



Memorandum

To	Christchurch City Council – Peter Christensen & Emily Tredinnick
Copy	
From	Jake Simpson
Office	Christchurch
Date	19 December 2024
File/Ref	
Subject	Christchurch City Comprehensive Stormwater Network Discharge Consent (CSNDC) - Condition 21 Consent Adherence – FINAL

1 Introduction

The Christchurch City Comprehensive Stormwater Network Discharge Consent (CSNDC) (CRC231955) authorizes the discharge of stormwater and contaminants to land and water from the Christchurch stormwater network. The consent includes various conditions aimed at mitigating the impact of stormwater discharges on the environment.

Condition 19 of the consent requires Christchurch City Council (Council) to *achieve the contaminant load reduction standards* specified in Table 2. Table 2 specifies the required reductions in contaminant loads for Total Suspended Solids (TSS), Total Zinc, and Total Copper over different timeframes. These reductions are measured against a baseline scenario as of 2018. The specific targets are outlined below.

Table 2: Reductions in stormwater contaminant load

	Contaminant load compared to no treatment as at 2018	5 years from 2018 compared to no treatment (as at 2023)	10 years from 2018 compared to no treatment (as at 2028)	25 years from 2018 compared to no treatment (as at 2043)
TSS	12 %	21 %	25 %	27 %
Total Zinc	10 %	15 %	18 %	20 %
Total Copper	16 %	23 %	28 %	30 %

These targets are derived from the Christchurch Contaminant Load Model 2018 version (C-CLM 2018) and are intended to progressively improve the quality of stormwater discharges over time. Council's objective is to meet these requirements and report back whether they are achieving the required modelled contaminant reduction at each of the timeframes within the Table 2 of the consent.

Under Condition 21 of the consent, Council is required, at five yearly intervals from commencement of the consent, to report on whether the contaminant load reduction standards under Condition 19 and targets developed through the SMPs are being met. This report is prepared to meet the requirement of that condition.

2 Stormwater asset validation work

To ensure that Council had accurately identified and recorded its catchment's stormwater treatment, WSP was engaged to undertake two projects to update the stormwater facility attributes and contributing catchment areas. The results from these projects enabled the C-CLM 2018 model to be updated to a model which more accurately reflects the catchment's stormwater treatment. This updated model C-CLM Version 1 was delivered in 2024.

2.1 Project 1 – Updating stormwater facility information

WSP was engaged by CCC to undertake 'Project 1', which involved reviewing, auditing, and completing the CCC stormwater facility [GIS dataset](#). The previous dataset lacked attributes that correlated with catchments as part of a stormwater treatment system, making it difficult to identify which assets were part of specific systems. Additionally, sometimes important information such as facility purpose and treatment type were missing, and there were some inaccuracies in facility types that needed correction. The tasks included reviewing all in-service and proposed stormwater assets identified in the stormwater facility dataset, updating facility type, sub-type, purpose, treatment type, and discharge type. Facilities that were part of the same treatment group were grouped together, and the outlet/discharge point ID for each group was identified. Project 1 was completed on the 24th of March 2023.

2.2 Project 2 – Updating stormwater facility catchments

Following on from Project 1, the newly classified treatment facilities and groups required their treatment catchments to be reviewed and delineated. This project required updating the treatment catchment layer based on the updated facility classification information. The entire dataset needed to be reviewed to confirm the correct linkage between qualifying catchments and each treatment facility. The first task was to review and update treatment catchments (current and proposed) based on the facility verification work. WSP identified treatment catchments requiring updates, explained the proposed changes to CCC, and updated the treatment catchment layer. All updates were recorded and confirmed with CCC for approval, reflecting the current state of the treatment catchments in Christchurch. The completion date for Project 2 was the 4th of August 2023.

3 Updated contaminant load model

WSP have updated the Christchurch Contaminant Load Model (C-CLM). The C-CLM Version 1 utilises the original 2018 model but is updated with the changed treatment information and inputs obtained from Projects 1 and 2. Version 1 retained the land use data from the C-CLM 2018 version. Version 1 was selected as the optimal version for comparison with the results presented in Table 2 because it provides a consistent baseline, allowing for a clear assessment of the impact of updated treatment systems and contributing catchments on contaminant load reduction. Figure 3.1. identifies the four catchments included in the C-CLM Version 1 and Figure 3.2. sets out the areas treated by Council operated treatment devices and the timelines for these devices' implementation.

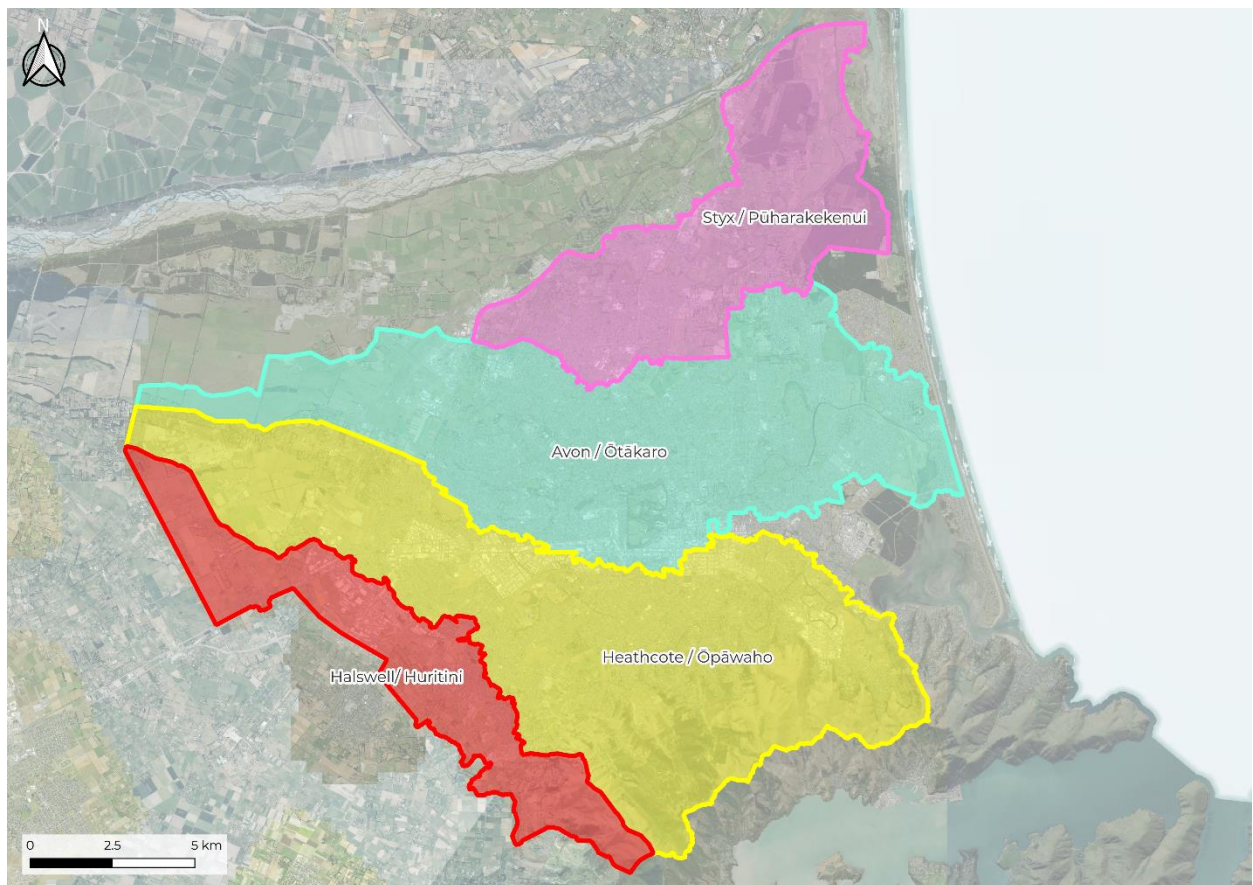


Figure 3-1: Map highlighting the 4 Major Catchments being modelled in the C-CLM

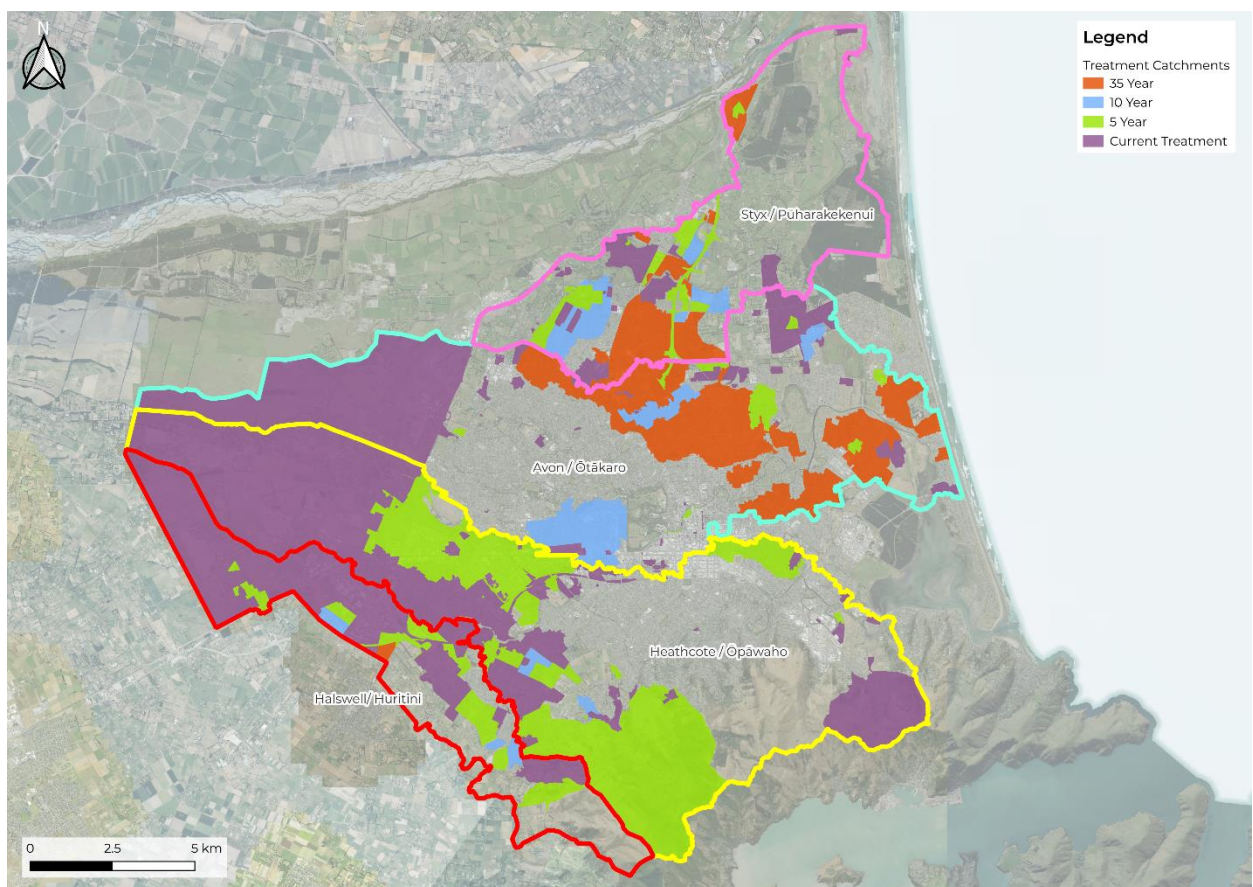


Figure 3-2: Map showing the treatment catchments within each major catchment and their implementation timeline (C-CLM Version 1)

4 Comparison of C-CLM 2018 results with updated C-CLM Version 1

Table 4-1: Reduction in stormwater contaminant load comparison with Table 2 results from CSNDC

		Contaminant load compared to no treatment (as at 2018)	5 years from 2018 compared to no treatment (as at 2023)	10 years from 2018 compared to no treatment (as at 2028)	25 years from 2018 compared to no treatment (as at 2043)
TSS	CSNDC C-CLM	12%	21%	25%	29%
	2024 v1 C-CLM	15%	26%	28%	26%
Total Zinc	CSNDC C-CLM	10%	15%	18%	21%
	2024 v1 C-CLM	9%	16%	19%	16%
Total Copper	CSNDC C-CLM	15%	23%	28%	31%
	2024 v1 C-CLM	16%	26%	29%	26%

As seen in Table 4-1, the results from the updated C-CLM Version 1 differ from the previous results found in the CSNDC C-CLM 2018. This discrepancy is attributed to the updates and improved knowledge of the treatment systems that have been applied to the updated C-CLM Version 1.

In the case of zinc contaminants, we observe a lower load treated in the base case. This is because the review and updates of the treatment information discussed in Section 2 revealed inaccuracies in the previous assumptions about treated loads. This included differences in the facility type, treatment type, catchment extent and treatment device implementation timeline. Now, with a better understanding of the treatment systems, their catchment areas, and their efficiencies, C-CLM Version 1 better reflects the contaminant loads. However, this improved understanding has led to better results in the 5-year (2023) scenario, demonstrating the effectiveness of the updated treatment over time.

The 5-year (2023) scenario shows that Christchurch City Council (Council) has successfully met its required contamination load reduction standards, as shown in CSNDC Table 2, across the Avon, Heathcote, Halswell, and Styx catchments combined.

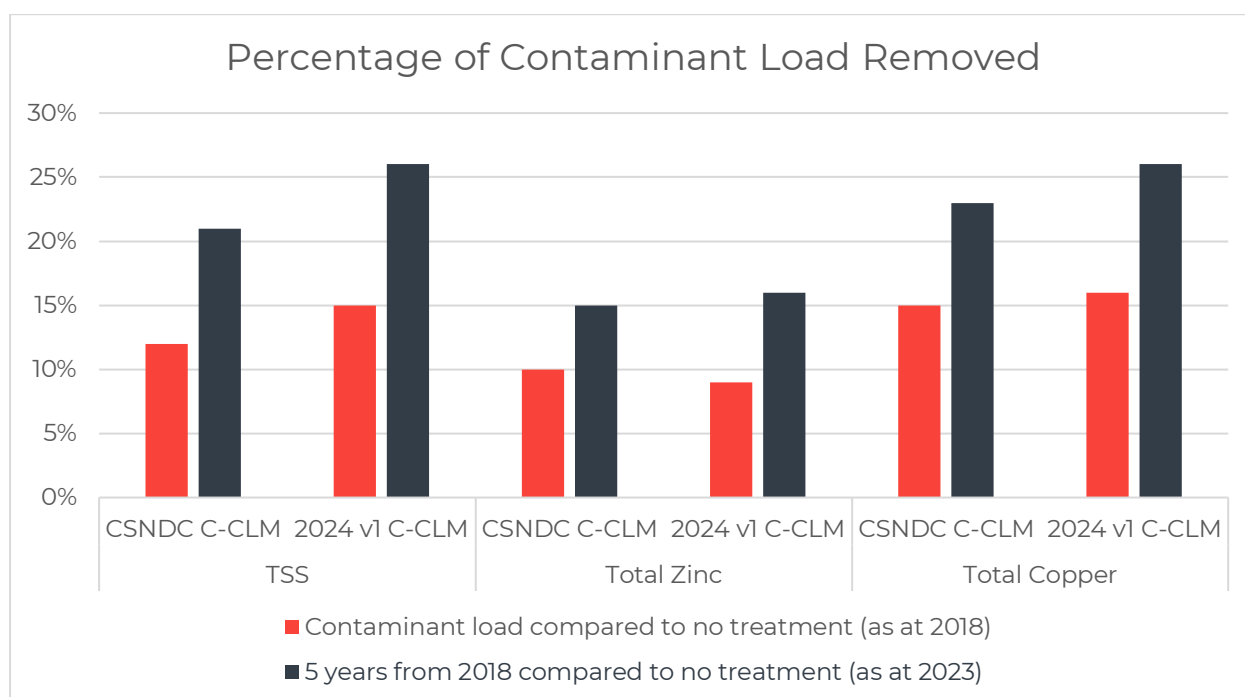


Figure 4-1: Percentage of Contaminant Load Removed Comparison Between CSNDC (Table 2, C-CLM 2018) and 2024 C-CLM Version 1

5 Stormwater Management Plan Targets

The purpose of a Stormwater Management Plan (SMP) is defined in condition 6 of the Comprehensive Stormwater Network Discharge Consent (CSNDC), CRC231955, and includes contributing to meeting contaminant load reduction standards, setting (and meeting) additional contaminant load reduction targets and demonstrating the means by which stormwater discharges will be progressively improved toward meeting receiving environment objectives and targets. Condition 20 of the CSNDC requires Council to ‘*use best practicable options to achieve the contaminant load reduction targets specified in the SMPs derived from the C-CLM*’.

The SMPs have reported contaminant load reduction in a slightly different way than Table 2, as rather than comparing the change from *no* treatment as at 2018, the SMPs are reporting the reduction from the *treated* load in 2018. The SMP targets are the same as the loads reported in the C-CLM 2018 model, but due to the different calculation method result in a different percentage reduction. In order to be consistent with the SMPs this section uses the SMP method for report % reductions.

Further differences between the SMP (C-CLM 2018 model) and C-CLM Version 1 numbers arise because the C-CLM Version 1 model incorporates more recent and comprehensive data on treatment processes that were analysed in project 1 and 2, as discussed in 2.1. and 2.2. This updated data allowed for more precise modelling and predictions of the treatment catchments and how treatments impact the levels of the contaminants of interest.

Due to the update of the C-CLM the base case treatments numbers, and subsequently, the 5-, 10- and 25-year scenario numbers do differ slightly between the models. Therefore, there is a change in contaminant load reduction percentages over the base case in the updated C-CLM model. It is key to note this, as in some cases, the starting point for these calculations will be different. It is also important to note that the 2018 SMP results for Avon, excluded the Wairarapa A and Wairarapa B catchments. The C-CLM Version 1 has included these catchments. The change in the sub catchments within the Avon will explain some of the change in numbers.

The SMPs’ focus is the 2028 scenarios; therefore, the analysis below focuses on the 10-year (2028) case. Sections 5.1 to 5.4 discuss the contaminant reduction for each of the four catchments delineated in Figure 3.1.

5.1 Ōtākaro - Avon River Area

Table 5-1: Avon Catchment contaminant load reduction over base case SMP vs C-CLM Version 1

Contaminants	Model	Reduction over base case – 5-years (%)	Reduction over base case – 10-years (%)	Reduction over base case – 25-years (%)
TSS	SMP	3.3	13.9	25.3
	2024 v1 C-CLM	2.2	7.7	23.3
Total Zinc	SMP	3.6	11.5	33.0
	2024 v1 C-CLM	2.8	11.6	28.3
Total Copper	SMP	2.7	12.5	22.2
	2024 v1 C-CLM	1.0	7.7	19.4

- **TSS:** The target (SMP) is 13.9%, while the actual result (C-CLM Version 1) is 7.7%, indicating **not- achieving** the target.
- **Total Zinc:** The target is 11.5%, and the result is 11.6%, indicating **achieving** the target.

- **Total Copper:** The target is 12.5%, and the result is 7.7%, indicating **not-achieving** the target.

5.2 Huritini - Halswell River Area

Table 5-2: Halswell Catchment contaminant load reduction over base case SMP vs C-CLM Version 1

Contaminants	Model	Reduction over base case – 5-years (%)	Reduction over base case – 10-years (%)	Reduction over base case – 25-years (%)
TSS	SMP	12.6	14.4	13.8
	2024 v1 C-CLM	12.0	17.3	17.5
Total Zinc	SMP	9.7	13.7	34.4
	2024 v1 C-CLM	12.9	21.8	31.6
Total Copper	SMP	11.1	15.5	35.6
	2024 v1 C-CLM	17.2	27.1	35.6

- **TSS:** The target (SMP) is 14.4%, while the actual result (C-CLM Version 1) is 17.3%, indicating **achieving** the target.
- **Total Zinc:** The target is 13.7%, and the result is 21.8%, indicating **achieving** the target.
- **Total Copper:** The target is 15.5%, and the result is 27.1%, indicating **achieving** the target.

5.3 Ōpāwaho - Heathcote River Area

Table 5-3: Heathcote Catchment Improvement in treatment over base case SMP vs C-CLM Version 1

Contaminants	Model	Reduction over base case – 5-years (%)	Reduction over base case – 10-years (%)	Reduction over base case – 25-years (%)
TSS	SMP	17.9	18.5	19.1
	2024 v1 C-CLM	27.0	27.2	27.5
Total Zinc	SMP	10.6	12.7	23.8
	2024 v1 C-CLM	16.7	18.9	25.1
Total Copper	SMP	17.8	17.9	18.5
	2024 v1 C-CLM	26.6	26.7	27.1

- **TSS:** The target (SMP) is 18.5%, while the actual result (C-CLM Version 1) is 27.2%, indicating **achieving** the target.
- **Total Zinc:** The target is 12.7%, and the result is 18.9%, indicating **achieving** the target.
- **Total Copper:** The target is 17.9%, and the result is 26.7%, indicating **achieving** the target.

5.4 Pūharakekenui - Styx River Area

Table 5-4: Styx Catchment contaminant load reduction over base case SMP vs C-CLM Version 1

Contaminants	Model	Reduction over base case – 5-years (%)	Reduction over base case – 10-years (%)	Reduction over base case – 25-years (%)
TSS	SMP	8.1	11.8	19.9
	2024 v1 C-CLM	7.0	27.2	7.7
Total Zinc	SMP	11.5	21.1	38.3
	2024 v1 C-CLM	10.2	18.9	27.6
Total Copper	SMP	13.3	22.1	44.1
	2024 v1 C-CLM	13.4	26.7	21.8

- **TSS:** The target (SMP) is 11.8%, while the actual result (C-CLM Version 1) is 27.2%, indicating **achieving** the target.
- **Total Zinc:** The target is 21.1%, and the result is 18.9%, indicating **not-achieving** the target.
- **Total Copper:** The target is 22.1%, and the result is 26.7%, indicating **achieving** the target.

Given that this modelling has been completed in 2024, there are four years remaining to achieve the SMP targets. The C-CLM Version 1 results enables targeted improvements and further investigations to aim for compliance by the target year for each SMP.

Conclusions

The updated C-CLM Version 1 provides a more accurate and up to date assessment of the stormwater treatment systems in place compared with the results from C-CLM 2018. The CSNDC Table 2 outlines the required reductions in contaminant loads for Total Suspended Solids (TSS), Total Zinc, and Total Copper, which are essential benchmarks for evaluating progress. The results from the C-CLM Version 1, when compared to Table 2 standards, highlight the areas where improvements are needed and where compliance with Table 2's standards has been achieved. Notably, the 5-year case results demonstrate compliance with the Table 2 standards, indicating progress in reducing contaminant loads. This comparison underscores the importance of ongoing efforts to meet the Table 2 standards and the necessity for further investigation and optimisation of stormwater treatment systems to ensure environmental protection and regulatory compliance.

When evaluating the C-CLM Version 1 results against the SMP targets, we see in most cases, the stormwater contaminant load reduction targets are being met. However, we do see some areas where there is an indication of not achieving the contaminant reduction targets for zinc. This indicates the importance of continuing to develop and improve stormwater treatment functionality and coverage in these catchments. The C-CLM Version 1 results enable Council to prioritise the necessary improvements and further investigations to work towards meeting the SMP's targets.