharakekenui – Styx River catchment has slightly below or at moderate cultural health values. The results from the 2023 survey showed a slight improvement of overall health scores compared to the 2012 survey. Insufficient indigenous riparian planting and the prevalence of invasive weed species was identified as a key concern throughout the catchment, as well as adjacent agricultural land use. Key recommendations from the monitoring were the removal of exotic weed species from the margins, and an increase in stock fencing and indigenous riparian margins should be consistent with recommended setbacks. E. coli was identified as the contaminant of concern with two sites exceeding the Canterbury LWRP guideline. Further studies should be conducted to identify the likely sources of contamination.

The average State of Takiwa score from the monitored sites was 2.8. The average score from the Cultural Health Assessment survey was 3. None of the eight sites met the ATL of '5' under Schedule 7 of the CSNDC.

8.4.5. Holistic Assessment

A 2023 summary of surface water quality, instream sediment, aquatic ecology (including monthly fine sediment), and mana whenua values monitoring, will be included within the summary memo to be provided to Environment Canterbury on 30 August 2024.

8.4.6. Comparison to Attribute Target Levels

Table 5 below provides a collation of whether Receiving Environment Objectives and Attribute Target Levels for Waterways (Schedule 7) and Coastal Areas (Schedule 8), respectively, have been met for the 2023 monitoring year. Surface water quality ATLs will be covered in a supplementary memo.

In summary:

The following ATL's in Schedule 7 were not met at most sites:

- QMCI; and
- Fine sediment cover.

The following ATL's in Schedule 7 were met at most sites:

- Total macrophyte and filamentous algae cover;
- Copper, lead and PAH's in instream sediment.

Schedule 8 comparisons are not yet available and will be presented in the supplementary memo.

Table 5. Assessment against Comprehensive Stormwater Network Discharge Consent Schedule 7 (Waterways) Attribute Target Levels (ATLs) for 2023 monitoring year.

PAHs = Polycyclic aromatic hydrocarbons; QMCI = Quantitative Macroinvertebrate Community Index; TSS = Total Suspended Solids. Note surface water quality data will be presented in supplementary memo.

Objective	Attribute	Attribute Target Level	Monitoring Report	Outcome
Adverse effects on ecological values do not occur due to stormwater inputs	QMCI	Lower limit QMCI scores: Spring-fed – plains – urban waterways: 3.5 Spring-fed – plains waterways: 5 Banks Peninsula waterways: 5	Pūharakekenui – Styx River five-yearly and annual aquatic ecology monitoring: Appendix D	Five-yearly: Not met at 10 of the 12 sites Annual: Not met at 4 of 5 sites (Balguerie Stream met the ATL)
Adverse effects on water clarity and aquatic biota do not occur due to sediment inputs	Fine sediment (<2 mm diameter) percent cover of stream bed TSS concentrations in surface water	Upper limit fine sediment percent cover of stream bed: Spring-fed – plains – urban waterways: 30% Spring-fed – plains waterways: 20% Banks Peninsula waterways: 20% Upper limit concentration of TSS in surface water: 25 mg/L No statistically significant increase in TSS concentrations	Pūharakekenui – Styx River five-yearly and annual aquatic ecology monitoring: Appendix D Monthly fine sediment cover: Appendix F	Five-yearly: fine sediment cover not met at 8 of the 9 sites Annual monitoring: fine sediment cover not met at 4 of the 5 sites Monthly fine sediment cover: not met at 11 of the 17 sites. (Monthly TSS to be addressed in supplementary memo)
Adverse effects on aquatic biota do not occur due to copper, lead and zinc inputs in surface water	Zinc, copper and lead concentrations in surface water	Upper limit concentration of dissolved zinc: Ōtākaro-Avon River catchment: 0.02951 mg/L Ōpāwaho-Heathcote River catchment: 0.0396 mg/L Cashmere Stream: 0.00634 mg/L Huritini-Halswell River catchment: 0.01743 mg/L		To be addressed in supplementary memo.

		Pūharakekenui-Styx River catchment: 0.01172 mg/L Ōtukaikino River catchment: 0.00912 mg/L Stream Reserve Drain & Aylmers Stream (Banks Peninsula): ≤0.00293 mg/L Balguerie Stream (Banks Peninsula): ≤0.00254 mg/L Upper limit concentration of dissolved copper: Ōtākaro-Avon and Ōpāwaho-Heathcote River catchments: 0.0018 mg/L Huritini-Halswell, Pūharakekenui-Styx and Ōtūkaikino River catchments: 0.0014 mg/L Cashmere Stream and Banks Peninsula waterways: 0.001 mg/L Upper limit concentration of dissolved lead: Ōtākaro-Avon River catchment: 0.01539 mg/L Ōpāwaho-Heathcote River catchment: 0.02388 mg/L Cashmere Stream: 0.00427 mg/L Huritini-Halswell River catchment: 0.01089 mg/L Pūharakekenui-Styx River catchment: 0.00601 mg/L Ōtūkaikino River catchment: 0.00414 mg/L		

		Stream Reserve Drain & Aylmers Stream (Banks Peninsula): ≤0.00135 mg/L Balguerie Stream (Banks Peninsula): ≤0.00109mg/L No statistically significant increase in copper, lead and zinc concentrations		
Excessive growth of macrophytes and filamentous algae does not occur due to nutrient inputs	Total macrophyte and filamentous algae cover (>20 mm length) cover of stream bed	Upper limit total macrophyte cover of stream bed: Spring-fed – plains – urban waterways: 60% Spring-fed – plains waterways: 50% Banks Peninsula waterways: 30% Upper limit filamentous algae cover of the stream bed: Spring-fed – plains – urban waterways: 60% Spring-fed – plains waterways: 50% Banks Peninsula waterways: 20%	Pūharakekenui – Styx River five-yearly and annual aquatic ecology monitoring: Appendix D	Five-yearly macrophyte data: not met at 1 of the 9 sites Annual macrophyte data: not met at 2 of 4 sites Five-yearly algae data: met at all of the 9 sites Annual algae data: met at all sites
Adverse effects on aquatic biota do now occur due to zinc, copper, lead and PAHs in instream sediment	Zinc, copper, lead and PAHs concentrations in instream sediment	Upper limit concentration of total recoverable metals for all classifications: Copper = 65 mg/kg dry weight Lead = 50 mg/kg dry weight Zinc = 200 mg/kg dry weight Total PAHs = 410 mg/kg dry weight No statistically significant increase in copper, lead, zinc and Total PAHs	Pūharakekenui – Styx River five-yearly and annual aquatic ecology monitoring: Appendix D	Zinc: not met at 3 of the 8 sites Lead: met at all 8 sites Copper: met at all 8 sites Total PAHs: met at all 8 sites
Adverse effects on Mana Whenua values do not occur due to stormwater inputs	Waterway Cultural Health Index and State of Takiwā scores	Lower limit averaged Waterway Cultural Health Index and State of Takiwā scores for all waterway classifications: 5	Pūharakekenui – Styx River mana whenua vales monitoring: Appendix G	Not met at any of the eight sites.

9. Condition 55 – Review of Flood Models

The water quantity/flood model(s) for the Pūharakekenui – Styx, Ōtākaro - Avon, Ōpāwaho - Heathcote and Huritini / Halswell Rivers are required to be updated to reflect changes in development patterns or modelling parameters at least every five years following the commencement of this resource consent and so is required to be reported in next year's 2025 annual report (for 2024 calendar year).

Below is an update showing Councils progress to date, undertaking flood modelling for Condition 55 using Schedule 10.

Only the Heathcote model has been updated for the Schedule 10 comparison, reported below (Table 6). The Avon model has been completed and the Schedule 10 comparison is being scoped, with the expectation this will be available by the end of the year. The Styx and Halswell models are still in the build phase for existing development, and so will be able to carry out the Schedule 10 comparison early next year.

The Heathcote results are presented below (Table 6), with the '2024' results being current day and the '1991' results representing the 1991 model constructed as per Schedule 10 requirements. Schedule 10 requires, for the 2% AEP event, an increase of no more than 30mm (0.03m) between the current day results and the 1991 situation. The model shows that the water level in the 2% AEP events has dropped 390mm. This is repeated elsewhere in the model for the 10% AEP results, although the difference decreases in the tidally dominated areas. The drop in water levels during flood events is due to the construction of basins in the Upper Heathcote area.

Table 6. Heathcote Model Schedule 10 comparison.

	Water levels (RL CDD)				**Difference (m)**	
Location	**10% AEP 2024**	**10% AEP 1991**	**2% AEP 1991**	**10% AEP 1991**	**10% AEP**	**2% AEP**
Lodestar Ave	27.82	28.55	28.35	28.78	-0.73	-0.43
Templetons Rd	22.57	24.67	22.88	24.81	-2.10	-1.93
Lincoln Rd	20.99	21.87	22.04	22.45	-0.88	-0.40
Frankleigh St	19.10	19.77	19.97	20.36	-0.67	-0.39
Ferniehurst St	16.90	17.52	17.69	18.08	-0.61	-0.39
Buxton Tce	13.17	13.25	13.61	13.67	-0.08	-0.06
Opawa Rd	11.24	11.30	11.93	12.00	-0.06	-0.07
Ferry Rd	10.99	11.01	11.31	11.34	-0.02	-0.04

10. Condition 59 – Responses to Monitoring

Condition 59 requires the Council to report on any results which identify that the TSS, copper, lead, and zinc Attribute Target Levels in surface water, as set out in Schedules 7 and 8, and *E.coli*, copper, lead, and zinc in groundwater, as set out in Schedule 9, are not being met. Council will provide a "Response to Monitoring" report to Environment Canterbury by the 30 August 2024.

10.1. Schedules 7 (Waterways) and 8 (Coastal Waters)

Council have continued to focus on the same four priority sites (Ōpāwaho-Heathcote River at Ferry Road Bridge, Curlett Stream at Motorway and Nottingham Stream at Candys Road and Addington Brook) as outlined in the 2022 and 2023 report. Council has now finalised monitoring plans for further targeted wet weather monitoring within the Curlett Stream (Appendix M) and additional wet weather monitoring in the Lower Ōpāwaho-Heathcote River and Nottingham Stream catchments (Appendix L). Dry weather monitoring is also proposed within Curlett Stream (Appendix M) and Addington Brook (Appendix N) to identify non-stormwater illicit discharges to the network. The monitoring plans have been finalised and the progress and implementation of these investigations are to be reported in the following year's CSNDC annual report.

10.2. Schedule 9 (Groundwater)

The purpose of monitoring under CSNDC EMP Chapter 3 is to determine whether the Receiving Environment Objectives and Attribute Target Levels of Schedule 9 are being met (Condition 49). Furthermore, the basis for each of these targets provides further clarity as to their respective purpose, which can inform future monitoring programmes. Where the Attribute Target Levels for *Escherichia coli*, copper, lead, and zinc in groundwater are not met, Condition 59 requires that investigations be undertaken to determine whether this is due to stormwater discharges authorised under the CSNDC.

Groundwater quality sampling of Council bores did not result in any exceedances above the parameter levels set in Schedule 9 in the 2023 calendar year. The Council confirms that no further Responses to Monitoring investigations are required under Condition 59- Groundwater for this period.

11. Stormwater Quality Investigation Programme (Schedule 3)

11.1. Schedule 3(b) – Develop an Instream Contaminant Concentration Model (ICCM)

An ICCM bridges the gap between stormwater contaminant loads (based on land use) and water quality in surface water. This is an important part of determining the effects of stormwater on the receiving environment so that ecological outcomes are enhanced.

The Christchurch City Council ICCM is underway, with hydraulic modelling software developer, DHI and University of Canterbury collaborating to develop the model.

The model utilises the University of Canterbury (UC) GIS contaminant load model called MEDUSA. MEDUSA has been calibrated for a number of Christchurch catchments, including Okeover Stream, Addington Brook, and the Ōpāwaho/Heathcote River. DHI previously teamed with the UC to produce an online version of MEDUSA ('MEDUSA Online') and this will be the platform used for the ICCM.

The project will determine the annual loads of TSS and total and dissolved copper and zinc generated in the following catchments:

- Pūharakekenui -Styx
- Ōtākaro -Avon
- Ōpāwaho - Heathcote
- Huritini - Halswell

The following catchments will be added at a future date:

- Ōtūkaikino
- Ihutai - Coastal and Estuary

Reporting on reductions in stormwater contaminant load at the following time horizons (as per CSNDC Table 2) using Council provided treatment scenarios: 2018, 2023, 2028 and 2043.

Progress to date includes:

- Completion of all data collection and generation
- Near completion of the prototype Avon model for review
- Initial network outline for Styx, Halswell and Heathcote
- Near completion of the web platform

The initial ICCM is scheduled for completion by the end of 2024.

11.2. Schedule 3(d) – Feasibility Study of Receiving Environment Response Research Programme

National Institute of Water and Atmospheric Research (NIWA) were commissioned by Council to undertake a feasibility study to establish the existing knowledge base and investigate the feasibility of robustly predicting the responses of the receiving environment to changes in network contaminant loads and resulting in-stream concentrations. The feasibility study for this project has been completed and can be viewed in Appendix I. The scope of this study was constrained to the ability to predict responses within the streams and rivers of Christchurch, and not including streams within settlements of Banks Peninsula, as there is more monitoring data and other information for the

former. The scope also included predicting responses in coastal receiving environments – this was constrained to the Avon-Heathcote Estuary - Ihutai for the same reason.

In summary, two types of models were tested for freshwater environments one for coastal environments, and concluded bayesian models are most suited to predicting how the receiving environment might respond to changes in network contaminant loads and resulting in-stream concentrations, as well as changes in other limiting factors. However, it highly depends on the quality of the inputs of which some require updates. The model may face limitations where it has to predict when such changes will occur as there is often a lag effect for biological community responses.

11.3. Schedule 3(f) – Alternative Modelling Impact Investigation

This task is being implemented via other scheduled items such as Schedule 3(a), Schedule 3(d and e), and Schedule 3(g and h).

11.4. Schedule 3(g) – Feasibility Study of Instream Remediation Programme

NIWA were commissioned by Council to undertake an assessment of the feasibility of sediment removal and mitigation within Christchurch waterways by identifying priority locations for trials of potential methods of sediment removal.

In summary, the report concluded a feasibility assessment was not possible given the data and knowledge available. The report included recommendations for collation of existing data, targeted collection of new data and two sediment removal/mitigation methods that will assist in filling some of the knowledge gaps, providing for more robust future feasibility assessment. In addition, it was concluded that if trials of the methods are carefully designed and maintained they will provide good ecological and/or cultural outcomes as well as provide the data required to make more robust assessments of the feasibility of different methods of fine deposited sediment removal and mitigation meeting target outcomes. Appendix J includes the report in full.

Recommendations for Council:

- Eight potential sites for sediment removal in the Ōpāwaho - Heathcote, Ōtākaro - Avon and Pūharakekenui - Styx catchments;
- Develop carefully defined goals and indicators of success for any trials;
- Monitor deposited sediment data in areas that have previously had deposited fine sediment removed; and
- Trial deposited fine sediment removal and mitigation methods at representative sites specifically, excavator dredging and the installation of a sediment trap.

11.5. Schedule 3(i) – Device Effectiveness Monitoring and Modelling

11.5.1. Knights Stream and Prestons Stormwater Monitoring Facility

Knights Stream and Prestons stormwater facility effectiveness monitoring was finalised this year and was undertaken by Pattle Delamore Partners (PDP). The full investigative report can be found in Appendix K. In total, nine rainfall events were sampled from 2018-2023. Five sampling sites were monitored at each facility, using a combination of autosamplers and in-sump first flush bottles. Composite samples were analysed from the autosamplers.

Knights Stream is a small development located between Halswell and Prebbleton. The stormwater facility consists of a dry first flush basin, and a wetland. Prestons is a 200ha development, the facility is made up of a wet first flush basin and a wetland, connected via a swale.

Overall, the monitoring demonstrated that first flush treatment provides most of the treatment, whereas the wetlands provide “light polishing treatment”. Both sites are treating most of the typical stormwater contaminants, to the extent that many of these contaminants meet the receiving water standards in their outlets prior to mixing. For Prestons, the receiving environment water quality standards were met for all contaminants, post-treatment, except phosphorus. The results indicate low TSS removal, however, Council considers that the results from Knights Stream justify further work to resolve potential concerns, we intend to investigate:

- Pump operation – monitor the flow rate and the potential resuspension of sediment in the well.
- Hydraulic residence time – may be modified to provide improved treatment.
- Maintenance practices.

11.5.2. Stormfilters at Richardson Terrace, Bells Creek

Council are working on developing a monitoring programme to ensure maintenance and replacement of filters are effective to achieve intended treatment performance. The system was inspected 15 May 2024, and we intend to sample rainfall events over the next year will be monitored through the winter, and results will be made available in the following annual report. Further investigations of the upstream sub-catchment will look for opportunities to improve the treatment and longevity of the filter media.

11.5.3. Mussell Shell Trials

In response to the Port Hills Fire 2024, the existing Hoon Hay Valley sediment basins were cleared, and gravel and mussel shell bunds added to a portion of the channel to increase sediment capture. Unfortunately, no rainfall events have been substantive enough to enable runoff and subsequent sampling. These modifications will be monitored through the winter, and results will be made available in the following annual report.

At Wigram East Retention Basin, Council is trialling the installation of a mussel shell filtration bund to increase metal removal from stormwater. This will be installed at the end of the treatment wetland as a polishing filter and monitored for effectiveness.

Any results will be reported on in next year's annual report.

11.6. Schedule 3(j) – Implementation of Device Effectiveness Monitoring and Modelling

Schedule 3(j) requires the Council to apply monitoring outputs from Schedule 3(i), along with other stormwater modelling and monitoring data being gathered, to inform the planning and design of stormwater systems and facilities, including in the development of Implementation Plans, and reviews of SMPs, Infrastructure Design Standards (IDS) and the Waterways Wetlands and Design Guide (WWDG). This task has no start or end dates assigned to it and has been considered an ongoing objective of implementation of findings. Council intend to get the treatment performance monitoring results we have to date peer reviewed to determine if findings warrant a review of either the IDS or WWDG.

11.7. Schedule 3(k) – Targeted Wet Weather Monitoring Programme

The Targeted Wet Weather Monitoring Programme is designed to improve the level of detail of particular receiving environments, contaminant inputs and to inform mitigation options required under the SMPs. Council have chosen three of the four priority sites (Ōpāwaho - Heathcote River at Ferry Road Bridge, Curlett Stream at Motorway and Nottingham Stream at Candys Road) for carrying out Targeted Wet Weather Monitoring as per Condition 59. The monitoring plans for all sites have been finalised and will begin to be implemented in 2024. The results of these investigations are to be reported in the following year’s CSNDC annual report.

11.7.1. Lower Heathcote

Pattle Delamore Partners (PDP) have provided Council with options for a Targeted Wet Weather Monitoring Plan for Lower Heathcote. There are complexities with this catchment as there is potential tidal influence and movement of contaminants from the estuary. The finalised monitoring

plan was presented to council in early 2024. The monitoring plan can be viewed in full in Appendix L.

11.7.2. Curlett Stream

NIWA have sampled four events over two years and it is still too difficult to make any further inference of the main contributors to poor stormwater quality in this catchment. The 2023 monitoring plan (Appendix M) has proposed to quantify the pollutant loads exported from 6 sub-catchments to identify those contributing the most to the pollutants load export during wet weather, and to quantify pollutant loads exported to the Heathcote River after treatment by the Curlett wetland. Due to resourcing and costs of proposal, no monitoring has been implemented by the time of writing this annual report.

11.7.3. Nottingham Stream

PDP have provided Council with some options for a Targeted Wet Weather Monitoring Plan for Nottingham Stream. This catchment is largely urban, which makes identifying the source of contaminants difficult. PDP have recommended 11 potential sites to sample. This will enable us to make well-informed decisions about the location and mechanism of stormwater treatment. The full monitoring plan was provided to council early 2024 and can be viewed in Appendix L.

12. Other Actions (Schedule 4)

12.1. Schedule 4(c) – Trials of Increased Street Sweeping and Sump Cleaning

The Council engaged the University of Canterbury to undertake field trials of unswept and swept road runoff quality to assess the effectiveness of street sweeping for pollution reduction. The report (Appendix O) is the requirement of CSNDC Schedule 4(c) - a trial for increased targeted/selective street sweeping", which seeks to optimise the effectiveness of its street sweeping practices for pollutant removal from road runoff and also ensure that Council meets its obligations under the CSNDC conditions. Phase 1 was a literature review that identified the most influential factors for street sweeping, and it informed the design of the street sweeping field trials of Phase 2. Phase 2 aimed to create a dataset of road runoff quality to compare the relative difference between unswept and swept conditions, rainfall intensity and road surface characteristics (traffic intensity, surface condition) on runoff quality.

This study developed new data on the unswept and swept runoff quality from five road sites around Christchurch City. The selected sites represented a range of traffic intensities and surrounding land-use activities (both of which can correlate to pollutant load build up on the surface). The sites were also selected in proximity to other Christchurch City Council surface water monitoring sites.

The new data contrasts with previous studies, which have mostly focused on road sediment characterisation rather than unswept and swept road runoff comparisons.

For the trial, a rainfall simulator was used at each site to generate unswept road runoff (at 11 mm/hr intensity), vacuum-swept road runoff and regenerative-swept road runoff (both at 11, 22 and 33 mm/hr intensities). Runoff samples (whole of flow) were collected three times during each plot to quantify first flush effects. Samples were analysed for total suspended solids, particle size distribution, total and dissolved copper and total and dissolved zinc.

Lunns Road, a medium-trafficked industrial road, was found to have the highest pollutant concentrations for sediment and heavy metals, with first flush concentrations of 360-1,200 mg/L TSS, 1,630-3,057 µg/L total copper and 1,550-6,148 µg/L total zinc. Overall, the two industrial/commercial sites (Lunns Road and Princess Street) and one residential street with a very coarse chipseal surface, Montana Ave, were found to have substantially higher pollutant concentrations in both unswept and swept runoff. The sites with the lowest pollutant concentrations were a highly trafficked but smooth inner city road (Durham Street) and a low trafficked, moderately smooth residential road (Sabys Road).

The regenerative sweeper was observed to be 18-77% (average of 49%) effective at removing TSS for the situations where TSS >150 mg/L. Similarly, vacuum sweeping was seen to achieve 0-69% removal rates (average of 50%) for TSS where TSS >300 mg/L. This corroborates a theory in the literature of different sweeper technologies requiring a minimum threshold amount of sediment on a surface before they become effective. At TSS concentrations less than these thresholds, no consistent removal was observed (assuming that the swept plots had similar unswept pollutant build up to the unswept plot).

12.2. Schedule 4(f) - Application of Trial Results for Street-Sweeping and, Schedules 4(g and h) – Increasing frequency of street sweeping and sump cleaning

Council has only recently (June 2024) received the results and associated final report for the Street-Sweeping trails, and so has not yet been able to analyse these results alongside other data sets and models. Council aims to address these sections and report on any updates in the next annual report.

12.3. Schedule 4(i) – ESCP within Building Control and Resource Consent Processes

The Sediment Discharge Management Plan 2022 (Condition 43 of CSNDC) outlines how the Council manages the discharge of sediment laden stormwater from development (building) sites into its stormwater network.

Erosion and Sediment Control Plans (ESCP) are the primary tool used to mitigate and manage the risks posed to the Councils stormwater network from buildings sites. A ESCP prepared by a suitably experienced person is now required for all building consents and most land use resource consents (involving earthworks). Council Building Inspectors are required to check each site they visit has implemented the ESCP correctly, while RMA Compliance Officers also undertake ESCP audits during their resource consent inspections.

In late 2023, Council launched its Erosion and Sediment Control - Remediation Action Plan which outlined several projects it would undertake in the next 12 months to improve ESCP implementation and reduce sediment discharges from building sites.

12.4. Schedule 4(j) – Developing a Programme for Operational Inspection of Private Stormwater Treatment Devices

The Council is required to develop a program for the operational inspection of a sample of private stormwater treatment and/or retention devices on non-industrial sites (such as commercial business complexes, rest homes, residential homes and multi apartment buildings, education centres etc) for the purposes of ensuring proper function and maintenance. In 2023, 23 stormwater treatment devices were inspected. Two of them were exempted from the inspection due to the demolition of the associated buildings. Of the remaining devices, two were found to be non-compliant due to various reasons. Details of the inspection sites and the type of inspected devices can be found in the attached report (Appendix Q). The CSNDC requires work under this condition to be a long-term project. A representative device from the various catchments was inspected as required by the manufacturer's guidelines. The internal database and workflow have been established to record the inspections and maintenance reports and to track down the devices for future follow-up. The recommendations have been made to set up a process for non-compliant reporting, integrating approved stormwater treatment devices in the council's mainstream legal documents such as the Land Information Memorandum (LIM) to keep track of its ownership and regular maintenance. While it is not currently mandatory under the CSNDC, it is anticipated that the Council's long-term objectives would greatly benefit from the development of an operational and maintenance guidelines manual and educational outreach program to inform private property owners about the importance of maintaining stormwater treatment devices.

12.5. Schedule 4(m) – Community Water Engagement Programme

This report presents an overview of the collaborative efforts and progress made by Community Waterways Partnership groups and the enactment of the Community Water Engagement Programme.

- The Community Waterways Partnership (CWP) held its annual hui in 2023, which provided an opportunity for the CWP to present an overview of progress to date, and a forum for partners to showcase projects and activities related to tackling litter in waterways; a key focus for the CWP in 2023.
- The CWP has partnered with 'Wai Connection – Tatai Ki Te Wai' (provided in Canterbury by EOS Ecology- under the Essential Freshwater fund). Wai Connection facilitators will support the partnership until June 2025, to build catchment group's capability and capacity, and assist the CWP with developing a long-term strategy.
- Early in 2024 the CWP formally established a steering group to provide direction and leadership to the partnership. A draft Impact Action Plan is under construction through the steering group's workshop sessions with Rose Challies-Terra Nova Foundation.
- The development of an online hub as a platform for sharing information, resources, events, news, projects and stories is still underway. To create a financially viable and secure website, it is now being developed and hosted by Christchurch City Council, drawing on the proficiency of the Council's Communication and Engagement Team.
- The CWP supported Christchurch West Melton Water Zone Committee with community-scale implementation and the reviewing of a regional stormwater awareness campaign.
- The CWP provided feedback on Christchurch City Council's draft Healthy Waterways Action Plan and arranged workshops for presentation and further discussion of the action plan.
- The Stormwater Superhero Trailer has been funded again this financial year by ECan and Christchurch City Council (CCC), with an annual contractual arrangement established with Christchurch Envirohub. An evaluation conducted in June 2023 found the trailer to be a crucial part of achieving freshwater strategies and improvements sought by regional and city councils. The finalised Report can be found in Appendix .
- Now with the Ōtākaro Avon River Corridor under the management of Christchurch City Council, the Avon Ōtākaro River Network (AvON) has been prompted to broaden its scope beyond the Red Zone, encompassing the entire catchment. With support from the CWP, AvON is refreshing its capacity. A recent workshop (CWP collaboration: Christchurch City Council, AvON) delved into opportunities within the Ōtākaro Avon Stormwater Management Plan and Christchurch City Council's Long-term Plan, focusing on community engagement, submissions, and alignment with AvON's goals.

- The Avon-Heathcote Estuary Ihutai Trust along with the 'Mother of All Clean Ups' Committee has launched an enduring 'Pick up Five' Campaign (funded by the CWP). Their resources have been made freely available online to encourage all to take up the challenge of picking up litter for the purpose of keeping our waterways clean.
- In the Ōpāwaho - Heathcote Catchment, Beckenham Te Kura o Pūroto has embarked on a co-design landscape project (CWP collaboration: CWP, Christchurch City Council) aimed at restoring the Beckenham Ponds. Meanwhile, the Ōpāwaho Heathcote River Network's (OHRN) bin latch trial (CWP funded), ongoing until August 2024, is currently being implemented in three trial areas. Its purpose is to assess the effectiveness of bin latches in reducing litter entering waterways during wind and storm events.
- The Styx Living Laboratory joined the partnership, offering the CWP an opportunity to participate in their Summer in the Styx event in February 2024. At the event, the CWP collaborated with EOS Ecology, operating a stall together and showcasing a newly developed map resource (CWP collaboration: Wai Connection). This resource served to visually communicate and generate interest in the CWP's initiatives.
- There has been an increased demand from schools for external support with freshwater education, particularly from Christchurch high schools due to a new Geography assessment 'He aha te oranga o to awa', focusing on local waterway health. Waterways education providers (CWP collaboration: ECan, CCC, OHRN) are meeting this demand through working together, offering guest speakers, field trips, and water monitoring sessions.

12.6. Schedule 4(n, o, p, and q) – River Care Liaison Group and Industrial Liaisons Group

The River Care Liaison Group meeting was held on the 9 November 2023 with four representatives from four community groups. The agenda items covering resource consent were:

- Consent Compliance
- Erosion and Sediment Control
- Capital Works and Modelling
- Environmental Monitoring
- Stormwater Management Plan Programme
- Community Waterways Partnership

It was decided by attendees that this annual meeting should be held in July right after the CSNDC annual report is released, as November is deemed a busy time of year, which results in a low turnout. It was also decided that these River Care

Liaison Group meetings will be absorbed into the Community Waterways Partnership.

Council elected to forego the usual Industrial Liaison Group in personal meeting format and instead continue with the emailed newsletter established in 2022 to update group members with the Councils stormwater news. Group members were also invited to partake in an online MS Teams Q&A style meeting if they had any questions about the newsletter's contents. The 2023 Industrial Liaison Group newsletter covered the following topics:

- CSNDC Annual Report
- Stormwater Management Plan Programme Update
- Transitional Plan
- Industrial Site Audit Process
- New Stormwater Technologies
- Consent Compliance
- Monitoring
- Stormwater Superhero Awards

12.7. Schedule 4 (s) – Pūharakekenui/Styx River Weed Management

The investigation mandated by Schedule 4 item S of the CSNDC has identified several practicable options for mitigating flooding through river channel weed management in the Pūharakekenui-Styx River. A staged approach was undertaken for the delivery of this schedule as listed below:

- Stage 1: Desktop analysis of five macrophyte control methods;
- Stage 2: Run the MIKE FLOOD model version 2020 of the Puharakekenui – Styx River through a range of river flow scenarios;
- Stage 3A: Assessment of macrophyte control methods control methods against available technical knowledge, available regulatory mechanisms, ecological effects, and responsibilities under other legislation between Environment Canterbury and CCC;
- Stage 3B: Conduct a cost-benefit analysis based on the above to identify the best practicable options for carrying out a targeted trial for achieving reduced flooding from changes in the weed management of the Pūharakekenui - Styx River.
- Stage 4: Produce a final report detailing the outcomes from the analysis of control methods, the hydrological modelling, and the cost-benefit analysis for the control methods.

Stages 1-3A have been completed and stages 3B-4 are currently with CCC for final review. The final report for encompassing all of the work done in stages 1-4 will be presented in next years annual report.

In summary, five viable control methods: hessian matting, diver-based hand weeding, aquatic herbicide application, mechanical cutting, and riparian shading have been included in the analysis. Each method presents varying degrees of effectiveness in controlling macrophytes, which directly impacts water flow dynamics and flood risk reduction.

13. Industrial Site Audit Programme

The industrial site audit programme assists site occupiers to identify on-site activities, infrastructure and site management practices that pose a risk to the stormwater leaving their site. The purpose of the programme is to resolve problems at the source and thereby improve stormwater quality to promote healthier waterways and instream biota.

In 2023, 15 industrial sites were audited, 10 of which were agreed with ECan. Details of the audited sites can be found in Table 7).

Table 7. Industrial Site Audits Undertaken in 2023.

Business Name	Site Address	Industry Category	Waterway Impacted	Audit Date	Agreed with ECan
The Granite Benchtop Company	132 Wrights Road, Middleton, Christchurch 8024	Glass, Clay, Cement, Concrete, and Gypsum Product Manufacturers	O'Shannessey Drain	13 March 2023	Yes
Lanyon and Le Compte Construction Ltd	3-7 Shivas Place, Bromley, Christchurch 8062	Glass, Clay, Cement, Concrete, and Gypsum Product Manufacturers	Charlesworth Drain	16 March 2023	Yes
Loman Auto Parts	5 Kennaway Road, Woolston, Christchurch 8023	Automobile Salvage Yards	Heathcote River	16 March 2023	Yes
Walker Powder Coatings	13 Kotzikas Place, Wigram, Christchurch 8042	Primary and Fabricated Metal Product Manufacturers	Curlett Stream	30 March 2023	Yes
Mainstream Transport/BP Service Station	6 Jipcho Road, Wigram, Christchurch 8042	Motor Vehicle and Equipment Associated Facilities	Curlett Stream	17 May 2023	Yes
Aakland Chemicals (1997) Ltd	12 Wigram Close, Sockburn, Christchurch 8042	Chemical and Pharmaceutical Product Manufacturers	Paparua Stream	29 August 2023	Yes
Sika (NZ) Ltd	53-55 Edmonton Road, Hornby, Christchurch 8042	Chemical and Pharmaceutical Product Manufacturers	Halswell Junction Outfall	29 August 2023	Yes
Chemfreight	38 Edmonton Road, Hornby, Christchurch 8042	Motor Vehicle and Equipment Associated Facilities	Halswell Junction Outfall	30 August 2023	Yes
Metro Performance Glass	704 Halswell Junction Road, Hornby	Glass, Clay, Cement, Concrete, and Gypsum Product Manufacturers	Halswell Junction Outfall	20 September 2023	Yes
Yukon Diesel Services	5 Edmonton Road, Hornby, Christchurch 8042	Motor Vehicle and Equipment Associated Facilities	Halswell Junction Outfall	20 September 2023	Yes
Frews Contracting Limited	51 Chapmans Road, Hillsborough, Christchurch 8022	Waste Transfer and Composting Facilities	Chapmans Road Drain	13 April 2023	

ARDEX New Zealand REAUDIT	32 Lane Street, Woolston, Christchurch 8023	Chemical and Pharmaceutical Product Manufacturers	Heathcote River	9 May 2023	
Drayton Holdings (leased to Opal Packaging New Zealand Ltd)	58 Canada Crescent, Hornby, Christchurch 8042	Timber and Paper Product Manufacturers	Halswell Junction Outfall	26 October 2023	
Hynds Pipe Systems	133 Waterloo Road, Hornby, Christchurch 8042	Glass, Clay, Cement, Concrete, and Gypsum Product Manufacturers	Hayton Stream	26 October 2023	
Lyttelton Port Company	41 Chapmans Road, Hillsborough, Christchurch 8022	Motor Vehicle and Equipment Associated Facilities	Brightlings Drain/Chapmans Road Drain	23 November 2023	

14. Updates to CSNDC Schedule 1

An updated list of sites excluded from the CSNDC (Schedule 1) can be found in Appendix R

15. Engagement with Papatipu Rūnanga

The Council is committed to working in partnership and collaboration with Papatipu Rūnanga of the Christchurch District. More specifically, these Rūnanga, in no particular order, include:

- Te Ngāi Tūāhuriri Rūnanga;
- Te Hapū o Ngāti Wheke (Rāpaki);
- Te Rūnanga o Koukourārata;
- Wairewa Rūnanga;
- Ōnuku Rūnanga; and
- Te Taumutu Rūnanga.

The Council has engaged with Papatipu Rūnanga in the development of SMPs and intend to engage on the respective implementation plan, through providing quarterly reports to and having an annual meeting with MKT (25 September 2023). MKT has assisted the Council with providing position statements for the Papatipu Rūnanga on the Ōpāwaho-Heathcote, Huritīni-Halswell, and Ihutai-Estuary Coastal SMPs.

MKT provided assistance with CSNDC Condition 54, in establishing Attribute Target Levels in Schedules 7 and 8 for the Waterway Cultural Health Index, Marine Cultural Health Index and State of Takiwa scores. They also undertook cultural reviews of various Schedule 3 and 4 technical/ investigation scopes and reports.

16. Appendices

Appendix A: Developments Authorised Under CRC231955

Appendix B: Environmental Monitoring Programme (Version 9)

Appendix C: Groundwater Quality and Quantity

Appendix D: Aquatic Ecology Monitoring

Appendix E: Surface Water Quality (to be provided by 30th August 2024)

Appendix F: Fine Sediment

Appendix G: Mana Whenua Values Monitoring

Appendix H: Condition 59 Responses to Monitoring (to be provided by 30th August 2024)

Appendix I: Receiving Environment Response Research Programme

Appendix J: Instream Remediation Programme

Appendix K: Prestons and Knights Stream SW Monitoring Report

Appendix L: TWWMP Nottingham Stream and Lower Heathcote

Appendix M: TWWMP Curlett Stream

Appendix N: Addington Brook Dry Weather Monitoring

Appendix O: Street Sweeping Trails

Appendix P: Efficacy of the Superhero Trailer

Appendix Q: Inspections of private stormwater treatment devices

Appendix R: CSNDC Schedule 1