WAIMAKARIRI DISTRICT COUNCIL

REPORT FOR INFORMATION

FILE NO and TRIM NO:	DRA-16-03 / 220912157598
REPORT TO:	UTILITIES AND ROADING COMMITTEE
DATE OF MEETING:	27 September 2022
AUTHOR(S):	Kalley Simpson, 3 Waters Manager Rob Kerr, Flood Recovery Programme Manager
SUBJECT:	2021-2022 Flood Recovery: September Update
ENDORSED BY: (for Reports to Council, Committees or Boards)	General Manager / Acting Chief Executive

1. SUMMARY

1.1 The purpose of this report is to update the Utilities and Roading Committee on the status of the drainage and sewer service requests and further investigations related to the following flood events:

Group 1. 29 to 31 May 2021, 15 December 2021 and 12 February 2022.

Group 2. 12 July 2022, 20 July 2022, 26 July 2022 and 30 July 2022

1.2 As outlined in the August update (Trim Ref 220811137957), a total of 598 drainage service requests were received related to the rainfall events in Group 1 and total of 61 areas were previously identified for further assessment. A further 685 drainage service requests and 130 sewer requests were received related to the rainfall events in Group 2.

1.3 Council staff have now triaged all the service requests, made initial contact with those who submitted drainage requests whom we have been able to contact and are making good progress in contacting the sewer service requesters. Staff have begun working through the priority issues. Based on the scale of additional service requests, it is anticipated that it will take at least 3-6 months to work through these investigations. Accordingly, while almost all customers have received or will receive an initial call back, it may take some time to respond with the outcome of the investigations.

1.4 A total of 143 investigations have been identified which cover all the above-mentioned drainage and sewer service requests plus an additional 321 maintenance actions. Additional resources have been bought on to manage the high workload and a programme governance structure established to drive the programme and oversee the risk, resourcing and financial implications of the programme of work.

1.5 The status of the investigations and maintenance action are as follows:

Phase	As at 9 Sept	This report	Change
Triaging	0	0	0
Scoping	119	89	-30
Under Investigation	5	22	17

Review and approval	3	7	4
In Implementation	6	9	3
Completed	10	16	6
Total	**143**	**143**	

Maintenance items	As at 9 Sept	This report	Change
To be started	256	256	0
Work in process	23	23	0
Completed	42	42	0
Total	**321**	**321**	

Attachments

i. Progress and status of the 143 Investigations (TRIM 220915160824 and 220915160823).

2. RECOMMENDATION

THAT the Utilities and Roading Committee:

(a) **Receives** report No 220912157598.

(b) **Notes** that 143 investigations and 321 maintenance actions have been triaged and prioritised from the drainage and sewers service requests from the flood events over 2021 and 2022.

(c) **Notes** that 16 of the 143 investigations are either complete, and the issue resolved, or incorporated into the Business as Usual (BAU) work and is being tracked as part of a maintenance or capital works programme.

(d) **Notes** that 42 of the 321 maintenance actions have been completed.

(e) **Notes** that a fortnightly report is being issued to elected members and published on the Council's website.

(f) **Notes** that drainage service request submitters have had initial contact where possible, and further holding contact is being made to those whom Council has electronic contact details.

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

3. BACKGROUND

3.1. Background on the Group 1 rainfall events was previously reported through to the Utilities and Roading Committee in the following reports:

- May 2021 Flood Event – TRIM 210909144676
- December 2021 Flood Event – TRIM 211223205713
- February 2022 Flood Event – TRIM 220310034384

3.2. During the month of July 2022, four rainfall events occurred and the total rainfall for the month was about 4 times higher than the typical average for this time of the year. While individually these were not significant events, the cumulative monthly rainfall for the month reached record levels. Additionally the high annual rainfall we have experienced over the past 12 months means the catchment in the district are saturated catchments and

groundwater levels high to the extent the resurgence channels are flowing in the Mandeville area.

3.3. A total of 598 drainage service requests were received related to the May 2021, December 2021 and February 2022 rainfall events and total of 61 areas were identified for further assessment.

3.4. Following the events of 12 July 2022, 20 July 2022, 26 July 2022 and 30 July 2022, a further 685 drainage service requests and 130 sewer requests were received

4. ISSUES AND OPTIONS

4.1. Council staff have now triaged all the service requests, made initial contact with all those who submitted requested and begun working through the priority issues. Based on the scale of additional service requests, it is anticipated that it will take at least 3-6 months to work through these investigations. Accordingly, while almost all customers have received an initial call back, it may take some time to respond with the outcome of the investigations.

4.2. A total of 143 investigations have been identified which cover all the above-mentioned drainage and sewer service requests plus an additional 321 maintenance actions. Additional resources have been bought on to manage the high workload and a programme governance structure established to drive the programme and oversee the risk, resourcing and financial implications of the programme of work.

4.3. In regard to communications:

4.3.1. All 685 Drainage Service requests have been contacted with an initial confirmation that the request has been received. All 130 Sewer Service Requests are in the process of being contacted with an initial confirmation to confirm that the request has been received. This work is underway and is expected to be completed by the 23 September 2022.

4.3.2. The website is being updated with a Home Page Tile so residents can access the flood recovery page more easily. Note that the website is in the process of being updated as some information is now out of date, and a version of the attached progress report will be included.

4.3.3. For all live service requests, staff will be sending out a holding message (via email or text) next week in order to maintain continuous contact alongside the more specific contact with the flood team as they address each investigation.

4.4. The status of the investigations and maintenance action as at 15 September are as follows:

Phase	As at 9 Sept	This report	Change
Triaging	0	0	0
Scoping	119	89	-30
Under Investigation	5	22	17
Review and approval	3	7	4
In Implementation	6	9	3
Completed	10	16	6
Total	**143**	**143**	

Maintenance items	As at 9 Sept	This report	Change
To be started	256	256	0
Work in process	23	23	0

Completed	42	42	0
Total	**321**	**321**	

4.5. Progress on the key focus areas is summarised below:

Location	Update
Kiln Place / Fairweather Crescent	Issue with backflow from the Kaikanui Stream. Removal/modifications of farm culverts is underway. Flapgates and bunds to be installed as urgent works.
Fuller Street	Issue with a low lying residence being repeatedly close to flooding. Investigation is complete and upgrades will be implemented this financial year from existing budgets.
Broadway Avenue	Detailed design underway for a new pipe from Kiwi Ave Reserve to Broadway Ave. Construction works to be undertaken this summer.
Swindells Road	CCTV and swale / driveway culvert maintenance work complete. Options memo currently being finalised. Design and consent in 22/23 and construct in 23/24.
Pearson Drain	Issue with drain overtopping and causing flooding in central Oxford. Detailed investigation to commence shortly.
Stalkers Road	Issue with regular flooding during periods of high groundwater and causing issue with overloading the sewer. Detailed investigations to commence shortly. Community meeting with residents to be organised.
Cust Road	New larger soakpits will be installed next week. Solution for secondary flow to be developed.
Ranui Mews	The installation of vents at Ranui Mews in progressing well, will be complete by the end of next week. Investigation works on the Ohoka Road sewer main to continue.
Kairaki PS	Issue with inflow and infiltration overloading sewer. Meeting with residents held 7 September. Urgent works to address main issues in campground to commence next week.
Cones Road / Fawcetts Road	Issue with a rural catchment causing flooding in neighbouring area. Land purchase currently being finalised for proposed diversion drain upgrade.
Resurgence Flow, Mandeville	Groundwater levels are high and undercurrents are flowing in the Mandeville area. This is causing surface flooding issues and impacting some septic tanks. Investigations are underway and the Mandeville Resurgence Channel Upgrade/Diversion is proposed.
Vicenza Drive / Bradleys Road	Issue with overloaded drains and water races causing issues with surface flooding and septic tanks. Culvert upgrade to be undertaken on Bradleys Road.

Flannigans Drain	Issue with overloaded drain causing flooding on neighbouring properties. Investigation and site inspection is underway.

Implications for Community Wellbeing

Some of the locations of flooding have had flooding in the past and some residents have had to make insurance claims for flood related damage. This has a potential implication on community wellbeing for these residents.

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

5. COMMUNITY VIEWS

5.1. Mana whenua

Te Ngāi Tūāhuriri hapū are not likely to be directly affected by this work. However, they will have an interest in any future proposed works that may have an impact on waterways and rivers. Staff will update the Runanga at the executive meetings and where relevant on specific projects engage with MKT.

5.2. Groups and Organisations

Directly affected property owners will be consulted with on the proposed upgrades.

Community boards and drainage advisory groups will be updated on the investigation works and any specific future proposed works that come out of the assessment.

5.3. Wider Community

The wider community will be kept informed via the Council's website. A dedicated webpage has been set up for the recent flood events across the wider district, refer:

https://www.waimakariri.govt.nz/services/water-services/stormwater/drainage-works

A communications plan has been developed that covers both general updates to the wider community and also area specific engagements. Where necessary targeted updates, via a local news agent flyer or dedicated flyer, or street or community meetings will be held.

A holding message will be send to all customers with an open service request, with via text or email over the next week. Individual service request submitters will be contacted to close out once complete.

6. OTHER IMPLICATIONS AND RISK MANAGEMENT

6.1. Financial Implications

6.1.1. The financial implications of the flood recovery are addressed in the report to the September Council meeting (Ref 220825147219). The estimated costs of the clean-up from this flood event, and initial works underway or planned for the immediate future is in the order of $3.15 million and the full costs are not likely to be clear for another 4 to 8 weeks. Further detailed information on costs and any details as they relate to budgets will be provided to Council in a future report. The September report sought approval for the expenditure of this $3.15 million and Council approved this recommendation.

Table 3 – Estimate of Unbudgeted Expenditure

Area	Estimate

Roading	$2,000,000
Stormwater	$450,000
Land Drainage	$75,000
Rivers	$25,000
Wastewater	$100,000
Flood Response PCG	$500,000
TOTAL	**$3,150,000**

6.1.2. The October report to Council will include information such as whether each component of expenditure should be expensed or capitalised and the overall rating impact. If all of this unbudgeted expenditure were to be loan funded on a District wide basis over a 10 year period this would increase rates by approximately $11 (including GST) per ratepayer, assuming that Waka Kotahi co-funding is obtained for the Roading related works.

6.2. **Sustainability and Climate Change Impacts**

The recommendations in this report do not have sustainability and/or climate change impacts.

Any proposed upgrading works will consider the potential impacts of climate change in terms of higher rainfall intensities and sea level rise. The procurement of any physical works will use sustainable procurement practices.

6.3 **Risk Management**

There are no additional risks arising from the adoption/implementation of the recommendations in this report. The improvements implemented as a result of the drainage assessment identified will reduce the overall risk profile to Council and the community.

Health and Safety

The health and safety risks associated with undertaking this investigation work will be managed by standard Council processes.

7. CONTEXT

7.1. **Consistency with Policy**

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

7.2. **Authorising Legislation**

The Local Government Act 2002 sets out the power and responsibility of local authorities, including the Council's role in providing drainage services.

7.3. **Consistency with Community Outcomes**

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

- *There is a safe environment for all*
- *Core utility services are provided in a timely and sustainable manner*

7.4. **Authorising Delegations**

7.5. The Utilities and Roading Committee is responsible for activities related to stormwater drainage.

Project **Reporting**

Work package	Location	Date this report last updated	Stage	%age complete of stage	Progress since last reported	Planned actions
NS1	Percival Street	13/09/2022	Scoping	10%	Inital scoping of issues undertaken	Review CCTV inspection of downstream system. Consider if section should be re-inspected. Consider if localised improvements to hydraulics could be made at manhole, lateral connection or venting within the property. Budget for new pipe along Charles and down Percival to the southern end of Matawai Park.
NS2	Wesley Street	14/09/2022	Under Investigation	10	10	Check model and onsite venting.
NS3	Ohoka Road	14/09/2022	Scoping	0	none	review CSRs and check model.
NS4	Mandeville	14-Sep	Under Investigation	50	Service requests reviewed and appear to be related to multiple complaints from 1124 Tram Road and 1126 Tram Road. SR's reference the stormwater drain through the properties (covered by easements) and are not related to septic tank issues. Septic tank locations appear to be well setback from stormwater drain	To meet with Alex and Chris to assess modelling
NS5	Tuahiwi / Fernside	14/09/2022	Under Investigation	15	Aquatec undertaking review of all stations installed and awaiting their report	Once Aquatec report received, then develop plan to address issues arisen
FT01	Newnham Street		Scoping			

Project Reporting

Work package	Location	Date this report last updated	Stage	%age complete of stage	Progress since last reported	Planned actions
FT02	Ivory Street		Scoping			
FT03	Strachan Place	14/09/2022	Scoping	0	None	Decide on trash grill and get it fabricated
FT04	Beach Road	14/09/2022	Scoping	0	None	Organise CCTV and survey
FT05	Mansfield Drive		Scoping			
FT06	Williams Street	9/09/2022	In Implementation	100%	Bridge block crossings inspected and cleared. Added to critical sump list to be checked prior to all rain events.	Added to critical sump list to be checked prior to all rain events. PDU to include in future K&C renewal pgm.
FT07	Bracebridge Street		Scoping		Ultimate solution is a new K&C	
FT08	Fuller Street		Scoping			

Project Reporting

Work package	Location	Date this report last updated	Stage	%age complete of stage	Progress since last reported	Planned actions
FT09	Feldwick Drive	14/09/2022	In Implementation	20%	CORDE instructed to repair small 2m² patch. Repair completed	Long term solution is the new Beach Road PS - construction to be completed by the end of this year.
FT10	Main North Road		Scoping			
FT11	Sovereign Boulevard	14/09/2022	Scoping	0	None	Decide on grill modication required
FT12	Old North Road		Scoping			
FT13	Dale Street		Scoping			
FT14	Wesley Street		Scoping			
FT15	Porter Place		Completed			

Project **Reporting**

Work package	Location	Date this report last updated	Stage	%age complete of stage	Progress since last reported	Planned actions
FT16	Kalmia Place		Scoping			
FT17	Cridland Street West		Scoping			
FT18	Williams Street		Scoping			
FT19	Hamel Lane		Completed			
FT20	Williams Street		Completed			
FT21	Woodglen Drive	14-Sep	Scoping	100	Waiting for CCTV to be competed	As builts to be submitted once CCTV complete. Will form part of overall Norton Place SW Improvement project
FT22	Norton Place	14-Sep	Under Investigation	50	Waiting for CCTV to be competed	Options report being developed for adoption to detailed design and construct in 23/24.

Project Reporting

Work package	Location	Date this report last updated	Stage	%age complete of stage	Progress since last reported	Planned actions
FT23	Rangiora Woodend Road	12/09/2022	Scoping		Discussed issue with drainage staff. Download from Drainage Eng.	Contact landowner and meet on site to discuss issue
FT24	Broadway Avenue	14-Sep	Review and approval	80	Discussed with Greenspaces who are happy with initial design. Investigations mostly complete	Check what level of consultation has been carried out with residents and follow up, finalise initial investigations before getting approval to begin detailed design
FT25	Reserve Road, Kiwi Ave, Cross St		Scoping			
FT27	Swindells Road	8-Sep	Review and approval	50	CCTV results received of lateral at 127 Park Terrace	Options report being developed for adoption to detailed design and construct in 23/24. On hold currently while Tim prioritises other projects. Will get back onto it in November.
FT28	Beach Road	12/09/2022	Completed		Completed works	
FT29	Batten Grove		Scoping			
FT30	Featherstone Avenue		Scoping			

Project Reporting

Work package	Location	Date this report last updated	Stage	%age complete of stage	Progress since last reported	Planned actions
FT31	Pegasus Main Street		Scoping			
FT32	Kowhai Street		Scoping			
FT33	Weka Street	14/09/2022	Scoping	0		
FT34	Bay Road	14/09/2022	Scoping	0		
FT35	Queen Street		Completed			
FT36	Burnett Street	14-Sep	Under Investigation	40	Working through options and concept design	High level options assessment and costs to 3W Manager for approval of concept design. Detailed design & construction in 23/24.
FT37	High Street	8-Sep	Under Investigation	50	Working through scheme design	Scheme design/options report to 3W Manage by end of October. Detailed design & construction to follow.

Project **Reporting**

Work package	Location	Date this report last updated	Stage	%age complete of stage	Progress since last reported	Planned actions
FT38	Pearson Drain	14/09/2022	Scoping	0		
FT39	Mill Road		Completed			
FT40	Mill Road	13/09/2022	Under Investigation	75%	Onsite meeting with landowner 15 July 2022 to understand the issues.	Undertaken maintenance works on downstream section of the Ohoka Stream. Provide advice to the property owner on potential onsite improvements to protect the house. Consider need to add to the pre-event flood notification list.
FT41	McHughs Road	14-Sep	In Implementation	90	Progression of work on McHughs Rd	McHughs Works ongoing – expected completion end of Sep 22. Involved water race culvert replacements and improved capacity through 181 McHughs Roscrea Completed – swale/outlet to water race, raised driveway entrance at 10 Roscrea Pl
FT42	Wilson Drive		Scoping			
FT43	Victoria Street		Scoping			
FT44	SH1	14/09/2022	Scoping	80	Site vist completed. Options assessment underway	Memo to be issued to RK for review.

Project **Reporting**

Work package	Location	Date this report last updated	Stage	%age complete of stage	Progress since last reported	Planned actions
FT45	Macdonalds Lane		Scoping			
FT46	Stalkers Road		Scoping			
FT47	Main North Road		Scoping			
FT48	Skewbridge	9/09/2022	Completed	100%	CORDE repaired collapsed culvert at 80/80 repeater, then assessed as inadequate and new 600mm OD culvert installed.	
FT49	Cust Road	14/09/2022	Completed	100%	Scoped and CORDE given instruction. Works completed 12&13th Sept	Work commenced Friday, 9 September 2022
FT50	Earlys Road & Cust Road		Scoping			
FT51	Cust Road	14/09/2022	Completed	100%	Scoped and CORDE given instruction.	Work commenced Friday, 9 September 2022

Project **Reporting**

Work package	Location	Date this report last updated	Stage	%age complete of stage	Progress since last reported	Planned actions
FT52	Taaffes Glen Road		Completed			
FT53	Toppings Road	13/09/2022	Under Investigation	90%	Flood warnings provided to property owner during the July flood events. Property added to the pre-event flood notification list.	Finalise flood management advice to landowner and place on property file. Liaise with Ecan river engineers on designating the Sefton tributary as an Ecan maintained drain.
FT54	Smarts Road	12/09/2022	Under Investigation	90	Design largely completed. All property owners met, and issues discussed.	Get agreement from one landowner with additional discharge. Complete design. Update estimate. Get priced by Corde.
FT55	Steffens Road	14/09/2022	Completed	100%	Works completed	Soak holes installed
FT56	Depot Road	15/09/2022	Scoping	10%	Scope of works to be assessed and options to be determined for drainage upgrades.	Carl/Tim & Carl to investigate further and liaise with affected property owners.
FT57	Upper Sefton	9/09/2022	Completed	100%	Swales and drains cleared / reshaped, high shoulder removed, debris in waterway removed.	One section of open drain still to be maintained later under maintenance works.
FT58	Dixons Road	14/09/2022	Under Investigation	20%	CORDE requested to price culvert renewal. Still awaiting price.	Works to be instructed / programmed once estimate accepted.

Project **Reporting**

Work package	Location	Date this report last updated	Stage	%age complete of stage	Progress since last reported	Planned actions
FT59	Hodgsons Road	9/09/2022	Completed	100%	Nil	Tim to update CSR and advise caller of outcome.Caller advised.
FT60	Mount Thomas Road	13/09/2022	Under Investigation	75%	Onsite meeting with landowner and Ecan compliance officer on 29 August 2022.	Ecan to obtain legal advice to confirm if compliance action can be taken. WDC to provide summary advice through to upstream landowners of the access way.
FT61	Ranui Mews	13/09/2022	In Implementation	90%	External vent installation at Ranui Mews currently underway (expected to be completed by 16 September 2022).	Continue Ohoka Road sewer investigations - review logger information and drainage service requests in wider area.
FT62	Kairaki PS	13/09/2022	In Implementation	10%	Loggers installed in sewer main. Meeting with residents held 7 September 2022. Urgent works to address the main issues already identified commenced onsite on 12 September 2022.	Complete urgent works (current target 23 September 2022). Investigate remaining sewer and stormwater system in the upper campground. Undertake CCTV inspection of sewer main in Featherstone Ave and manhole surveys.
H01	Station Road, Loburn	9/09/2022	Completed	100%	Met with contractor and landowner to scope requirements, agreed on solution. Works completed 16/08/2022	None
H02	Bruces Road, Sefton		Scoping			
H03	View Hill Stream	14/09/2022	In Implementation	20%	Scope of works agreed with contractor, privcing up works. Srvey confirmed.	Carl/Tim & ECan investigated further and will be liaising with affected property owners. Contractor to undertake survey week commencing 19th September.

Project **Reporting**

Work package	Location	Date this report last updated	Stage	%age complete of stage	Progress since last reported	Planned actions
H04	Two Chain Road		Scoping			
H05	Depot Road / South Eyre Road		Scoping			
H06	Tui Street, Oxford	8-Sep	Under Investigation	50		Soakage testing of the trenches has been completed, awaiting results to determine next steps. On hold currently while Tim prioritises other projects. Will get back onto it in November.
H07	Williams Street / Kiln Place, Kaiapoi	14-Sep	Scoping	20	Kieran briefed on issue by Shaun	Kieran to look into service request and discuss required actions with Kalley
H08	Belcher Street, Kaiapoi	14-Sep	Scoping	50	None - Teifion currently prioritising Pearsons lane and Norton Place	Teifion to follow up with site investigations and review of previous work done by PDU.
H09	Harrod Place, Rangiora	12/09/2022	Scoping	50	New larger capacity stormwater nearly completed	check whether S/R will be resolved with current project
H10	Cam Road, Kaiapoi		Scoping			

Project **Reporting**

Work package	Location	Date this report last updated	Stage	%age complete of stage	Progress since last reported	Planned actions
H11	Percival Street, Rangiora	14/09/2022	Review and approval	0	price request issued	With Corde for pricing now
H12	Beach Road, The Pines Beach	12/09/2022	Completed		C ompleted works	
H13	Tram Road / Heywards Road		Scoping			
H14	Woodfields Road		Scoping			
H15	East Belt, Rangiora	14.09.22	Scoping	10	Have called the resident who put in the service request to get a better picture of what was happening. It sounds like the soakpit reached capacity on the eastern side, which made the sump on the western side of East Belt get overwhelmed and flood out onto that side of the road. Yet to call CORDE about what they did to fix it. Resident very	Call CORDE (Mark) to see what they did. I am starting on the design for East Belt Rain Gardens in November which will help with runoff down East Belt
H16	Cones Road / Fawcetts Road	14-Sep	Under Investigation	10	Contract folder set up. Before you dig plans obtained.	Carry out concept design
H17	Chapman Place, Kaiapoi	12/09/2022	In Implementation	50	Reviewing with Engineer supervising works in Chapman Place	Confirm works complete dudner Shovel Ready projects

Project **Reporting**

Work package	Location	Date this report last updated	Stage	%age complete of stage	Progress since last reported	Planned actions
H18	Greens Road, Tuahiwi	14/09/2022	Scoping	0	None	Contact ECan
H19	Skewbridge	9/09/2022	Under Investigation	20%	Culvert at Mulcocks Rd intersection will be upsized as part of Intersection Improvement project (design / tender docs underway by Aaron K - PDU).	Put out to tender shortly
H20	Wolffs Road		Scoping			
H21	Belmont Ave, Rangiora	14/09/2022	Scoping	0		
H22	Earlys Road		Scoping			
H23	Palmer Street, Rangiora	14/09/2022	Scoping	0	None	Advise customer
H24	Wetherfield Lane, Mandeville	14/09/2022	Scoping	0		Scope to be confirmed as works have been previously completed in this area (2019/20)

Project **Reporting**

Work package	Location	Date this report last updated	Stage	%age complete of stage	Progress since last reported	Planned actions
H25	Island Road, Kaiapoi	14/09/2022	Scoping	0		
H26	Giles Road, Clarkville	14/09/2022	Review and approval	10%	Repositioning of headwall and rock works to commence by Ecan in eatly October.	WDC to work with ECAN and to track progress
H27	Island Road / Silverstream	13/09/2022	Under Investigation	90%	Onsite meeting with landowner 27 july 2022. Advice provided to landonwer on potential onsite imrpovements they could make - landonwer to seek engineering advice. Arranged for Ecan to inspect the Silverstream to undertake maintenance works.	Drainage team to inspect Ohoka Stream to determine if maintenance works are necessary.
H28	Bairds Road, Sefton		Scoping			
H29	Rotten Row, Waikuku Beach	12/09/2022	Scoping	0	No action	Research issue internally, and with ECan
H30	Resurgence Flow, Mandeville	14/09/2022	Under Investigation	5	Update provided to the Ohoka Rural Drainage Advisory Group. Ongoing investigation as part of the overall project	Part of the Mandeville Resurgence Channel Upgrade / Diversion Project
H31	Tawera Lane, Oxford	14/09/2022	Scoping	0		

Project Reporting

Work package	Location	Date this report last updated	Stage	%age complete of stage	Progress since last reported	Planned actions
H32	Washington Place, West Eyreton	14/09/2022	Scoping	0		
H33	Ashley Gorge Road	13/09/2022	Under Investigation	50%	Onsite meeting with landowner 24 August 2022. Beca engaged to provide assessment of the stormwater impacts from a quantity perspective.	Determine role / responsibility of Council. Discuss stormwater assessment with landowner (planned for 19 September 2022).
H34	Maindonalds Road		Scoping			
H35	Williams Coup Road, Kaiapoi		Scoping			
H36	Kaikanui Stream	14/09/2022	Scoping	0%	Discussion to determine extent of survey completed 5/09/22	Plan to Survey Kaikanui Stream for Investigation in South Kaiapoi model. Location and operation of flap gates will be confirmed as part of survey.
H37	Box Drain, Woodend	14-Sep	Under Investigation	20	Arranged quotes for geological investiagtions and peizometer install on the site	Proceed with site investigation works. Need to set up meeting with te Ngai tuahuriri reps to discuss design options
H38	Orchard Place, Clarkville		Scoping			

Project **Reporting**

Work package	Location	Date this report last updated	Stage	%age complete of stage	Progress since last reported	Planned actions
H39	Chiltons Road, Clarkville	14/09/2022	Under Investigation	50	Caller contacted and provided updated photos. Location is by the corner of Chiltons / Baileys Rd. Including flooding at 84 Baileys Road	To meet with Alex and Chris to assess modelling once photos received and location confirmed
H40	Allin Drive, Waikuku Beach	14/09/2022	Scoping	0		
H41	Spare		Completed	9-Apr	Transferred to H08	nil
H42	No.10 Road, Mandeville	14/09/2022	Under Investigation	5	Refer H30	Part of the Mandeville Resurgence Channel Upgrade / Diversion Project
H43	Mairaki Road	13/09/2022	Scoping	0%	Nil - not started	Ring customer to discuss and obtain further information.
H44	Vicenza Drive / Bradleys Road	14/09/2022	Scoping	0		
H45	Inglis Road	12/09/2022	Scoping	0	No action	Research issue internally, and with ECan

Project Reporting

Work package	Location	Date this report last updated	Stage	%age complete of stage	Progress since last reported	Planned actions
N01	Flannigans Drain	14/09/2022	Scoping	90	Draft memo sent for review. Feedback from review by KS - catchment flow investigations to be completed	Address review comments - retrieval of LiDAR, and complete hydraulic assessment of Flannigans Drain
N02	Carmana Gardens	14/09/2022	Review and approval	80	Draft memo sent for review. Feedback from review by RK - catchment flow investigations to be completed	Address review comments and complete hydraulic assessment of existing kerb and channel
N03	Kingsbury Ave	14/09/2022	Review and approval	80	Draft memo sent for review	Address review comments
N04	Main Street, Oxford	14/09/2022	Review and approval	75	Draft memo sent for review	Address review comments
N05	Hilton Street, Kaiapoi	14/09/2022	Scoping	0		
N06	Coronation Street, Rangiora	14/09/2022	Under Investigation	30	Investigations underway	Site visit to determine network. Dicussions with 3W or Roading dependent of site assessment. Write up memo

Project **Reporting**

Work package	Location	Date this report last updated	Stage	%age complete of stage	Progress since last reported	Planned actions
N07	Littles Lane, Woodend	14/09/2022	Scoping	0		
N08	Kiln Place / Fairweather Crescent	14/09/2022	Scoping	0		
N09	King Street / Charles Street, Rangiora	14/09/2022	Scoping	0		
N10	Old North Road	14/09/2022	Scoping	0		
N11	Willock Street	14/09/2022	Scoping	0		

Project Reporting

Work package	Location	Date this report last updated	Stage	%age complete of stage	Progress since last reported	Planned actions
N12	Woodend Road, Woodend	14/09/2022	Scoping	0		
N13	Beach Crescent, Waikuku Beach	13/09/2022	Scoping	25%	Meeting with residents held 8 September 2022. Also to include flooding issue at the rear of 48 Rotten Row.	Scope proposed investigation approach. Discuss with Roading and Property team as solution may need their involvement. Identify appropriate resource to progress.
N14	Rapaki Street	14/09/2022	Scoping	0	None	Meet landowners onsite to determine source of flooding.
N15	Sidey Quay, Kaiapoi	14/09/2022	Scoping	0		
N16	Riverside Road, Okuku		Scoping			
N17	No.10 Road / Pattersons Road		Scoping			
N18	Northside Drive, Waikuku Beach		Scoping			

Project Reporting

Work package	Location	Date this report last updated	Stage	%age complete of stage	Progress since last reported	Planned actions
N19	Church Bush Road, Tuahiwi	14/09/2022	Scoping	0		
N20	Waikuku Beach Road, Waikuku Beach	13/09/2022	Scoping	0%	Nil - not started	Scope proposed investigation approach. Identify appropriate resource to progress.
N21	Williams Street, Kaiapoi	14/09/2022	Scoping	0		
N22	Helmore Street, Rangiora	14/09/2022	Scoping	0	Subdivision Auditor (Mike Lang) to carry out a site visit	Briefing with Caroline on background & expectations
N23	Main North Road, Woodend		Scoping			
N24	German Road, Summerhill	14/09/2022	Scoping	0		
N25	Maguires Road, Sefton	13/09/2022	Scoping	0%	Nil - not started	Ring customer to discuss and obtain further information.

Project **Reporting**

Work package	Location	Date this report last updated	Stage	%age complete of stage	Progress since last reported	Planned actions
N26	Elders Road, Clarkville		Scoping			
N27	Glenvale Drive, Kaiapoi	14/09/2022	Scoping	0		
N28	Sewell Street, Kaiapoi	14-Sep	Scoping	25	Shaun discussed with Greenspace team	Shaun & Ed Sard to meet on site 15/9 to discuss options
N29	Kennedys Hill Road, Springbank		Scoping			
N30	Bramleys Road, Tuahiwi	14/09/2022	Scoping	0		
N31	Rossiters Road, Loburn	14/09/2022	Scoping	0		
N32	Queens Avenue, Waikuku Beach	14/09/2022	Scoping	0		

FLOOD RECOVERY FORTNIGHTLY STATUS REPORT
AS AT 16-Sep-22

Fortnightly Report

Introduction

During the month of July 2022, four rainfall events occurred and the total rainfall for the month was about 4 times higher than the typical average for this time of the year. While individually these were not significant events, the cumulative monthly rainfall for the month reached record levels. Additionally the high annual rainfall we have experienced over the past 12 months means the catchment in the district are saturated catchments and groundwater levels high to the extent the resurgence channels are flowing in the Mandeville area.

The purpose of this report is to update the Utilities and Roading Committee and Community Boards on the status of the drainage and sewer service requests and further investigations related to the following flood events:

Group 1. 29 to 31 May 2021, 15 December 2021 and 12 February 2022.
Group 2. 12 July 2022, 20 July 2022, 26 July 2022 and 30 July 2022

Key messages

A total of 598 drainage service requests were received related to the rainfall events in Group 1 and total of 61 areas were then identified for further assessment. A further 685 drainage service requests and 130 sewer service requests were received related to the rainfall events in Group 2. These have now been triaged, and the result is a combined total of 143 investigations, and a further 321 Maintenance tasks.

The Flood Team, which was in the process of being disestablished following the Group 1 rainfall events, has been extended to work through the additional services requests and further investigations.

Based on the scale of additional service requests, it is anticipated that it will take at least 3-6 months to work through these investigations.

Accordingly, while almost all customers have received an initial call back, it may take some time to respond with the outcome of the investigations.

Report Format

This report will be prepared fortnightly and will include the following information
- This Dashboard showing:
  - General commentary
  - Dashboard metrics
  - Specific commentary on Key Focus Areas
- An attached traffic light report on all 143 investigations

At this stage the format is presented but has not yet been populated by each Investigator. This information will be available for the next report.

Key Metrics

Phase	As at 9 Aug	This report	Change
Triaging	0	0	0
Scoping	119	92	-27
Under Investigation	5	21	16
Review and approval	3	7	4
In Implementation	6	7	1
Completed	10	16	6
Total	**143**	**143**	

Implementation Solutions	As at 9 Aug	This report	Change
Not yet determined	121	105	-16
Physical Works FY22/23	19	27	8
Future year capex	3	6	3
O&M changes	0	3	3
No action/Customer Advice	0	2	2
Total	**143**	**143**	

Maintenance items	As at 9 Aug	This report	Change
To be started	256	256	0
Work in process	23	23	0
Completed	42	42	0
Total	**321**	**321**	

Communications update

This dashboard report and Tracking Sheet is being sent to all Elected Members.

All 685 Drainage Service requests have been contacted with an initial confirmation that the request has been received . All 130 Sewer Service Requests will be contacted with an initial confirmation next week that the request has been received

The website is being updated with a Home Page Tile so residents can access the flood recovery page more easily. Note that the website is in the process of being updated as some information is now out of date, and a version of the attached report will be included

For all live service requests we will be sending out a holding message (via email or text) in order to maintain continuous contact alongside the more specific contact with the flood team as they address each investigation

Key Focus Areas

Location	Update	Status
Kiln Place / Fairweather Crescent	Issue with backflow from the Kaikanui Stream. Removal/modifications of farm culverts is underway. Flapgates and bunds to be installed as urgent works.	
46 A Fuller Street	Issue with a low lying residence being repeatedly close to flooding. Investigation is complete and upgrades will be implemented this financial year from existing budgets.	
31 Broadway Avenue	Detailed design underway for a new pipe from Kiwi Ave Reserve to Broadway Ave. Construction works to be undertaken this summer.	
4 Swindells Road	CCTV and swale / driveway culvert maintenance work complete. Options memo currently being finalised. Design and consent in 22/23 and construct in 23/24.	
Pearson Drain	Issue with drain overtopping and causing flooding in central Oxford. Detailed investigation to commence shortly.	
11 Stalkers Road	Issue with regular flooding during periods of high groundwater and causing issue with overloading the sewer. Detailed investigations to commence shortly. Community meeting	
1838, 1840 & 1842 Cust Road	New larger soakpits will be installed next week. Solution for secondary flow to be developed.	
Ranui Mews	The installation of vents at Ranui Mews in progressing well, will be complete by the end of next week. Investigation works on the Ohoka Road sewer main to continue.	
Kairaki PS	Issue with inflow & infiltration overloading sewer. Meeting with residents held 7 September. Urgent works to address main issues in campground to commence next week.	
Cones Road / Fawcetts Road	Issue with a rural catchment causing flooding in neighbouring area. Land purchase currently being finalised for proposed diversion drain upgrade.	
Resurgence Flow, Mandeville	Groundwater levels are high and undercurrents are flowing in the Mandeville area. This is causing surface flooding issues and impacting some septic tanks. Investigations are underway	
Vicenza Drive / Bradleys Road	Issue with overloaded drains and water races causing issues with surface flooding & septic tanks. Culvert upgrade to be undertaken on Bradleys Road.	
Flannigans Drain	Issue with overloaded drain causing flooding on neighbouring properties. Investigation and site inspection is underway.	

WAIMAKARIRI DISTRICT COUNCIL

REPORT FOR INFORMATION

FILE NO and TRIM NO:	SEW-12 / 220816140839
REPORT TO:	UTILITIES AND ROADING COMMITTEE
DATE OF MEETING:	27 September 2022
AUTHOR(S):	Kalley Simpson, 3 Waters Manager Libica Hurley, Project Planning and Quality Team Leader
SUBJECT:	Eastern Districts Sewer Scheme and Oxford Wastewater Treatment Plant Annual Compliance Monitoring Reports 2021 – 2022

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

General Manager | Acting Chief Executive

1. SUMMARY

1.1. The purpose of this report is to update the Utilities and Roading Committee on the consent compliance performance of the Eastern District Sewer Scheme (EDSS) and Oxford Sewer Scheme for the 2021-2022 reporting year (1 July 2021 to 30 June 2022).

1.2. The Eastern District Sewer Scheme (EDSS) Ocean Outfall operates under resource consent CRC041162.2, in conjunction with various other consents that enable the wastewater schemes operation. Consent compliance for monitoring data of this nature is determined on two levels:

- Has the frequency of monitoring met the consent requirements
- Does the monitoring data comply with any numerical limits specified in the consent conditions

1.3. The Oxford Sewer Scheme is operated under three Canterbury Regional Council (CRC) resource consents being CRC961013, CRC144561 and CRC184787. These consents do not require an annual compliance report however a report has been prepared for the first time as good practice.

1.4. Compliance was not achieved for all EDSS or Oxford Sewer Scheme consent conditions during the 2021-2022 monitoring period. The full compliance was not achieved for the EDSS due to a small number of missed samples and administrative issues. All samples that were tested for the Ocean Outfall discharge were fully compliant. Environment Canterbury (ECan) are currently reviewing the Annual Compliance Monitoring Reports submitted by staff for 2021-2022 period, on 31 August 2022. A compliance report will be issued by ECan following the completion of their review.

Attachments:

i. Eastern Districts Sewer Scheme – Annual Compliance Monitoring Report 2021-2022 (Record No. 220729129759)
ii. Oxford Sewer Scheme – Annual Compliance Monitoring Report 2021-2022 (Record No. 220809135783)

2. RECOMMENDATION

THAT the Utilities and Roading Committee:

(a) **Receives** Report No. 220816140839.

(b) **Notes** that monitoring of the Eastern Districts Ocean Outfall discharge presented administrative non-compliances due to sampling errors within the 2021-2022 monitoring period.

(c) **Notes** that the Eastern Districts Ocean Outfall discharge was compliant for all samples that were tested and there were no significant effects attributable to discharge from the Ocean Outfall.

(d) **Notes** that the Eastern Districts Sewer Scheme – Annual Compliance Monitoring Report 2021-2022 is currently being reviewed by Environment Canterbury.

(e) **Notes** that although not required, the Oxford Sewer Scheme - Annual Monitoring Report 2021-2022 was provided to Environment Canterbury in good practice. Non-compliances were observed by staff due to weather events. Environment Canterbury are currently reviewing the report.

(f) **Circulates** this report to Council for their information.

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

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

3. BACKGROUND

3.1. The purpose of this report is to update the Utilities and Roading Committee on the consent compliance performance of the Eastern District Sewer Scheme and Oxford Sewer Scheme for the 2021-2022 reporting year.

Eastern District Sewer Scheme

3.2. The treatment facilities at the Rangiora, Kaiapoi, Woodend and Waikuku Beach Wastewater Treatment Plants (WWTP's) discharge into a pipeline (the Ocean Outfall), that discharges into Pegasus Bay between Pines/Kairaki Beach and Woodend Beach. These treatment plants and the Ocean Outfall comprise the Eastern Districts Sewer Scheme (EDSS). Figure 1 below geographically describes the scheme. The EDSS operates under a number of resource consents from the Canterbury Regional Council. The focus of this report is CRC041162.2, the consent that authorises the discharge of treated effluent into the coastal marine environment from the Ocean Outfall.

Figure 1: Eastern District Sewer Scheme Map

Oxford Sewer Scheme

3.3. The Oxford Sewer Scheme operates a wastewater treatment plant (WWTP) at Oxford, which serves approximately 900 properties. The WWTP is located on the north side of the Eyre River on High Street with an irrigation disposal field location on the south side of the Eyre River on Woodstock Road. Figure 2 below describes these locations geographically.

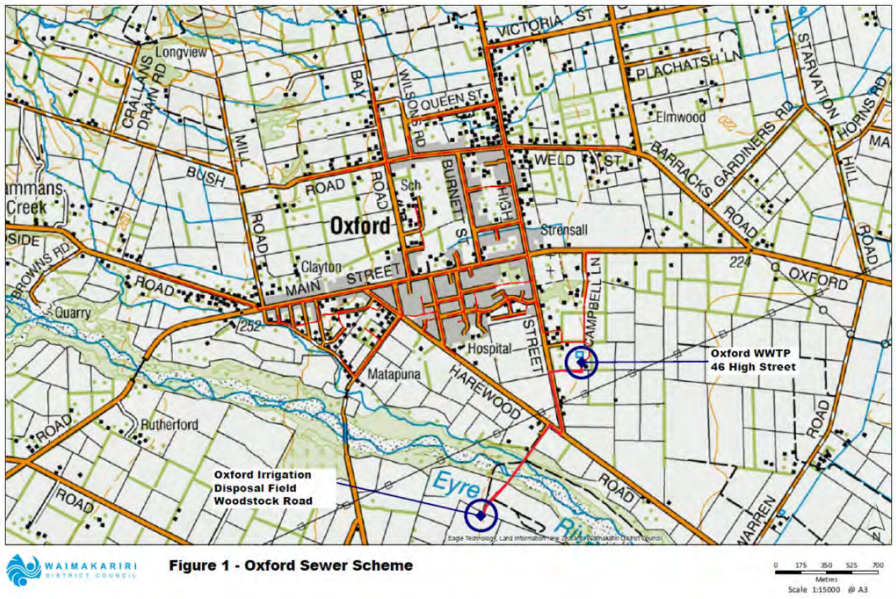


Figure 2: Oxford Sewer Scheme Map

4. ISSUES AND OPTIONS

4.1. Eastern District Ocean Outfall

4.1.1. Table 1 provides a summary of compliance for each consent utilised to operate the Eastern Districts Ocean Outfall.

Table 1: Summary of Eastern District Ocean Outfall Consent Compliance 2021/22

Consent	Activity	Reporting	Compliance
CRC041162.2	To discharge treated sewerage effluent into coastal marine area from sub-aqueous ocean outfall	Refer to Section 2.0 of this report	Non-compliant – sampling missed
CRC041049	To discharge treated sewage effluent to the infiltration wetland and to ground water via seepage at the Kaiapoi WWTP	Refer to Section 3.0 of this report	Full compliance
CRC168391	To discharge treated sewage effluent via seepage onto land (Woodend)	Refer to Section 4.0 of this report	Full compliance
CRC145027	To discharge dewatered sludge removed from a wastewater pond to land (Rangiora)	Refer to Section 6.0 of this report	Full compliance
CRC031724	To discharge groundwater from subsoil drains into the marine area of Jockey Baker Creek	Refer to Section 5.0	Full Compliance (no discharge)
CRC168388	To discharge contaminants to air (Woodend)	No reporting required No events to report	Full Compliance
CRC950610	To discharge contaminants to air (Kaiapoi)	No reporting required No events to Report	Full Compliance
CRC962560	To discharge contaminants to air (Waikuku)	No reporting required No events to Report	Full Compliance
CRC030917	To discharge contaminants, via seepage, from Rangiora STP to land	No reporting required	Full Compliance
CRC041163	For the erection, placement and maintenance of an ocean outfall pipeline and temporary structures, including a trestle structure and sheet piling for the purpose of constructing an ocean outfall, within the coastal marine area	No reporting required	Full Compliance
CRC154176	To discharged contaminants to land (Kaiapoi)	No reporting required	Full Compliance
CRC168390	To use land for storing, treating and discharging human effluent (Woodend)	No reporting required	Full Compliance
CRC173124	To discharge contaminants (odour) to air (Rangiora)	Section 7.0	Full Compliance

4.2. ESSS non-compliances – CRC041162.2

4.2.1. Condition 3 – 1,382 m3/day discharge limit exceeded twice in February 2022, due to wet weather events.

4.2.2. Condition 9(c) - Mercury was not monitored during the period and other metals were monitored once instead of twice due to changes to the sampling and testing approach. The samples were taken but not tested. Improvements are being implemented to ensure sampling and testing is completed in the future.

4.2.3. Conditions 11 and 12(b) – Holding pond spilled for 2 hours in February 2022, due to wet weather events.

4.2.4. Condition 13 – Holding pond retention limit (10 days) was exceeded twice in August 2021 and February 2022, again due to wet weather events.

4.3. Oxford Sewer Scheme

4.3.1. Table 2 provides a summary of compliance for each consent utilised to operate the Oxford Sewer Scheme.

Table 2: Summary of Oxford Sewer Scheme Consent Compliance 2021/22

Consent	Activity	Reporting	Compliance
CRC961013	To discharge contaminants to air	Refer to Section 2.0 of this report	Fully compliant
CRC144561	Land use consent for the establishment of a sewage storage basin	Refer to Section 3.0 of this report	Non-compliant
CRC184787	To discharge contaminant into land to water	Refer to Section 4.0 of this report	Non-compliant, due to wind damage to one of the irrigators and issues with the UV disinfection unit

4.4. **Oxford Sewer Scheme non-compliances**

4.4.1. Wet Weather Exceedances

4.4.2. Condition 3 – 1,382m3/day discharge limit exceeded twice in February 2022.

4.4.3. Conditions 11 and 12(b) – Holding pond spilled for 2 hours in February 2022.

4.4.4. Condition 13 – Holding pond retention limit (10 days) was exceeded twice in August 2021 and February 2022.

4.4.5. Irrigator Issues

4.4.6. Condition 12 – Nitrogen loading exceeded limit of 200kg-N/ha/year as only one irrigator was operating for 9 months of the period. The Western irrigator suffered wind damage in September 2021. A replacement irrigator is currently being installed and will be operational by mid-September 2022. Temporary measures have been implemented in the interim although the irrigation fields are heavily saturated due to the recent high rainfall.

4.4.7. Condition 14 – Ponding observed at the irrigation field.

4.4.8. Condition 16 – Location of discharge is not effectively recorded.

4.5. **Implications for Community Wellbeing**

4.6. Despite non-compliances there are no known implications on community wellbeing by the issues and options that are the subject matter of this report.

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

5. COMMUNITY VIEWS

5.1. **Mana whenua**

5.2. Te Ngāi Tūāhuriri hapū may be interested in the findings of the Ocean Outfall Compliance Report 2021/22, due to their relationship with the coastal area used for kai moana/mahinga kai gathering. The recommendations of this report include circulation of this report and the attachments to Te Ngāi Tūāhuriri Rūnanga for their information.

5.3. It is also intended to engage with Te Ngāi Tūāhuriri Rūnanga via Mahaanui Kurataiao Limited regarding the development of a cultural monitoring programme for the ocean outfall.

5.4. **Groups and Organisations**

5.5. Council staff meet regularly with residents adjacent to the Woodend WWTP, who are interested in operations and performance of this plant. A copy of the Annual Compliance Monitoring Report can be made available to them for information purposes.

5.6. There have also been a number of members of the public who have been interested in the performance of the Kaiapoi WWTP and have raised concerns in the past with the Waimakariri Zone Committee. A copy of the Annual Compliance Monitoring Report will be made provided to Waimakariri Zone Committee for information purposes.

5.7. Te Kōhaka o Tūhaitara Trust manages the Tūhaitara Coastal Park where the ocean outfall is located.

5.8. There are no other groups and organisations likely to be affected by, or to have a direct interest in the subject matter of this report. There has been no discussions or consultation with any group as part of this compliance monitoring report.

5.9. **Wider Community**

5.10. The wider community is not likely to be affected by the subject matter of this report as the Ocean Outfall system was fully compliant. The community have not been consulted as part of this monitoring.

6. OTHER IMPLICATIONS AND RISK MANAGEMENT

6.1. **Financial Implications**

6.2. There are not financial implications of the decisions sought by this report. However it should be noted that on-going non-compliances can result in increased monitoring costs and action being taken against the Council (i.e. abatement notice). Such instances can result in loss of confidence from the public as well as adverse effect to Council's reputation.

6.3. The non-compliances within the EDSS related to sampling and testing errors, processes have been put into place to avoid this issue reoccurring.

6.4. The Oxford Sewer Scheme non-compliances related to equipment failure and wet weather exceedances, once repaired the plant will be fully compliant.

6.5. **Sustainability and Climate Change Impacts**

6.6. The recommendations in this report do not have sustainability and/or climate change impacts.

6.3 **Risk Management**

6.7. There are not risks arising from the adoption/implementation of the recommendations in this report.

6.3 **Health and Safety**

6.8. There are not health and safety risks arising from the adoption/implementation of the recommendations in this report.

7. CONTEXT

7.1. **Consistency with Policy**

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

7.3. **Authorising Legislation**

7.4. Not applicable.

7.5. **Consistency with Community Outcomes**

7.6. The Council's community outcomes are relevant to the actions arising from recommendations in this report. Managing the Council's Eastern Districts Sewer Scheme in a manner is that compliance with our Canterbury Regional Consents ensures;

- There is a safe environment for all, and
- Core utility services are provided in a timely, sustainable, and affordable manner

7.7. **Authorising Delegations**

7.8. This report is for information only as the compliance report has already been submitted to Environment Canterbury for review, therefore no actions requiring delegated authority are recommended.

REPORT

Eastern Districts Sewer Scheme – Annual Compliance Monitoring Report 2021 - 2022

Waimakariri District Council

August 2022

Table of Contents

APPENDICES

LIST OF ABBREVIATIONS AND UNITS

ammoniacal-N	ammoniacal nitrogen
BODs	five-day biochemical oxygen demand
˚C	degrees Celsius
cfu/100 mL	colony forming units per 100 mililitres
CRC	Canterbury Regional Council
DIN	dissolved inorganic nitrogen
DO	dissolved oxygen
DRP	dissolved reactive phosphorus
EDSS	Eastern Districts Sewer Scheme
EDS	Eastern Districts Sewer
E. coli	*Escherichia coli*
ESR	Institute of Environmental Science and Research
g/m^3	grams per cubic metre
iu	infectious units
km	kilometre
LOESS	local polynomial regression fitting
L/s	litres per second
MDL	method detection limit
m	metres
mL	millilitres
m^3	cubic metres
m^3/day	cubic metres per day
N	number of samples
nitrate-N	nitrate nitrogen
NIWA	National Institute of Water and Atmospheric Research
PCB	polychlorinated biphenyls
PAH	polycyclic aromatic hydrocarbons
pfu	plaque forming units
SCADA	supervisory control and data acquisition

TN	total nitrogen
TP	total phosphorus
TSS	total suspended solids
UV	ultraviolet
WDC	Waimakariri District Council
WWTP	wastewater treatment plant

1. INTRODUCTION

1.1. Background

Waimakariri District Council (WDC) operates wastewater treatment plants (WWTPs) at Rangiora, Kaiapoi, Woodend and Waikuku Beach, all north of Christchurch. In 2006, the treatment facilities at each WWTP were upgraded, with the flows from these four locations combined for discharge to the coastal marine environment via an ocean outfall located in Pegasus Bay. The upgraded system and ocean outfall, shown in Figure 1, is known as the Eastern District Sewer Scheme (EDSS).

The EDSS operates under a number of resource consents from Canterbury Regional Council (CRC) also known as Environment Canterbury (ECan), which are listed in Table 1 along with their respective reporting requirements and level of compliance for the 2021/22 monitoring year.

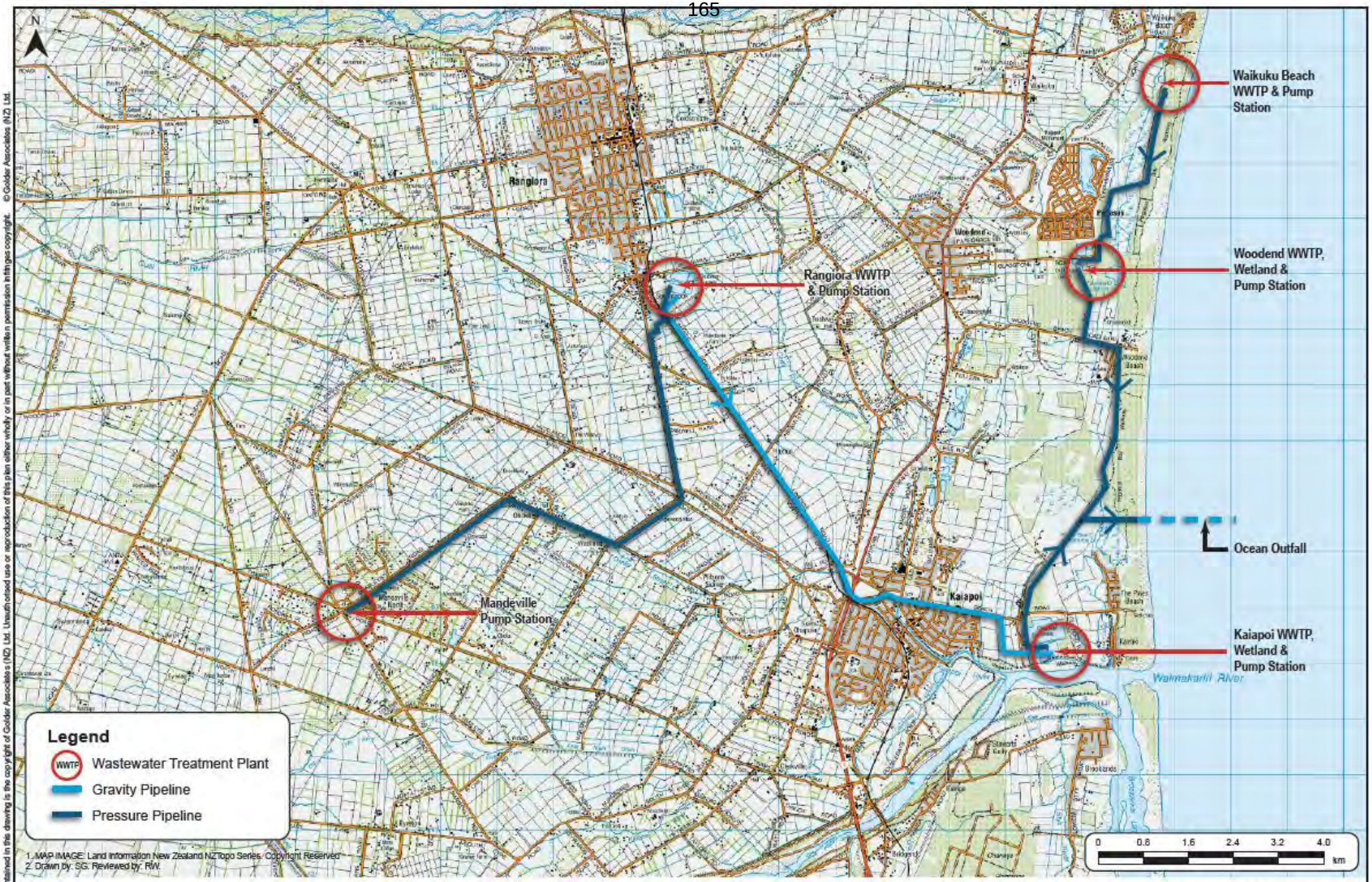
Table 1: Eastern District Sewer Scheme Resource Consents

Consent	Activity	Reporting	Compliance
CRC041162.2	To discharge treated sewerage effluent into coastal marine area from sub-aqueous ocean outfall	Refer to Section 2.0 of this report	Non-compliant – sampling missed
CRC041049	To discharge treated sewage effluent to the infiltration wetland and to ground water via seepage at the Kaiapoi WWTP	Refer to Section 3.0 of this report	Full compliance
CRC168391	To discharge treated sewage effluent via seepage onto land (Woodend)	Refer to Section 4.0 of this report	Full compliance
CRC145027	To discharge dewatered sludge removed from a wastewater pond to land (Rangiora)	Refer to Section 6.0 of this report	Full compliance
CRC031724	To discharge groundwater from subsoil drains into the marine area of Jockey Baker Creek	Refer to Section 5.0	Full Compliance (no discharge)
CRC168388	To discharge contaminants to air (Woodend)	No reporting required No events to report	Full Compliance
CRC950610	To discharge contaminants to air (Kaiapoi)	No reporting required No events to Report	Full Compliance
CRC962560	To discharge contaminants to air (Waikuku)	No reporting required No events to Report	Full Compliance
CRC030917	To discharge contaminants, via seepage, from Rangiora STP to land	No reporting required	Full Compliance
CRC041163	For the erection, placement and maintenance of an ocean outfall pipeline and temporary structures, including a trestle structure and sheet piling for the purpose of constructing an ocean outfall, within the coastal marine area	No reporting required	Full Compliance

CRC154176	To discharged contaminants to land (Kaiapoi)	No reporting required	Full Compliance
CRC168390	To use land for storing, treating and discharging human effluent (Woodend)	No reporting required	Full Compliance
CRC173124	To discharge contaminants (odour) to air (Rangiora)	Section 7.0	Full Compliance

1.2. Report Scope

The scope of this report fulfils the reporting requirements of consents issued to WDC by ECan for the purpose of managing and administering the EDSS, these include; CRC041162.2, CRC041049, CRC168391, CRC173124 and CRC145027. These consents require an annual monitoring report be submitted to Environment Canterbury. The reports are required to be submitted variously between 31 July and 31 August each year. However, a combined report for all four resource consents with a due date of 31 August has been agreed between WDC and ECan.



1. MAP IMAGE: Land Information New Zealand NZTopo Series. Copyright Reserved.
2. Drawn by: SG. Reviewed by: RW.

GOLDER

EASTERN DISTRICT SEWER SCHEME

OCTOBER 2018

PROJECT 1478107201

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2. CRC041162.2 – DISCHARGE FROM OCEAN OUTFALL

2.1. Overview

Consent compliance for the period 1 July 2021 through to 30 June 2022 ('the monitoring period'), has been assessed by WDC. This report includes comparison with data reported in previous monitoring periods reported under the EDSS resource consents.

2.2. Condition 2 – Discharge Volume and Rate

Condition 2 states:

"The discharge shall not exceed a rate of 660 litres per second or 57,000 cubic metres per day."

Discharge volumes to the ocean outfall were recorded by a supervisory control and data acquisition (SCADA) system, which transmits via a broadband connection to an InTouch data visualisation system. This system is more reliable than the radio link previously used to download outflow data. The meter is still read manually on at least a monthly basis to provide a backup data record in the event the SCADA system fails.

Daily discharge volumes for the 2021/22 period are plotted in Figure 2. Total discharge volumes did not exceed 20,000 m^3/day, and remained well below the consent limit. Data gathered since July 2021 is graphed in Figure 2. The maximum daily instantaneous discharge rates for the 2021/22 monitoring period are illustrated in Figure 3 below.

The spike in outfall volumes in December 2021 and February 2022 shown in Figure 3 are a result of the heavy rainfall events that Waimakariri experienced on the 15th December 2021 and 12th February 2022.

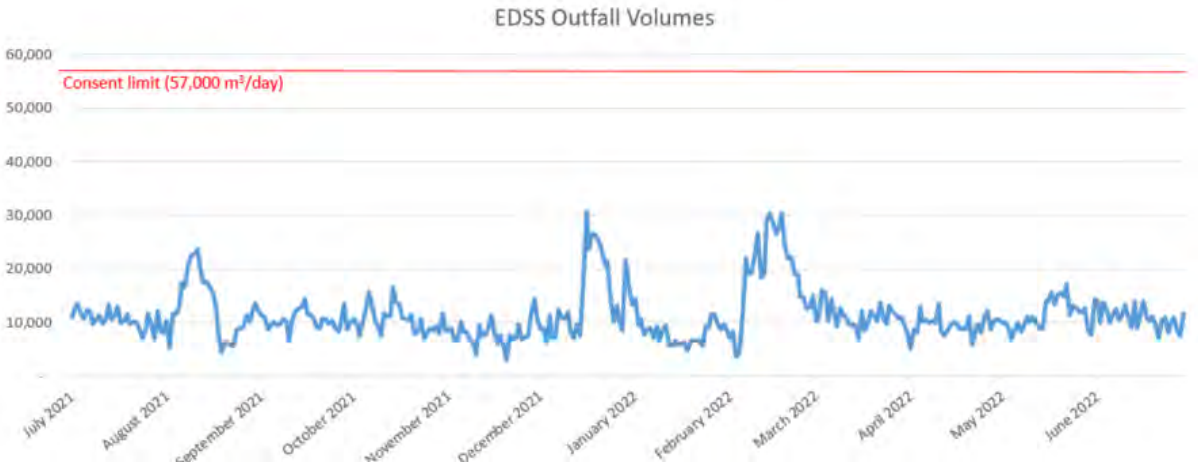


Figure 2. Daily discharge volumes to ocean outfall between July 2021 and June 2022

Figure 3: Maximum instantaneous daily discharge rate to ocean outfall between July 2021 and June 2022

Figures 2 and 3 show that the ocean outfall daily and instantaneous discharge volumes remained consistently below the respective limits of 57,000 m³/day and 660 L/s, during the 2021/22 monitoring period. As a result compliance with Condition 2 was met in full.

2.3. Conditions 9 – 12: Ocean Outfall Pipeline Discharge Quality

2.3.1. Overview of monitoring and compliance requirements

Condition 9

Condition 9 states the following:

> *"A single grab sample shall be taken from the ocean outfall pipeline at the frequencies noted in this condition and the same shall be analysed for the identified contaminants at the frequencies noted for each contaminant. Report schedules shall be prepared recording the results of such analyses. Grab sample locations and the times at which the grab samples are taken shall be recorded and included in the reporting schedules. The consent holder shall retain the reporting schedules.*

a) *Weekly*
   - i. *pH -reported as pH units*
   - ii. *Dissolved oxygen - reported as % saturation*
   - iii. *Temperature - reported as °C*
   - iv. *Five-day biochemical oxygen demand - reported as g O/m³*
   - v. *Filtered five-day biochemical oxygen demand - reported as g 0/ m³*
   - vi. *Total suspended solids - reported as g/ m³*
   - vii. *Dissolved inorganic nitrogen - reported as g N/ m³*
   - viii. *Ammoniacal nitrogen - reported as g N/ m³*
   - ix. *Dissolved reactive phosphorus - reported as g P/ m³*
   - x. *Faecal coliforms - reported as no./100ml*
   - xi. *Enterococci - reported as no./100ml*
   - xii. *Escherichia coli - reported as no./100ml.*

b) *Monthly*
   - i. *Total phosphorus – reported as g P/ m³*
   - ii. *Total nitrogen – reported as g N/ m³*

c) *Three monthly for the first two years and then six monthly thereafter*
   - i. *Arsenic - reported as g/ m³*
   - ii. *Cadmium - reported as g/ m³*
   - iii. *Chromium - reported as g/ m³*
   - iv. *Copper - reported as g/ m³*

v. *Lead - reported as g/ m^3*
vi. *Nickel - reported as g/ m^3*
vii. *Zinc - reported as g/ m^3*
viii. *Mercury - reported as g/ m^3*

All metal analysis shall be for total metals only.

d) Three Monthly for the first two years and then annually thereafter
i. *Human Enterovirus. (no./10l)*
ii. *Human Adenovirus. (no./10l).*

e) Annually
i. *Thermophilic campylobacter spp (cfu/l)*
ii. *Salmonella spp (no./l)*
iii. *Organo chlorine pesticides – reported as g/ m^3*
iv. *Polychlorinated biphenyls – report as g/ m^3*
v. *Polycyclic aromatic hydrocarbons – reported as g/ m^3*

The initial two year monitoring period began in May 2006 and concluded in April 2008. Since then, metals have been analysed at six monthly intervals, with viral and bacterial monitoring completed annually, in line with Condition 9 above.

Condition 11

Condition 11 requires that monitoring results for five-day biochemical oxygen demand (BODs), total suspended solids (TSS) and ammoniacal nitrogen (ammoniacal-N) are compared with the following limits:

> *"Based on the weekly sampling required by Condition (9) of this consent, and taken over each 26 week period commencing on the 1st of May, and the 1st of November of each year during the term of this consent, no more than 16 values in each 26 week period shall exceed the following standards for each of the named contaminants [Table 3]:"*

Table 3: Condition 11 limit of resource consent CRC041162.2.

Contaminant	Unit	Standard
BOD5 (filtered)	g/m^3	25
Total suspended solids	g/m^3	200
Ammoniacal nitrogen	g/m^3	27

Condition 12

Condition 12 requires that faecal indicator bacteria monitoring results are compared with prescribed limits:

> *"Based on the weekly sampling required by Condition (9) of this consent, over each Summer period (November - February inclusive) and over each Winter period (March - October inclusive), no more than six values from eight consecutive samples, shall exceed the following standard values and no more than two values from eight consecutive samples, shall exceed the higher value for enterococci and faecal coliforms /Table 4/."*

Table 4: Condition 12 limits of resource consent CRC041162.2

Contaminant	Unit	Standard value		Higher value	
		Summer	Winter	Summer	Winter
Enterococci	No./100mL	500	500	1,500	1,500
Faecal coliforms	No./100mL	1,000	9,000	5,000	20,000

2.3.2. Physiochemical

The results of weekly physicochemical monitoring at the outfall structure between July 2021 and June 2022 are summarised in Table 5, alongside results from the previous monitoring period (June 2020 – June 2021). These results are discussed by parameter below. Physiochemical monitoring requirements were met during the 2021/22 period.

Table 5: Physiochemical water quality in the ocean outfall discharge

Parameter	July 2021 to June 2022			June 2020 to June 2021		Consent Limit
	Samples	Median	Range	Median	Range	
Laboratory pH (unit less)	49	7.9	7.6 - 9.4	8	7.7 – 9.6	
Field pH (unit less)	52	7.12	6.4 - 8.45	7.71	6.66 - 9.13	
DO (g/m^3)	56	7.83	0 - 14.03	9.095	0.02 – 15.4	
Temperature (˚C)	56	14.15	3.1 - 25.6	14.5	4.0 – 22.8	
TSS (g/m^3)	49	40	8 - 91	48	11 - 149	200

pH

Laboratory and field measured pH in 2021/22 were reasonably comparable with that seen in the previous monitoring period (Figure 4). The maximum value of TSS was significantly less this period. Table 5 shows that the median and range of results over the two periods were relatively comparable. There is no consent limit for pH.

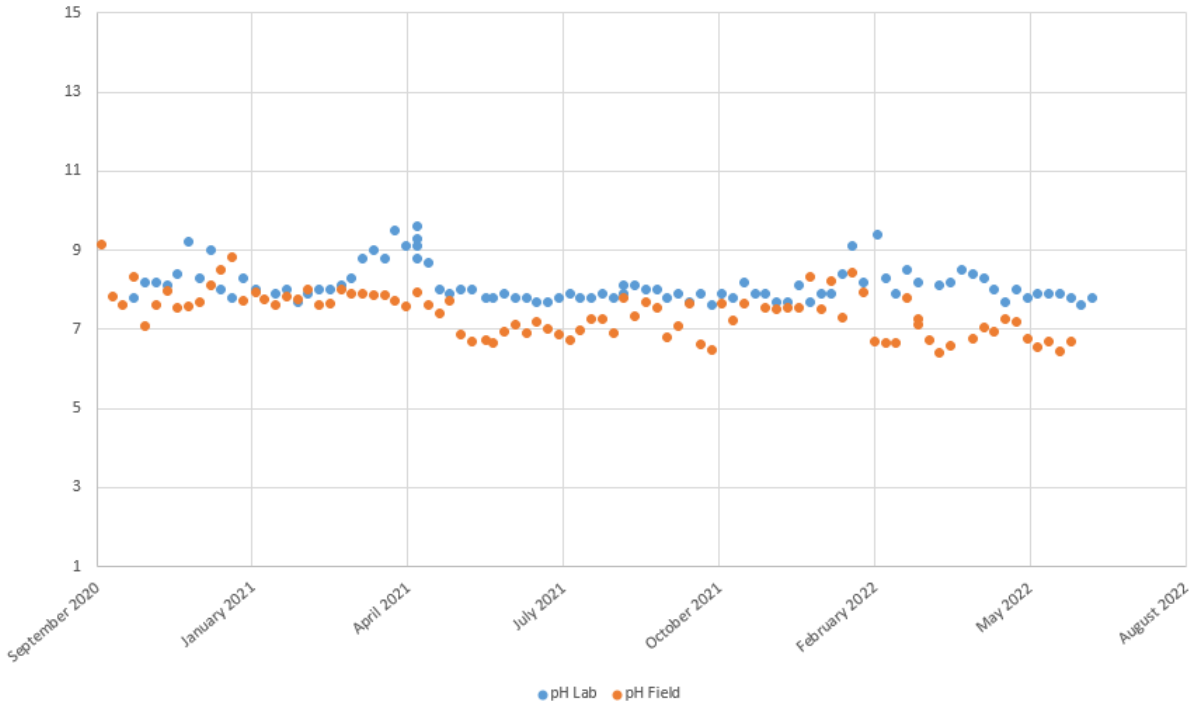


Figure 4: pH of the ocean outfall discharge between September 2020 and June 2022

Dissolved oxygen

Dissolved oxygen (DO) concentrations were lower than normal between July 2021 and June 2022 (Figure 5), as described by the median in Table 5 (7.83 g/m^3 compared to 9.095 g/m^3 for the previous period). The DO levels in winter months over the 2021/22 were higher than what has been historically recorded. The DO measurements are taken with handheld meters that are calibrated monthly. The procedure requires testing to be undertake at a certain time of the day and also for probes to be inserted about 300mm into the ponds to ensure that realistic DO readings are obtained. Measures have been put in place and will be continually reviewed to ensure that the DO levels reported are accurate and representative of the actual DO levels in the ponds. The DO was sampled weekly at the outfall structure as required under Condition 9. There is no consent limit for DO.

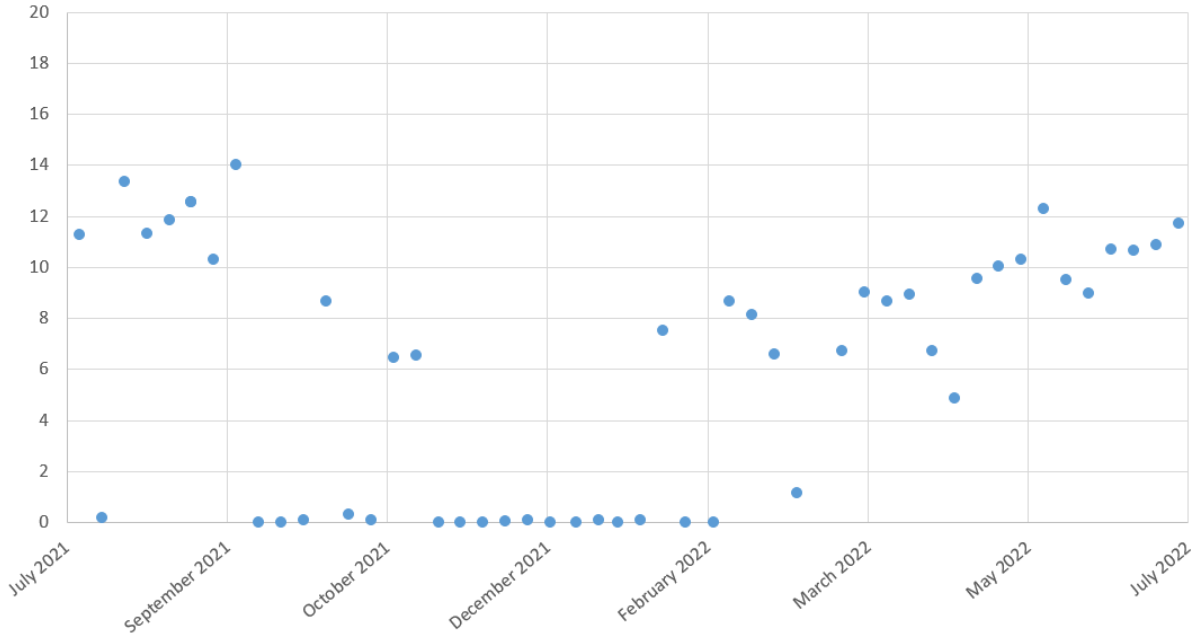


Figure 5. Dissolved oxygen concentrations in the ocean outfall discharge between July 2021 and June 2022

Temperature

Temperature data showed typical seasonal variation (Figure 6). During the 2021/22 monitoring period, the lowest temperature (3.1 °C) was recorded in May 22, while the highest temperature (25.6 °C) was recorded in February 2022. This is higher than last years' peak of 22.8 °C in February also. The temperature was sampled weekly at the outfall structure as required under Condition 9. There is no consent limit for temperature.

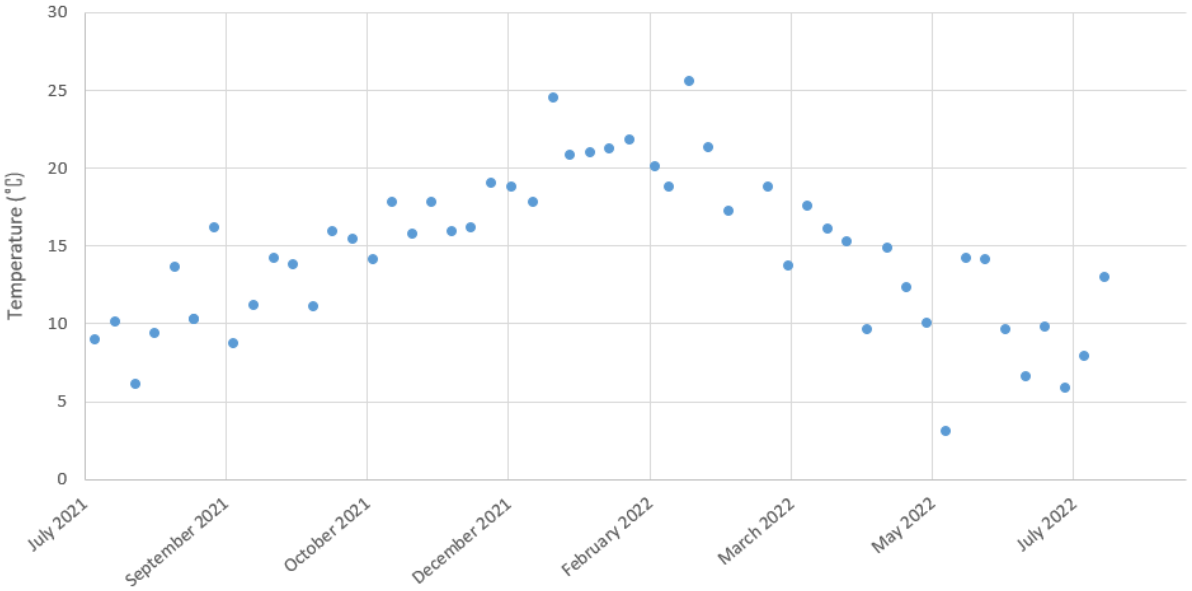


Figure 6. Temperature of the ocean outfall discharge between *July 2021 and June 2022*

Total suspended solids

There was no exceedance of the consent limit for TSS (200 g/m^3) over the 2021/22 monitoring period (Figure 7), with the maximum reading being 91 g/m^3 which is well below this allowance. Therefore, full compliance was achieved for Condition 11 of the resource consent, which allows up to 16 exceedances in each 26-week period of the current monitoring period. Although the maximum was higher than that recorded last monitoring period, on average the years were very similar (both approx. 55). In general, the TSS concentrations displayed consistent quality. The higher TSS results recorded are related to times of high algal numbers in the treatment ponds.

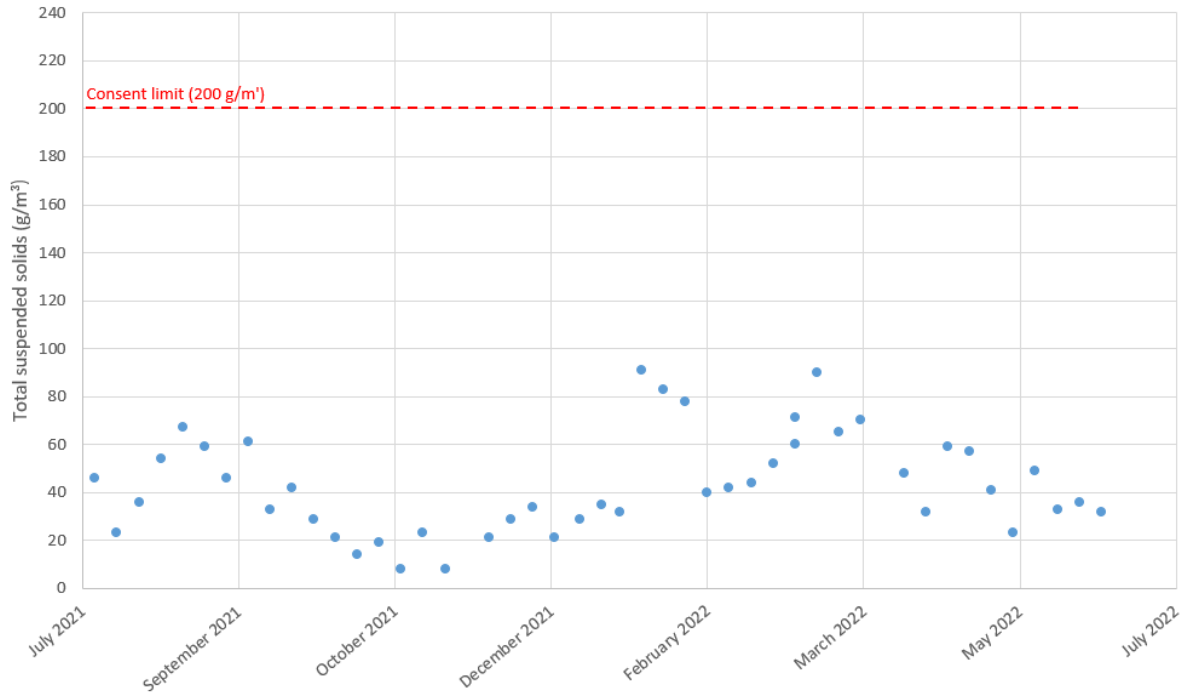


Figure 7. Total suspended solids in the ocean outfall discharge between July 2021 and June 2022

2.3.3. Biochemical oxygen demand

Biochemical oxygen demand (BOD) results for the 2021/22 monitoring period were similar to those recorded during the 2020/21monitoring period (Table 6), ranging from 10 g O^2/m^3 to 39 g O^2/m^3

The soluble BOD results were higher in the 2021/22 monitoring period compared to the previous period, but still well within the consent limit. A summary of BOD results from the ocean outfall discharge is provided in Table 6.

Table 6: Biochemical oxygen demand (g O_2/m^3) in the ocean outfall discharge

Species	July 2021 to June 2022			July 2020 to June 2021			Consent Limit
	Samples	Median	Range	Samples	Median	Range	
BOD_5 (g O2/m)	49	21	10 - 39	54	22	4-47	
Soluble BOD5 (g O2/m)	53	3	2 - 18	50	4	2-14	25

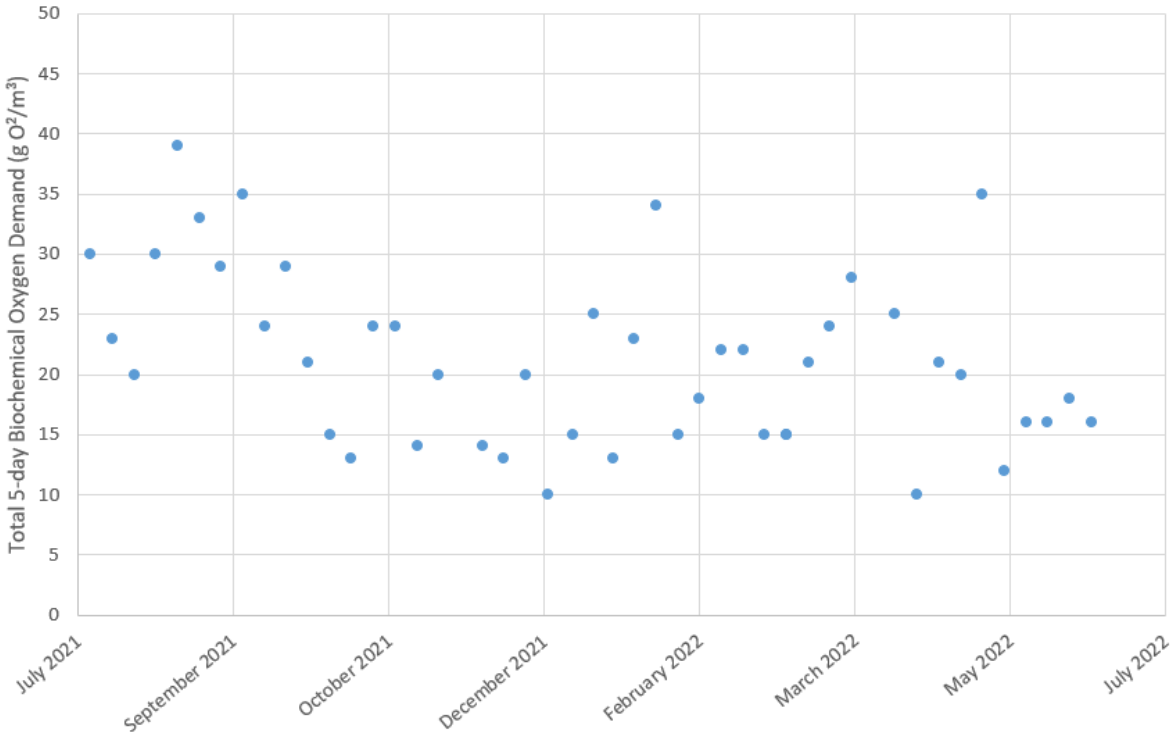


Figure 8: Five-day biochemical oxygen demand of the ocean outfall discharge between July 2021 and June 2022

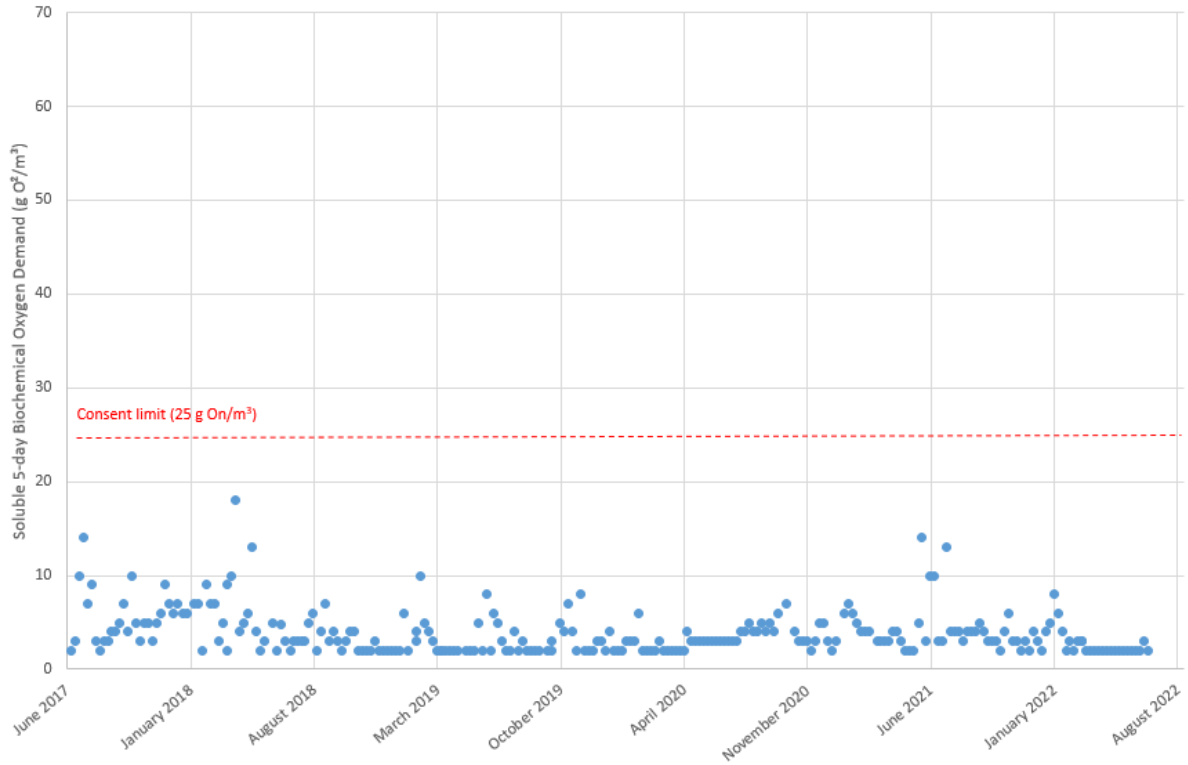


Figure 9. Soluble five-day biochemical oxygen demand of the ocean outfall discharge between July 2017 and June 2022

2.3.4. Nutrients

Condition 9 requires dissolved inorganic nitrogen (DIN), ammoniacal-N and dissolved reactive phosphorus (DRP) to be measured weekly. Total nitrogen (TN) and total phosphorus (TP) are required to be measured monthly. The frequency of monitoring prescribed by Condition 9 was met.

Table 7: Nutrient concentrations (g/m^3) in the ocean outfall discharge.

Parameters	July 2021 to June 2022			July 2020 to June 2021			Consent Limit
	N	Median	Range	N	Median	Range	
Dissolved inorganic nitrogen	49	12.8	1.07 - 30	54	7.8	0.047-22	
Ammoniacal-N	49	11.6	0.082 - 30	54	5.15	0.018-21	27
Total nitrogen	16	17	6.1 - 30	23	11.2	6.3-28	
Dissolved reactive phosphorus	49	4	1.37 - 9.2	54	4.55	0.94-9.5	
Total phosphorus	16	5	3.2 - 9.7	25	4.5	1.58 - 7.8	

Note: * No more than 16 values to exceed limit in the 26-week period beginning 1 May and 1 November. N: number of samples.

The dissolved inorganic nitrogen results shown in Figure 10 below, indicate a slight decrease throughout the year. Generally since early 2017 DIN has been trending down, although is cyclic. There is no consent limit for DIN.

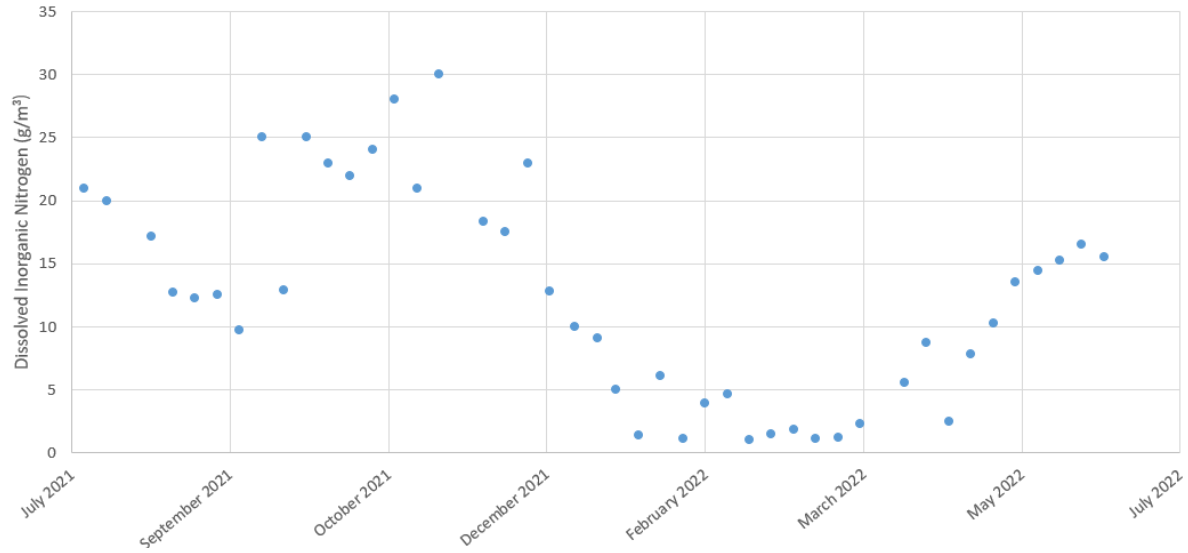


Figure 10. Dissolved inorganic nitrogen concentrations in ocean outfall discharge between July 2021 and June 2022

In general the ammoniacal-N (NH_4) levels have increased at their peak compared to the 2020/21 monitoring period and years prior as shown in Figure 11. In October 2021 there were 2 occasions that exceeded the consent limit of 27 g/m^3(being 28 and 30g/m^3 respectively). Condition 11 allows up to 16 exceedances in each 26-week period. Therefore compliance with this condition was achieved.

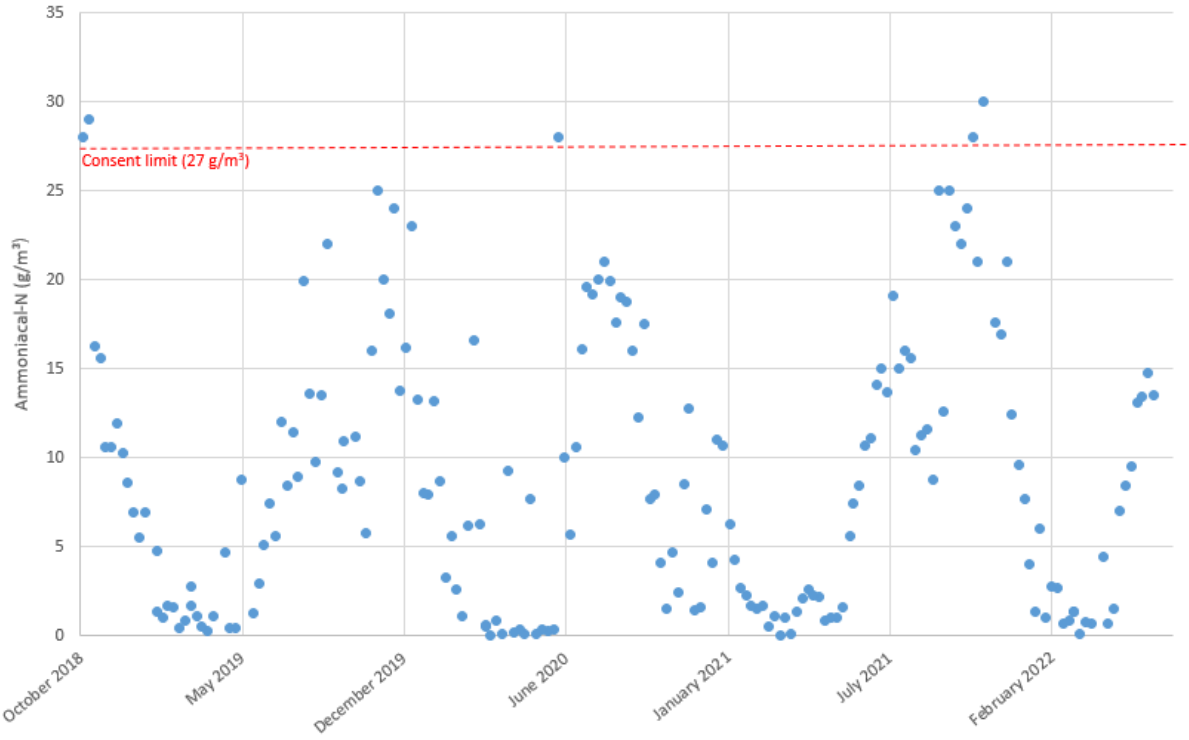


Figure 11. Ammoniacal-N concentrations in the ocean outfall discharge between July 2021 and June 2022

Total nitrogen (TN) concentrations over the 2021/22 monitoring period show similar trending to the previous monitoring period (Figure 12). There is no consent limit for TN.

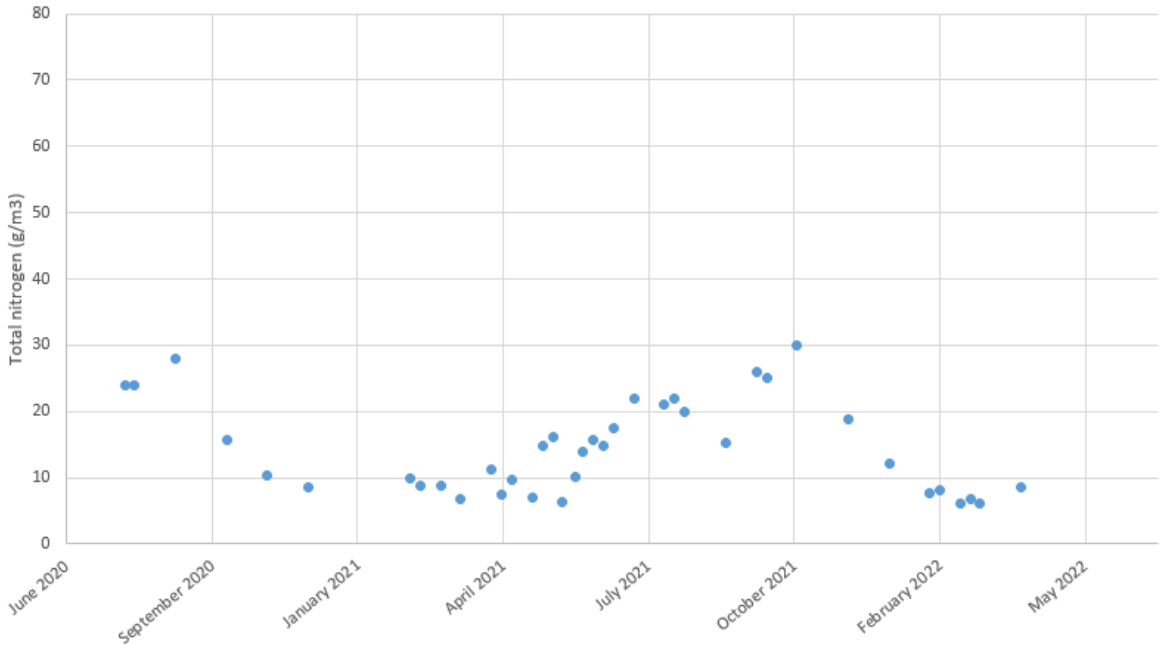


Figure 12. Total nitrogen concentrations in ocean outfall discharge between July 2020 and March 2022

For Total Nitrogen and Total Phosphorus samples were collected at the appropriate times but were not tested due to an error between Council staff and the lab. Measures have now been put in place to ensure this doesn't happen again and that the correct paperwork is provided. The samples were unable to be retrospectively tested upon realising the error.

The monitoring results for total phosphorus (TP) and dissolved reactive phosphorous (DRP) are shown in Figures 13 and 14. The pond performance and algae species and numbers remained stable during the 2021-2022 period. Most of the phosphorus was present in the dissolved form (DRP). There are no consent limits for DRP or TP. The median for 2021/22 period was 18.8 g/m^3.

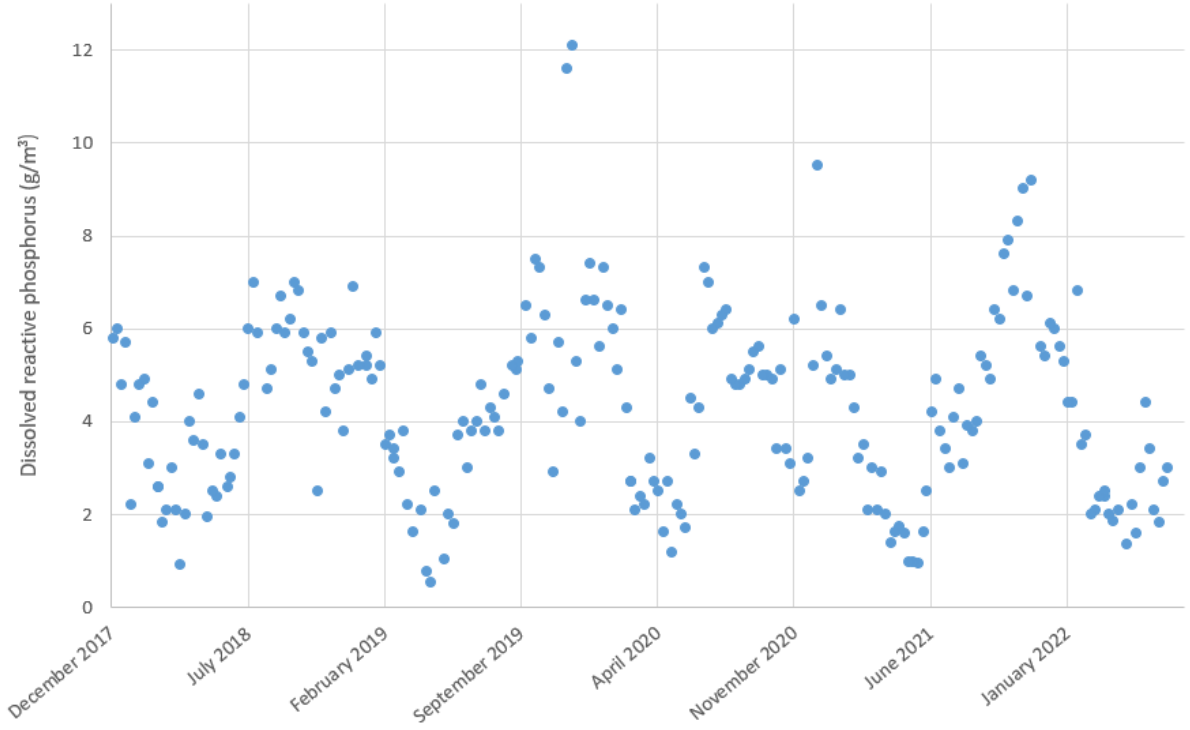


Figure 13. Dissolved reactive phosphorus concentrations in the ocean outfall discharge from December 2017 to June 2022

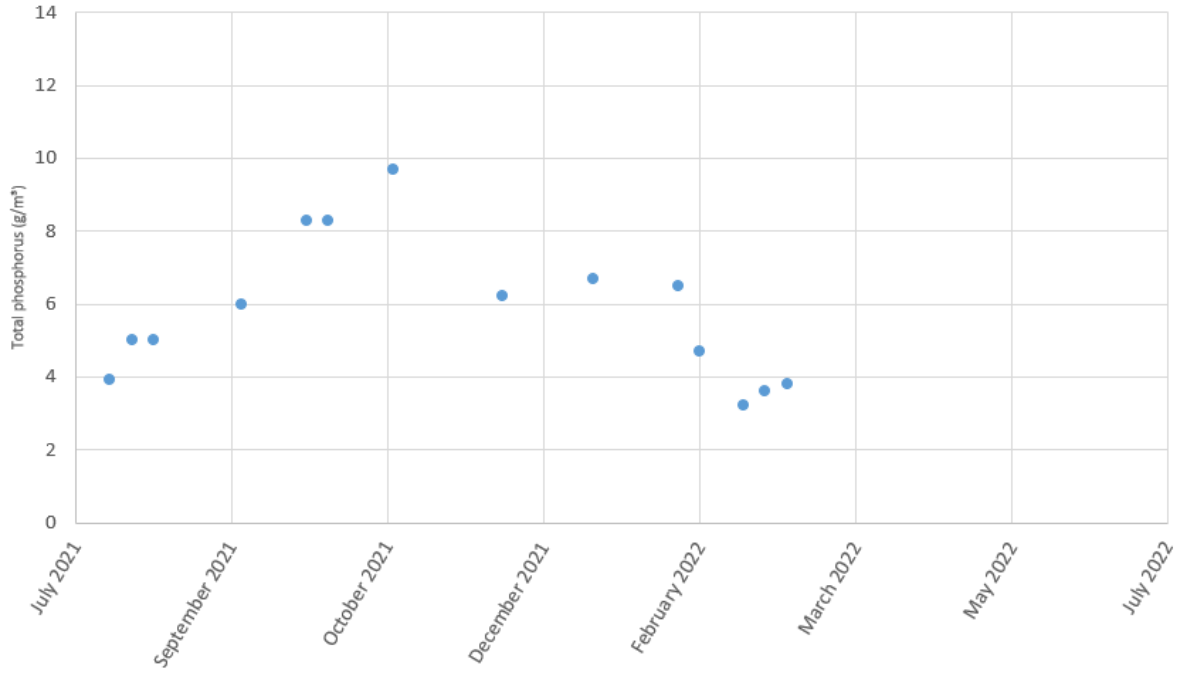
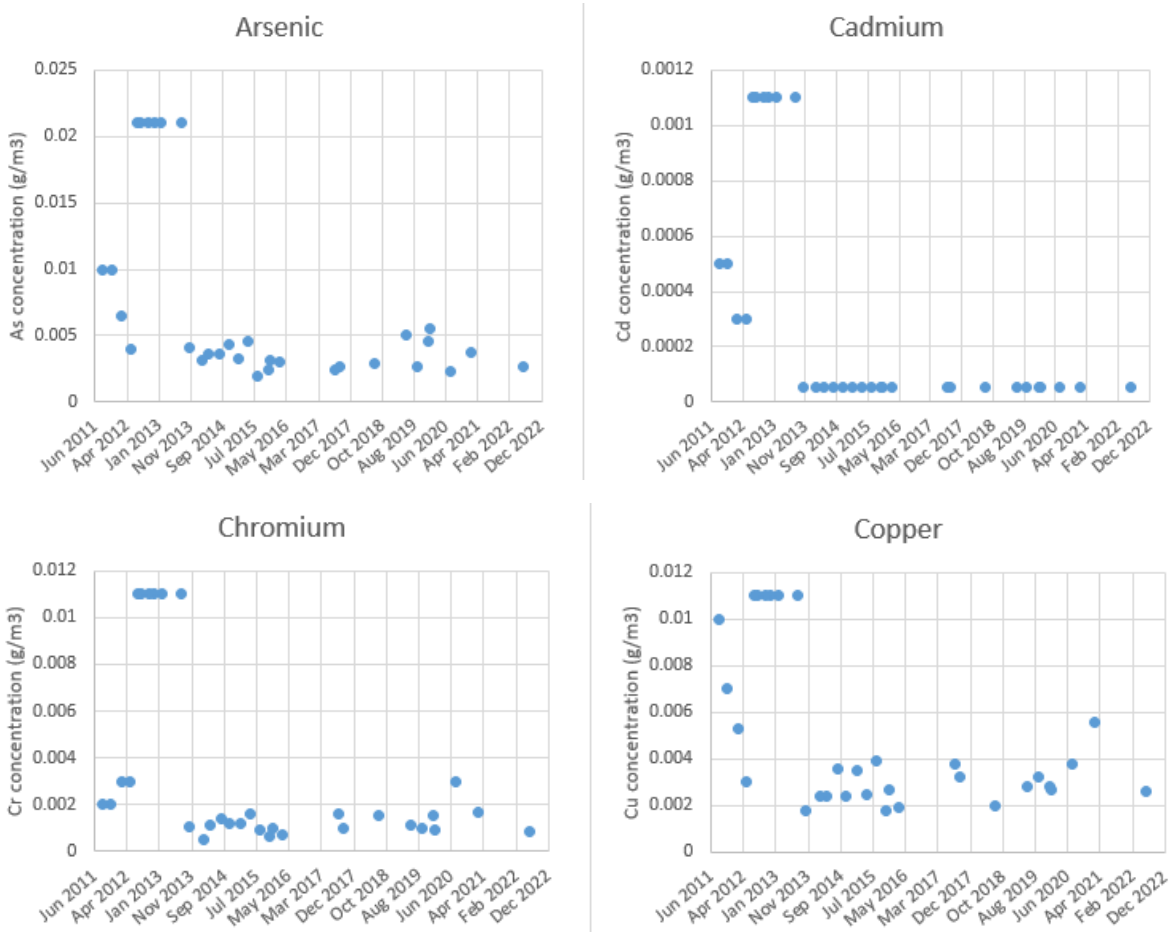


Figure 14. Total phosphorus concentrations in ocean outfall discharge between July 2021 and June 2022

2.3.5. Metals and metalloids

Total metal and metalloid concentrations since June 2011 are shown in Figure 15 below. These metals are sampled twice a year. Review of the results show the results for the metals were comparable to previous monitoring periods. There are no consent limits for any trace metals and metalloids.



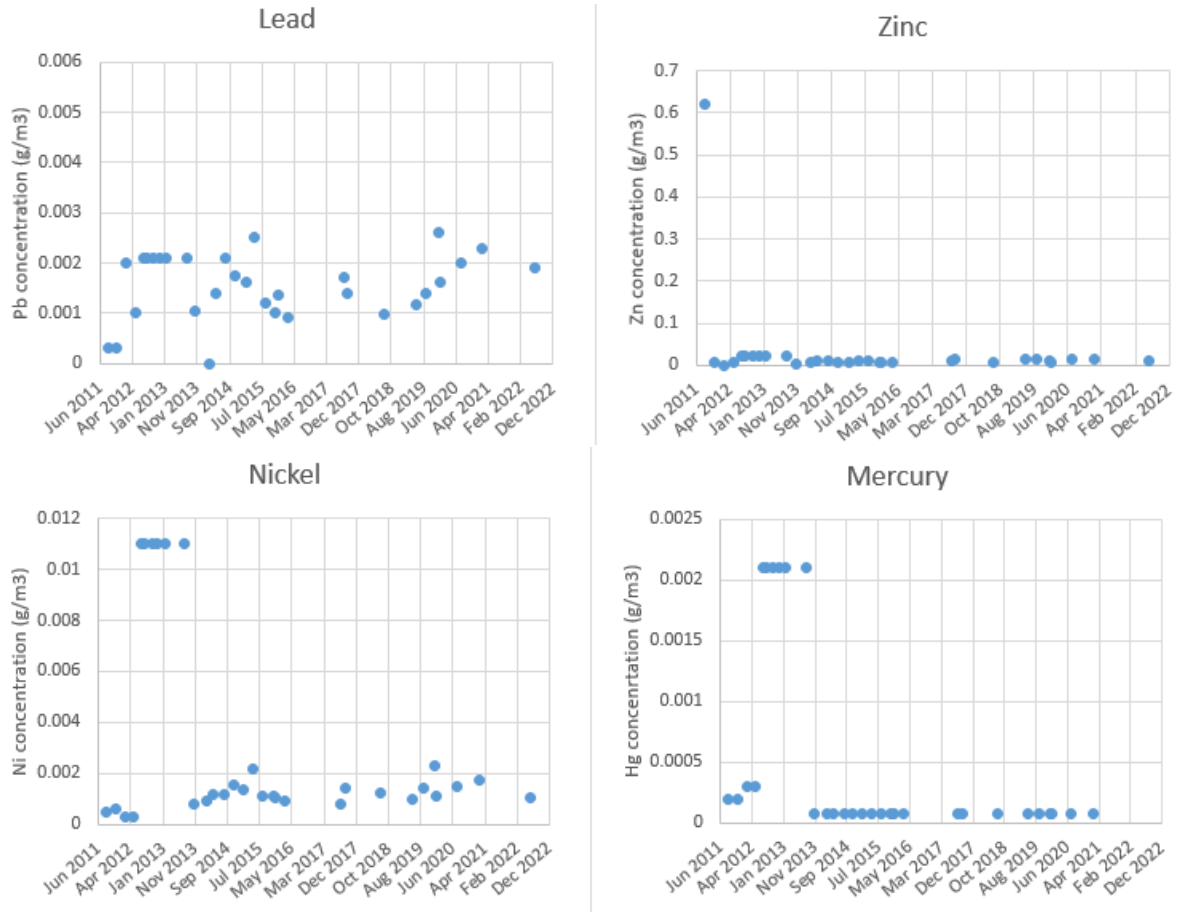


Figure 15: Tract metals and metalloids in ocean outfall discharge between June 2011 and April 2022

During the 2021/22 monitoring period there was an error made during sample collection which led to only one metalloids sample being taken. Our Water Unit thought bottles came in the kits straight from Hills, but we actually have to add bottles to the sample kits when required, and as we don't hold those on site. This error was made and the sample wasn't collected. Mercury wasn't sampled over the period.

2.3.6. Microbiological quality

The Woodend and Kaiapoi WWTPs have ultraviolet (UV) disinfection systems in operation to reduce bacterial numbers in the discharge. During the 2021/22 monitoring period the UV system was in continuous operation for the Woodend WWTP.

Consent CRC041162.2 specifies weekly monitoring of three faecal indicator bacteria:

- Faecal coliforms
- Enterococci
- *Escherichia coli (E. coli)*

The faecal indicator monitoring data for 2021/22 is summarised in Table 8. This data is plotted alongside data from the previous monitoring period and relevant consent limits in Figures 16, Figure 17 and 18. The sampling frequency for faecal indicator bacteria during the current monitoring period complied with the requirements of Condition 9.

Faecal coliform numbers were below relevant seasonal consent limits over the entire 2021/22 monitoring period (Figure 15), hence full compliance with Condition 12 was achieved for faecal coliforms.

Table 8: Faecal indicator bacteria in the ocean outfall discharge (cfu/100 mL)

Indicator	July 2021 to June 2022			July 2020 to June 2021			Consent Limit	
	N	Median	Range	N	Median	Range	Standard	High
Faecal coliforms (summer)	26	69	21 - 510	17	51	15-380	1,000	5,000
Faecal coliforms (winter)	23	50	10 - 1,300	37	100	10-1000	9,000	20,000
Enterococci	48	40	10 - 2,440	54	40	10-24,200	500	1,500
E. coli	49	50	10 - 990	54	80	10-900	-	-

Note: "For each period (summer: November—February; winter: March—October) no more than six out of eight consecutive samples may exceed the 'standard' value and no more than two out of eight consecutive samples may exceed the 'high' value. N: number of samples.

Enterococci numbers in a wastewater discharge of this type are typically lower than faecal coliform or *E. coli* numbers, which are more likely to include non-human derived faecal indicator bacteria as well as human- derived sources. Consent limits for enterococci do not vary between seasons as they do for faecal coliforms, although there is still a standard (500 cfu/100 mL) and high (1,500 cfu/100 mL) limit.

The resource consent allows for six out of eight consecutive samples to exceed the standard limit, and two out of eight consecutive samples to exceed the high limit. There were two occasions when the enterococci exceeded 1,500 cfu/100mL, as shown in Figure 17 below. Therefore, full compliance with Condition 12 was achieved for enterococci.

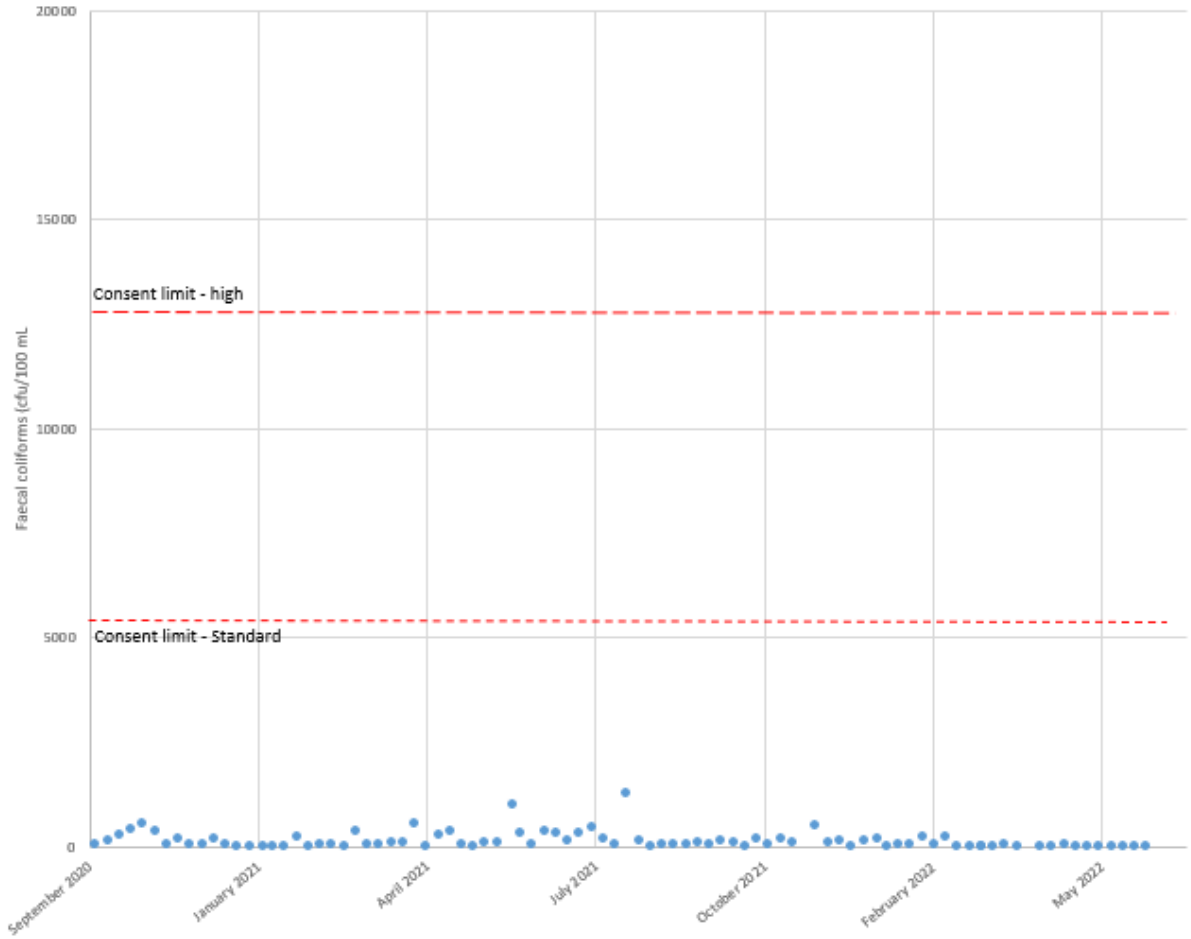


Figure 16. Faecal coliforms in ocean outfall discharge between July 2018 and June 2022

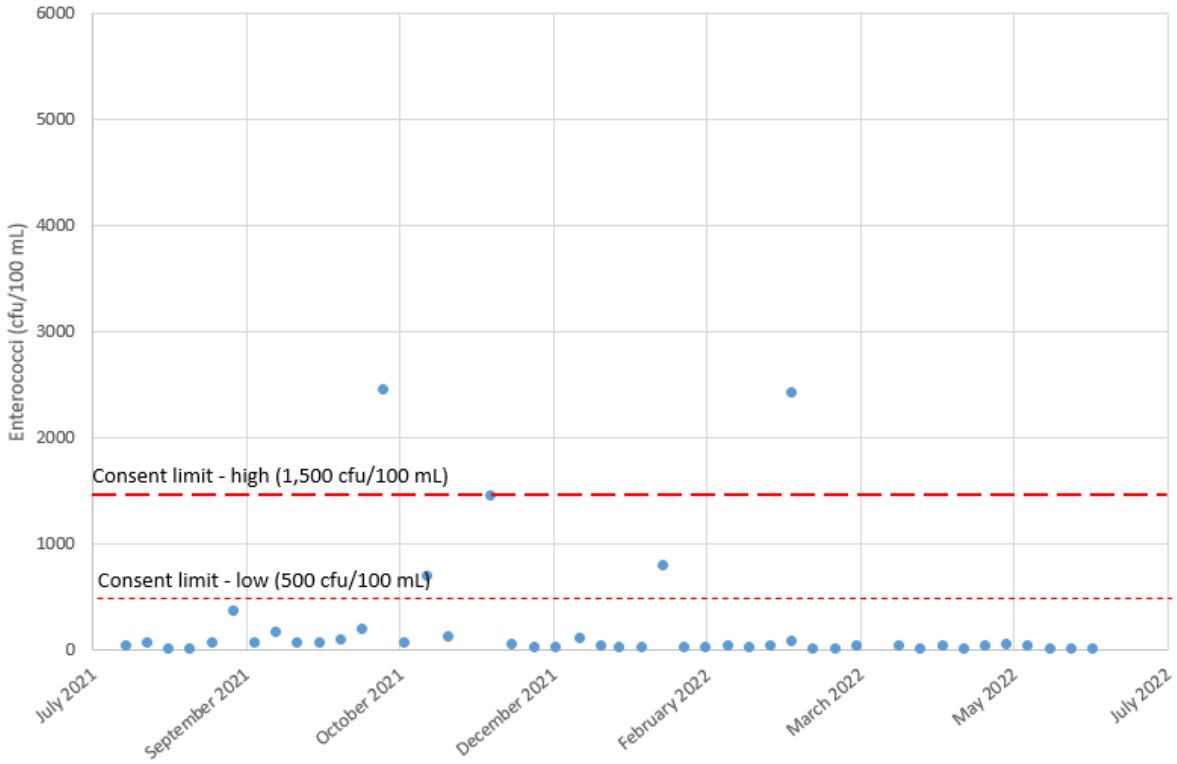


Figure 17. Enterococci in ocean outfall discharge between July 2021 and June 2022

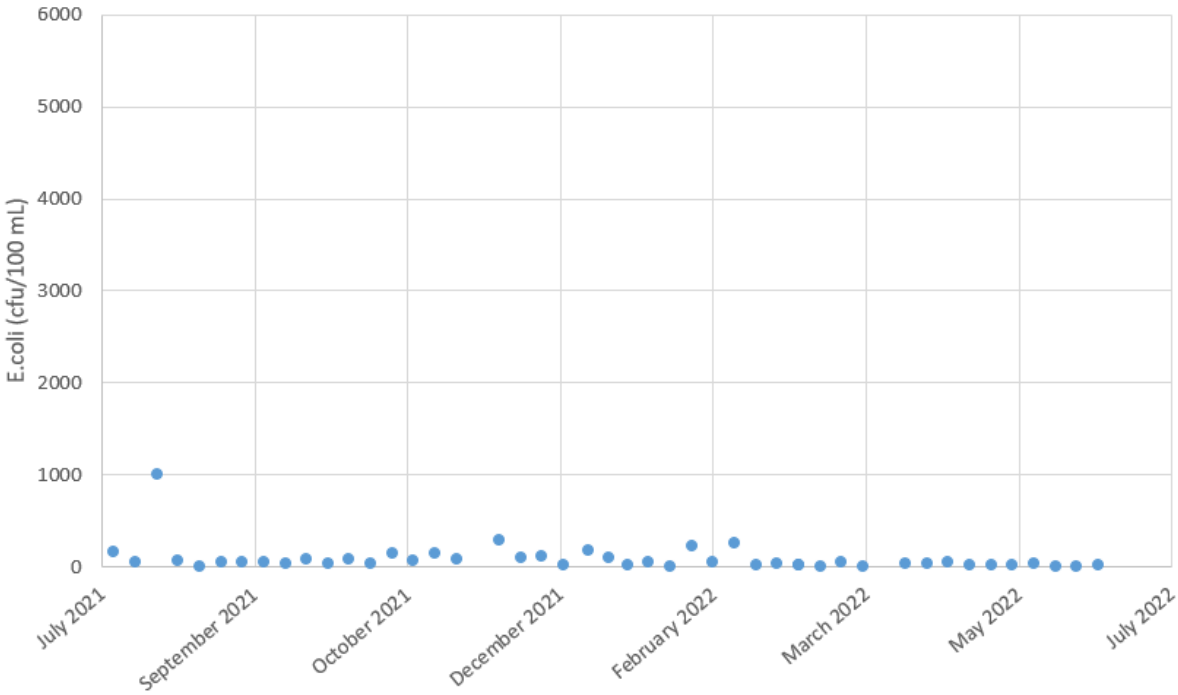


Figure 18. Escherichia coli in ocean outfall discharge between July 2021 and June 2022

Human pathogens

The results for the 2021/22 human pathogen tests are shown in Table 9, alongside results from the previous monitoring periods. Human enterovirus, adenovirus, *Campylobacter* and *Salmonella spp*. are required to be sampled annually, as the three-monthly sampling was only required for the first two years.

The human pathogen sampling requirements of Condition 9(d) were met in full in 2021/22. When sampled, human enterovirus and adenovirus were below their respective MDL during the 2021/22 monitoring period. There are no consent limits for human pathogens.

Table 9: Human pathogens in ocean outfall discharge.

Pathogen	March 2022	March 2021	March/June 2020	March 2019	Nov 2018	March 2018	March 2017	March 2016
Human enterovirus (pfu/10 L)	Not detected	Not sampled	<10	<10	<10	Not sampled	<10	<10
Human adenovirus (iu/10 L)	Not sampled	<10	<10	<10	<10	Not sampled	<10	<10
Campylobacter	Not detected	Detected	Not detected	Not detected	No sample taken	Detected	Detected	Not isolated
Salmonella spp. (/500 mL)	Not detected	Not detected	Not detected	Not detected	Not sampled	Not detected	Not detected	Not isolated

Note: Units: pfu = plaque forming units; iu = infectious units. * Pathogen monitoring during 2015 occurred over various dates.

2.3.7. Organochlorine pesticides, PCBs and PAHs

The annual monitoring for organochloride pesticides, polychlorinated biphenyls (PCBs) and polycyclic aromatic hydrocarbons (PAHs) was undertaken in March 2022. The full results are presented in Appendix A. There are no limits for organochloride pesticides, PCBs and PAHs, specified in the resource consent.

2.3.8. Summary

Overall, all requirements of conditions 9 — 12 have been met. The following are the main points from the outfall monitoring program:

- The plants are performing well, with monitoring showing the effluent quality meeting the consent requirements of the time.
- All organochlorine pesticide, PCB and PAH results were below their respective method detection limits.

2.4. Condition 13 – Woodend Beach, The Pines Beach and Waimakariri River mouth

2.4.1. Monitoring requirements

Condition 13 of CRC041162.2 requires weekly monitoring for faecal coliforms and enterococci at Woodend Beach and The Pines Beach. Woodend Beach is located to the north of the ocean outfall and The Pines Beach to the south. Both locations are north of the Waimakariri River mouth, as shown in Figure 1. The frequency of monitoring during the 2021/22 period at Woodend Beach and the Pines Beach complied with these requirements. In addition to the weekly monitoring at Woodend Beach and The Pines Beach, WDC also sampled at the Waimakariri River Mouth.

2.4.2. Microbiological monitoring results

The microbiological data measured at each site are shown in Figure 19 and Figure 20, and summarised in Table 10.

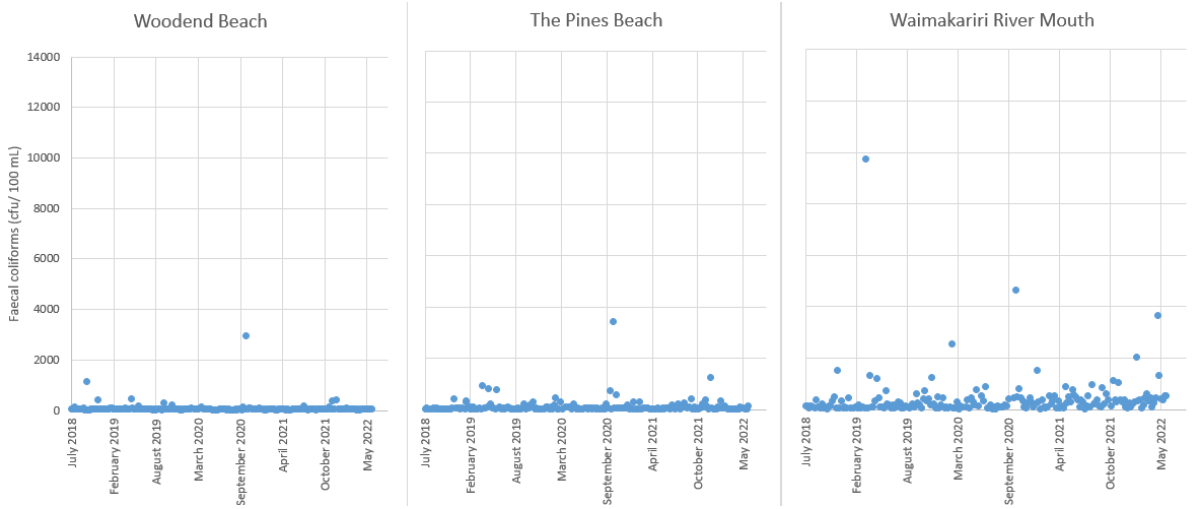


Figure 19: Faecal coliforms at Woodend Beach, The Pines Beach and the Waimakariri River Mouth between July 2018 and June 2022

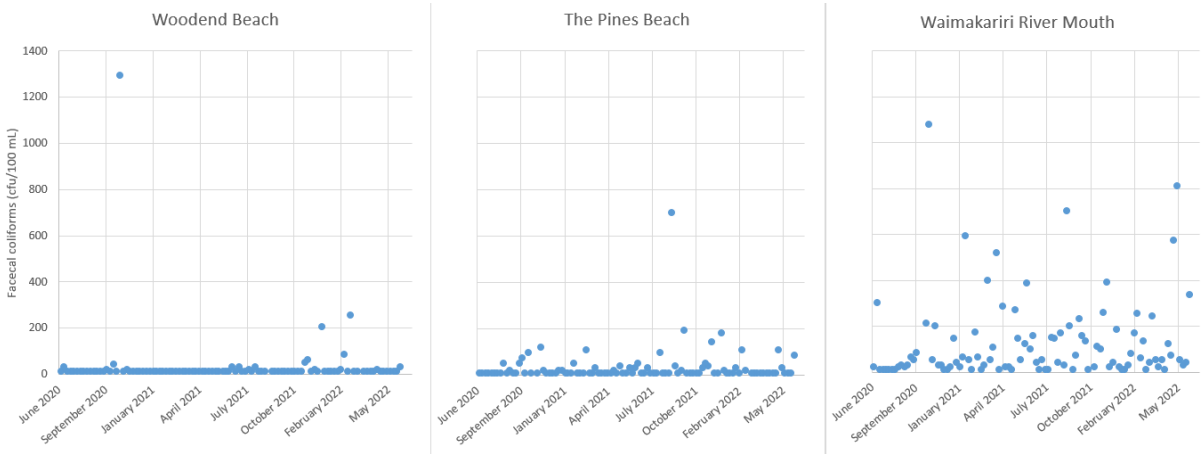


Figure 20: Enterococci at Woodend Beach, Pines Beach and Waimakariri River Mouth between July 2020 and June 2022

Table 10: Microbiological monitoring results for Woodend Beach, The Pines Beach and Waimakariri River Mouth for July 2021 to June 2022

Indicator	Woodend Beach		The Pines Beach		Waimakariri River Mouth	
	N	Median (range)	N	Median (range)	N	Median (range)
Faecal coliforms (cfu/100 ml)	50	12.5	50	22.5	49	310
Enterococci (cfu/100 ml)	49	10	49	10	48	67

Note: N: number of samples

Median numbers of faecal coliforms were highest at the Waimakariri River Mouth in all monitoring periods reported to date (Figure 19). These results could be due to a number of factors that differentiate the river mouth from Woodend and The Pines Beach (e.g., lowland tributaries [Styx River and Kaiapoi River] entering near the mouth, birdlife from Brooklands Lagoon and the short survival rate of faecal coliforms in marine waters).

Median numbers of faecal coliforms recorded at Woodend Beach increased from 4 to 12.5 cfu/100 mL this monitoring period, compared to 2020/21 (Report 210825137722) . The Pines Beach shows a similar median to that reported in 2020/21 (increase from 18 to 22.5 cfu/100mL). However at the Waimakariri River Mouth (Figure 19) the median increased from 141 to 215 cfu/100 mL in 2020/21 and has again increased to 310 cfu/100 mL in 2021/22.

As described in Table 10 and Figure 20, median numbers of enterococci recorded at Woodend Beach, The Pines Beach in 2020/21 were the same as those reported in 2021/22 (10 cfu/100 mL). The median number for the Waimakariri River Mouth doubled last monitoring period from 20 cfu/100 mL reported in 2020/21 to 46.5 cfu/100 mL in 2021/22. Further increase of approx. 20 cfu/100 mL was recorded in 2021/22 measuring 67 cfu/100 mL.

2.4.3. Compliance summary – Beaches

The monitoring requirements in Condition 13 for sampling at Woodend Beach and The Pines Beach have been met in full during the 2021/22 monitoring period.

2.5. Condition 14 – Visual Observations

As required by Condition 14, WDC make visual observations at each sampling site to assess the presence of conspicuous oil or grease films, scums or foams or floatable materials. Wind speed and direction were also recorded and are available on request.

During the 2021/22 period, no conspicuous oil or grease films, scums or foams, or floatable materials were noted at either Woodend Beach or The Pines Beach on any of the weekly site visits during the monitoring period.

2.6. Conditions 15 to 26 – Water Quality, Surface Sediments and Benthic Infauna

WDC was granted a variation to the conditions of consent, effective from 12 March 2009, relating to the sampling of mixing zone water quality, sediments and Benthic Infauna. Sampling is required after three years following commissioning of the ocean outfall and at five yearly intervals thereafter.

Water quality, surface sediments and Benthic Infauna sampling was undertaken in May 2022. This work was undertaken by NIWA and a copy their report “Waimakariri District Council outfall: sixth post construction survey” is included in Appendix B.

The survey found no significant effects from the outfall, based on sampling and analysis of physical, chemical, and bacteriological parameters of surface waters, sediment physicochemical properties and seabed fauna assemblages.

No significant effects attributable to the outfall discharge were evident from the analysis of the spatial and temporal distribution of benthic biota living in and around the seabed when comparing the results of this survey with previous post-construction surveys.

2.7. Condition 30 – Complaints

Condition 30 states the following:

> *“The consent holder shall maintain and keep a complaints register for all aspects of all operations in relation to the discharge into the ocean. The register shall detail the date, time and type of complaint, cause of the complaint, and action taken by the Consent Holder in response to the complaint. The register shall be available to the Canterbury Regional Council at all reasonable times.”*

WDC maintains a complaints register in accordance with the requirements of Condition 30.

There were no complaints received for the 2020/21 monitoring period and also during the 2021/22 monitoring period.

2.8. WWTP Operations, Maintenance and Major Shutdowns

There were no major shutdowns of the ocean outfall in the 2021/22 monitoring period. The plants have performed well with no major issues.

2.9. Summary of Compliance – CRC041162.2

A summary of compliance with condition CRC041162.2 is presented in Table 11 below.

Table 11: Summary if compliance for 2020/21 for consent CRC041162.2.

Consent condition	Description	Compliance
Condition 2	Discharge volume and rate	Full compliance
Condition 9	Ocean outfall discharge quality	Non-compliant
Condition 11	Discharge BODs, TSS, ammoniacal-N limits	Full compliance
Condition 12	Discharge microbiological limits	Full compliance
Condition 13	Woodend Beach and The Pines Beach	Full compliance
Condition 14	Visual observations	Full compliance
Condition 15 – 26	Water quality, surface sediments and benthic infauna	Full compliance
Condition 30	Complaints	Full compliance

3. CRC041049 – DISCHARGE FROM KAIAPOI WWTP

3.1. Condition 2 – Groundwater Quality Monitoring

Condition 2 states the following:

> *"The consent holder shall monitor on-site bores 1, 2, and 3 and two new monitoring bores within 200 metres of the site, on a monthly basis for a period of up to two years after the introduction of Rangiora effluent into the wetland, thereafter at three monthly intervals. Samples from the monitoring shall be analysed for faecal coliforms, E. coli, nitrate-nitrogen and ammoniacal-nitrogen."*

The locations of the groundwater quality monitoring bores are shown in Figure 21. The regional groundwater flow is assumed to be towards the east in the direction of the coast. Bore 1 (labelled as WDC1) and Bore A are considered 'control' bores as they are located up-gradient of the WWTP, whereas bores 2, 3 (labelled as WDC2 and WDC3, respectively) and B are 'effects' bores as they are down-gradient from the WWTP. Effects of the WWTP may be evident in groundwater quality through a comparison of the 'control' bores with the down-gradient bores' water quality.

Figure 21: Location of Kaiapoi monitoring bores

Although the two-year period of monthly sampling required by Condition 2 was met as of February 2008, monthly sampling continued until February 2010 when three-monthly sampling commenced.

Four samples were collected in 2021/22 (refer to Table 12), therefore, the three-monthly sampling requirement was met.

3.2. Groundwater Monitoring Results

3.2.1. Nutrients

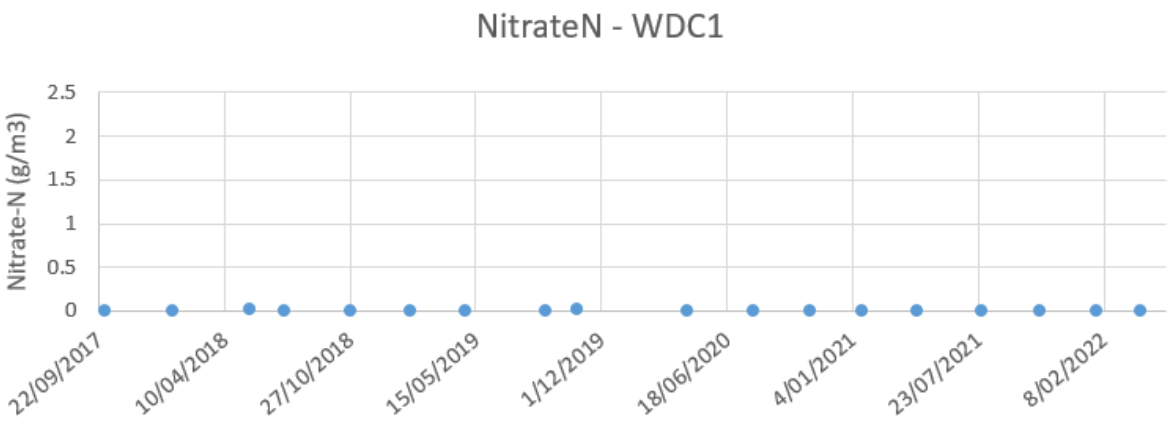
Nutrient concentrations in the five bores for the 2021/22 monitoring period are shown in Table 12. Nitrate nitrogen (nitrate-N) data is plotted in Figure 22 and ammoniacal-N data is plotted in Figure 23.

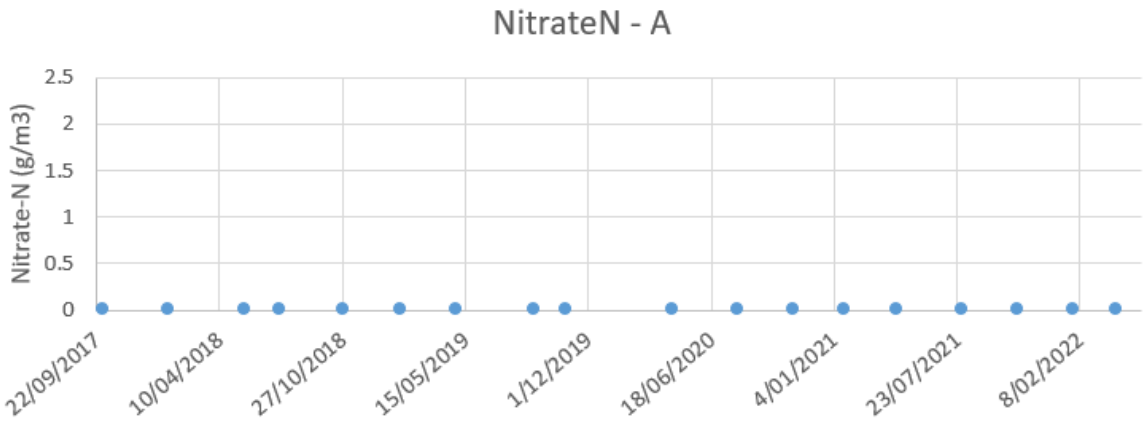
Similar to previous monitoring periods, the highest nitrate-N concentration during the 2021/22 monitoring period was recorded in Bore B and WDC 3 (0.086 g/m^3 and 0.02 g/m^3 respectively). In the 2021/22 monitoring period the highest nitrate-N concentration was recorded in Bore B in April (Figure 22).

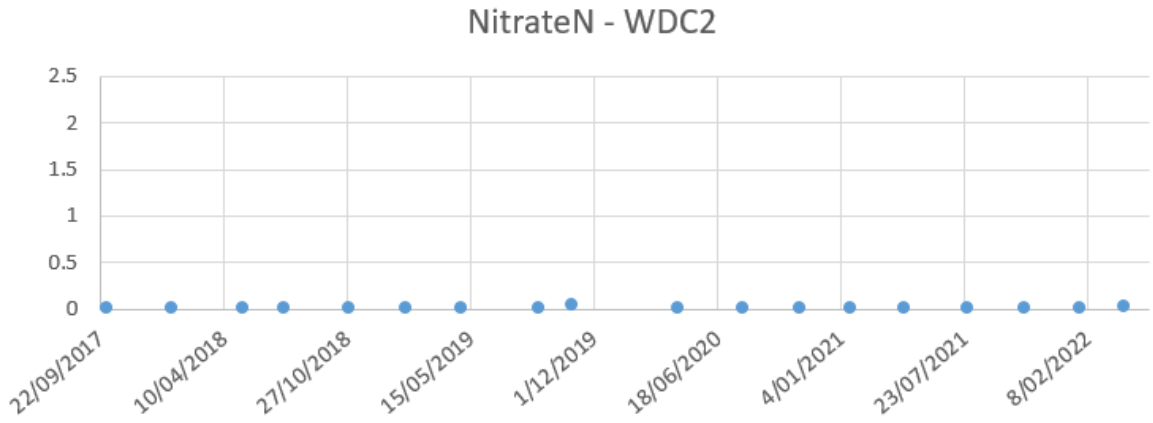
Ammoniacal-N concentrations were below detection limits or low in the up-gradient bores. Higher concentrations are measured in the down-gradient bores. The results (Figure 23), indicate that the Kaiapoi WWTP discharge is influencing groundwater quality down-gradient of the WWTP. The result trend is increasing over time as shown in Figure 23 where 5 years of data is graphed.

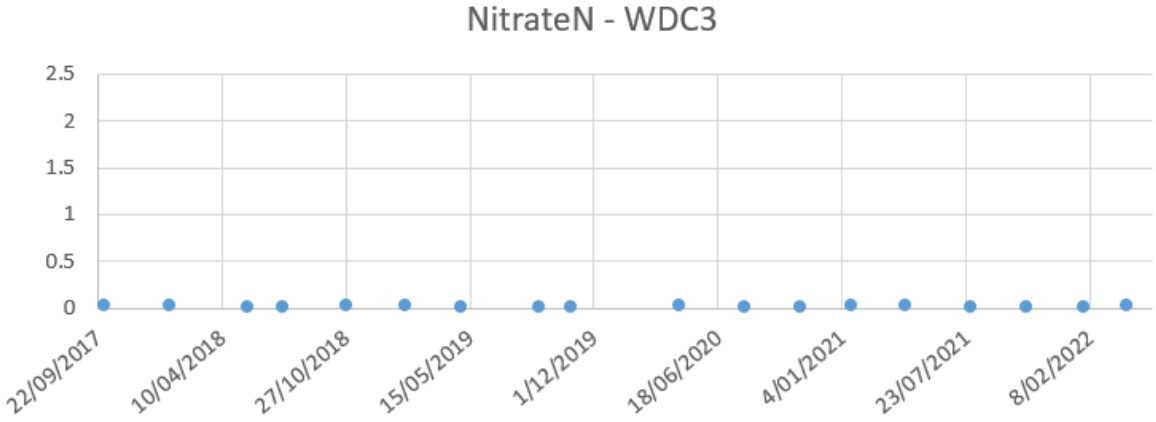
Table 12: Nitrate-N and ammoniacal-N concentrations in Kaiapoi WWTP groundwater monitoring bores.

Bore	Nitrate-nitrogen (g/m3)				Ammoniacal-nitrogen (g/m3)			
	Jul-21	Oct-21	Jan-22	Apr-22	Jul-21	Oct-21	Jan-22	Apr-22
WDC1 (control)	0.002	0.002	0.002	0.002	0.01	0.01	0.014	0.019
A (control)	0.002	0.002	0.002	0.002	0.37	0.072	0.073	0.09
WDC2 (effect)	0.002	0.002	0.002	0.02	12.1	13.2	11.7	13.6
WDC3 (effect)	0.002	0.002	0.002	0.02	14	13.1	12.3	7.5
B (effect)	0.002	0.002	0.002	0.086	7.9	6.1	3.9	5.3


NitrateN - WDC1
Nitrate-N (g/m3)
2.5
2
1.5
1
0.5
0
22/09/2017
10/04/2018
27/10/2018
15/05/2019
1/12/2019
18/06/2020
4/01/2021
23/07/2021
8/02/2022


NitrateN - A
Nitrate-N (g/m3)
2.5
2
1.5
1
0.5
0
22/09/2017
10/04/2018
27/10/2018
15/05/2019
1/12/2019
18/06/2020
4/01/2021
23/07/2021
8/02/2022


NitrateN - WDC2
2.5
2
1.5
1
0.5
0
22/09/2017
10/04/2018
27/10/2018
15/05/2019
1/12/2019
18/06/2020
4/01/2021
23/07/2021
8/02/2022


NitrateN - WDC3
2.5
2
1.5
1
0.5
0
22/09/2017
10/04/2018
27/10/2018
15/05/2019
1/12/2019
18/06/2020
4/01/2021
23/07/2021
8/02/2022

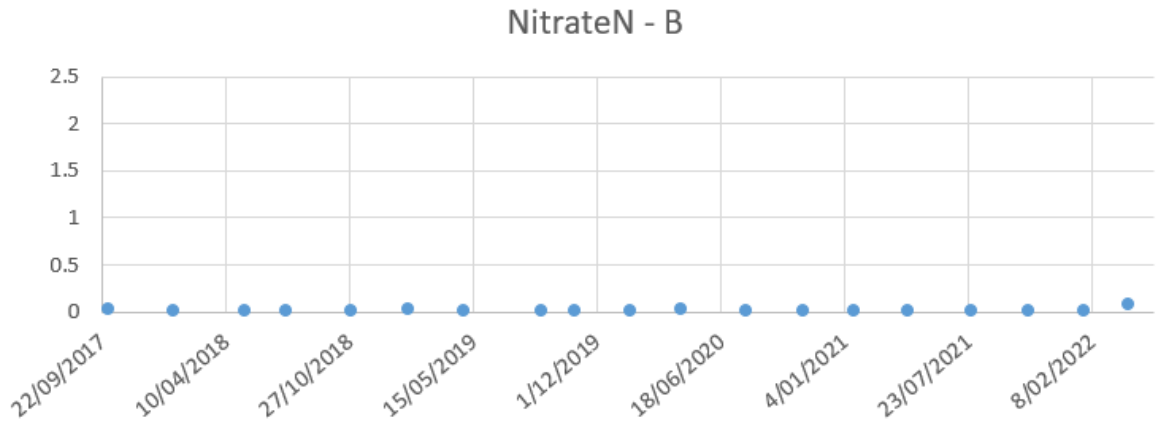
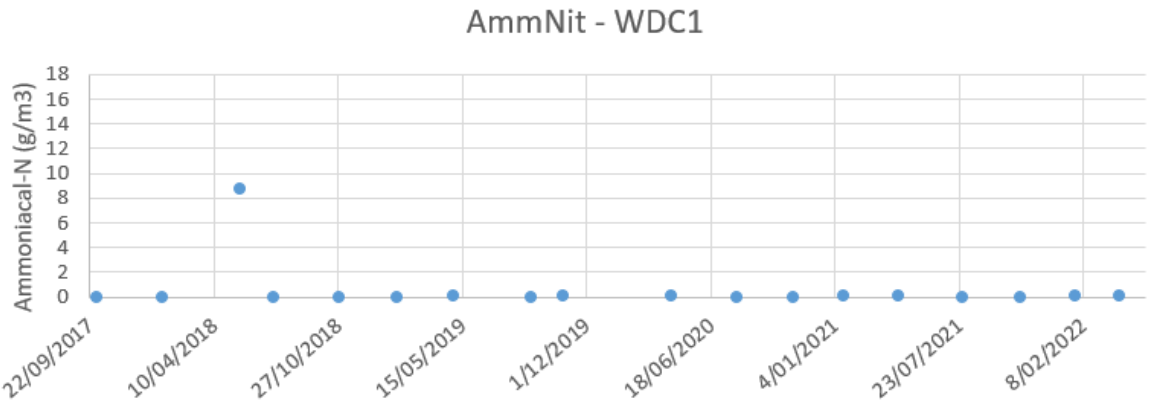
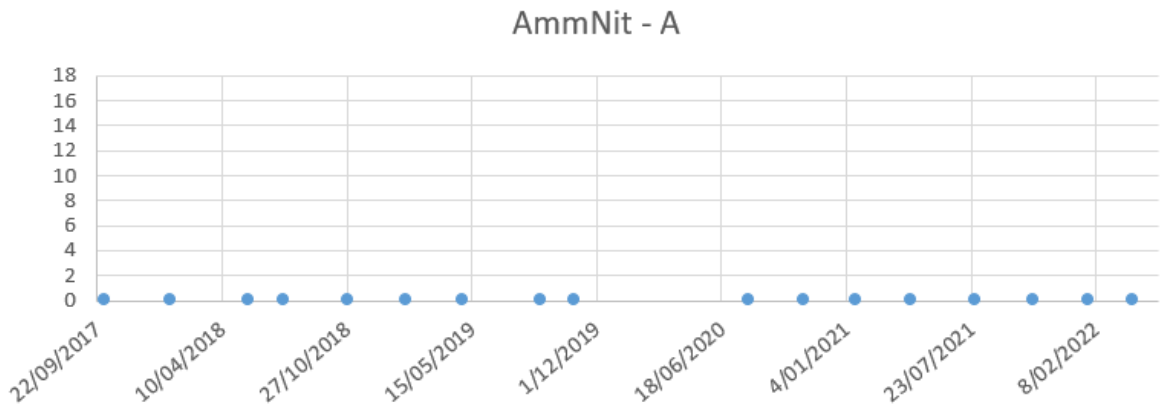


Figure 22: Nitrate-N concentrations in Kaiapoi WWTP monitoring bores between July 2017 and April 2022





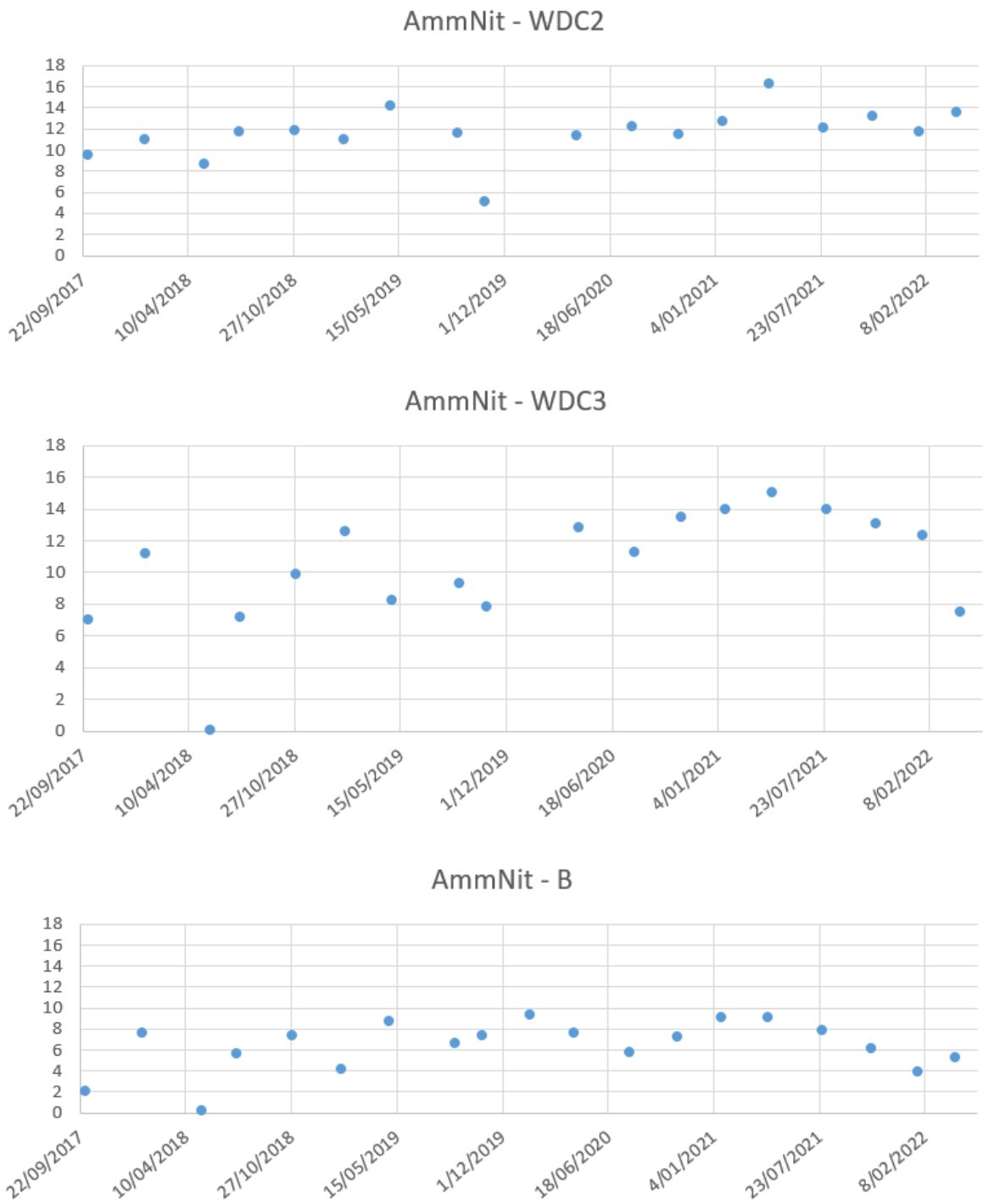


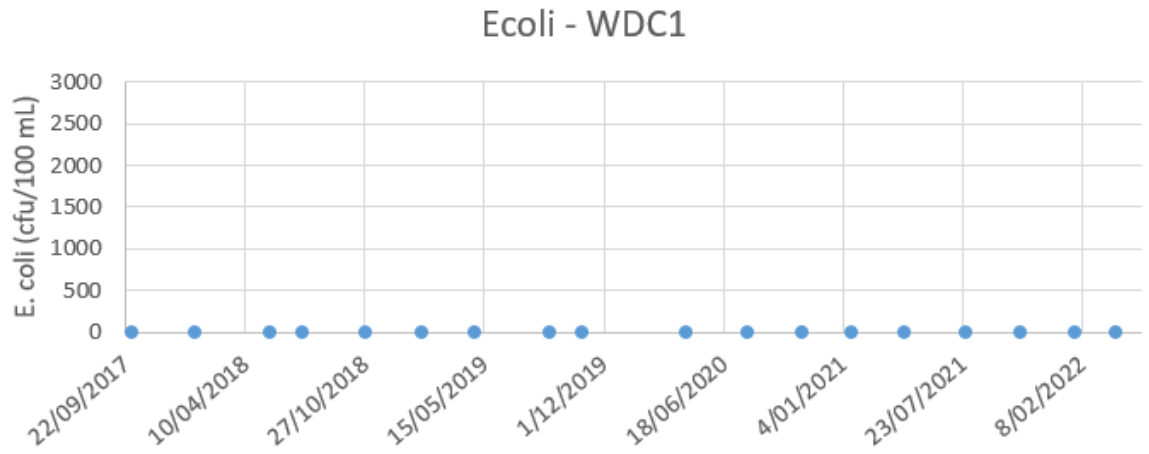
Figure 23: Ammoniacal-N concentration in groundwater monitoring bores from July 2017 – April 2022

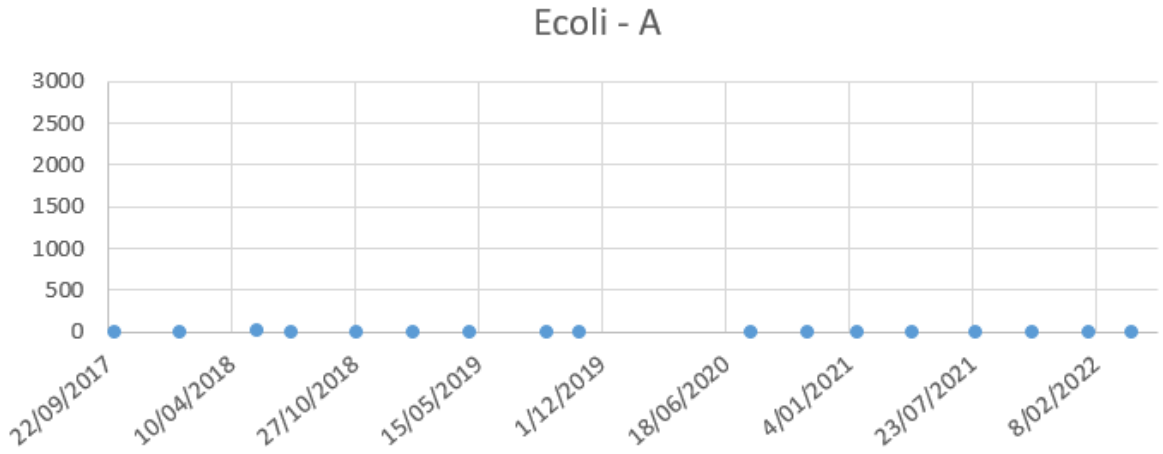
3.2.2. Faecal indicator bacteria

E. coli and faecal coliform numbers measured during sampling in 2021/22 are tabulated in Table 13 and shown on Figure 24 and Figure 25, respectively.

Table 13: Escherichia coli and faecal coliforms in Kaiapoi WWTP groundwater monitoring bores

Bore	Escherichia coli (cfu/100mL)				Faecal coliforms (cfu/100mL)			
	Jul-21	Oct-21	Jan-22	Apr-22	Jul-21	Oct-21	Jan-22	Apr-22
WDC1 (control)	1	1	1	0	1	1	1	1
A (control)	1	1	1	1	1	1	1	1
WDC2 (effect)	1	1	1	17	1	1	1	17
WDC3 (effect)	1	1	100	250	1	1	110	480
B (effect)	1	1800	1	15	4	1800	1	24





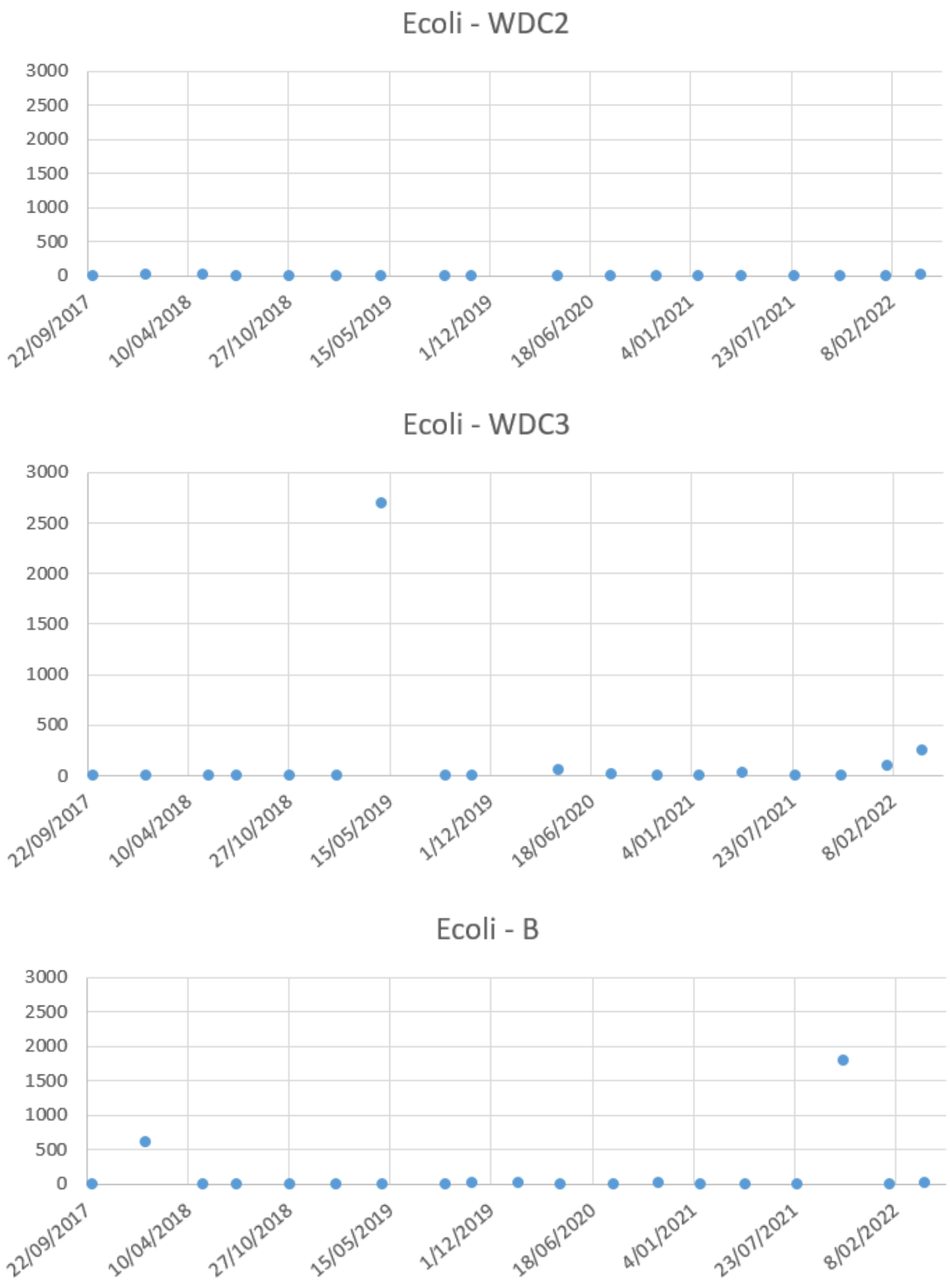
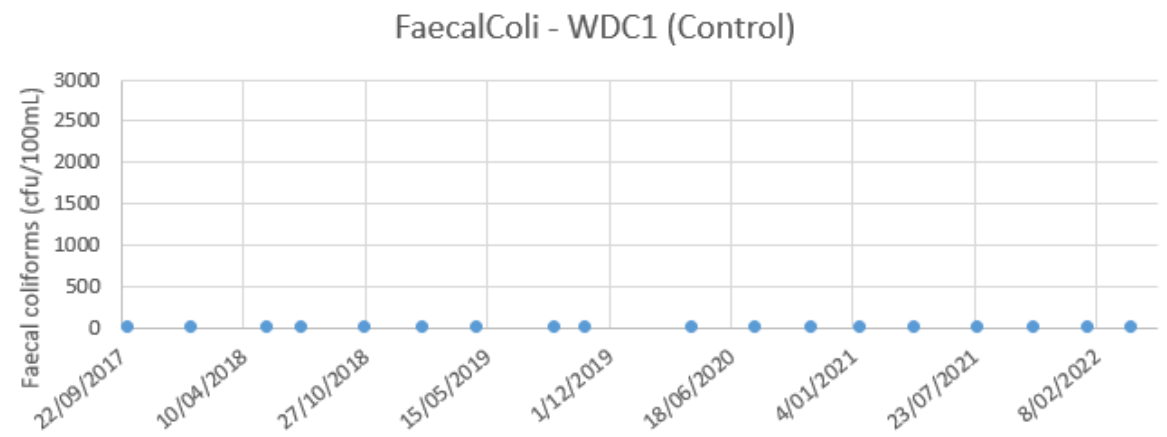
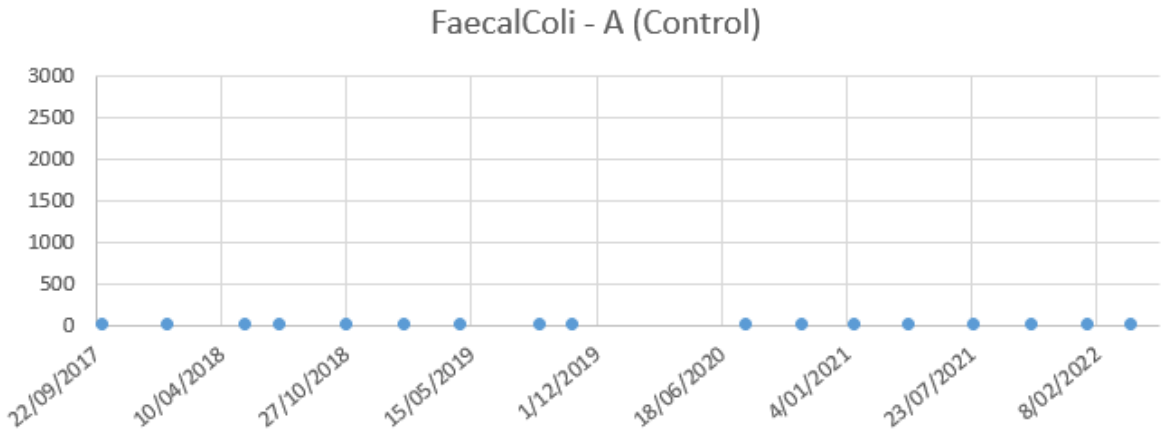
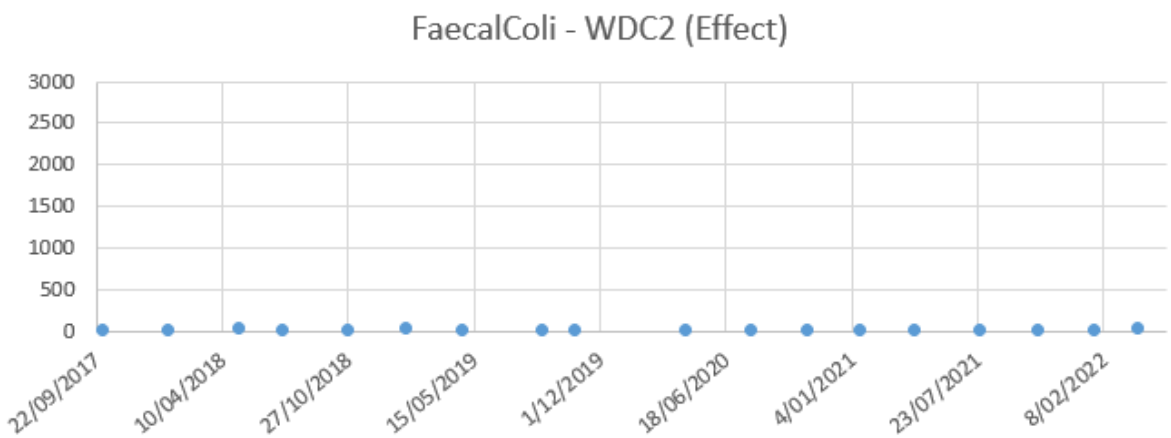


Figure 24: Escherichia coli in Kaiapoi WWTP monitoring bores between July 2017 and April 2022


FaecalColi - WDC1 (Control)
Faecal coliforms (cfu/100mL)
3000
2500
2000
1500
1000
500
0
22/09/2017
10/04/2018
27/10/2018
15/05/2019
1/12/2019
18/06/2020
4/01/2021
23/07/2021
8/02/2022


FaecalColi - A (Control)
3000
2500
2000
1500
1000
500
0
22/09/2017
10/04/2018
27/10/2018
15/05/2019
1/12/2019
18/06/2020
4/01/2021
23/07/2021
8/02/2022


FaecalColi - WDC2 (Effect)
3000
2500
2000
1500
1000
500
0
22/09/2017
10/04/2018
27/10/2018
15/05/2019
1/12/2019
18/06/2020
4/01/2021
23/07/2021
8/02/2022

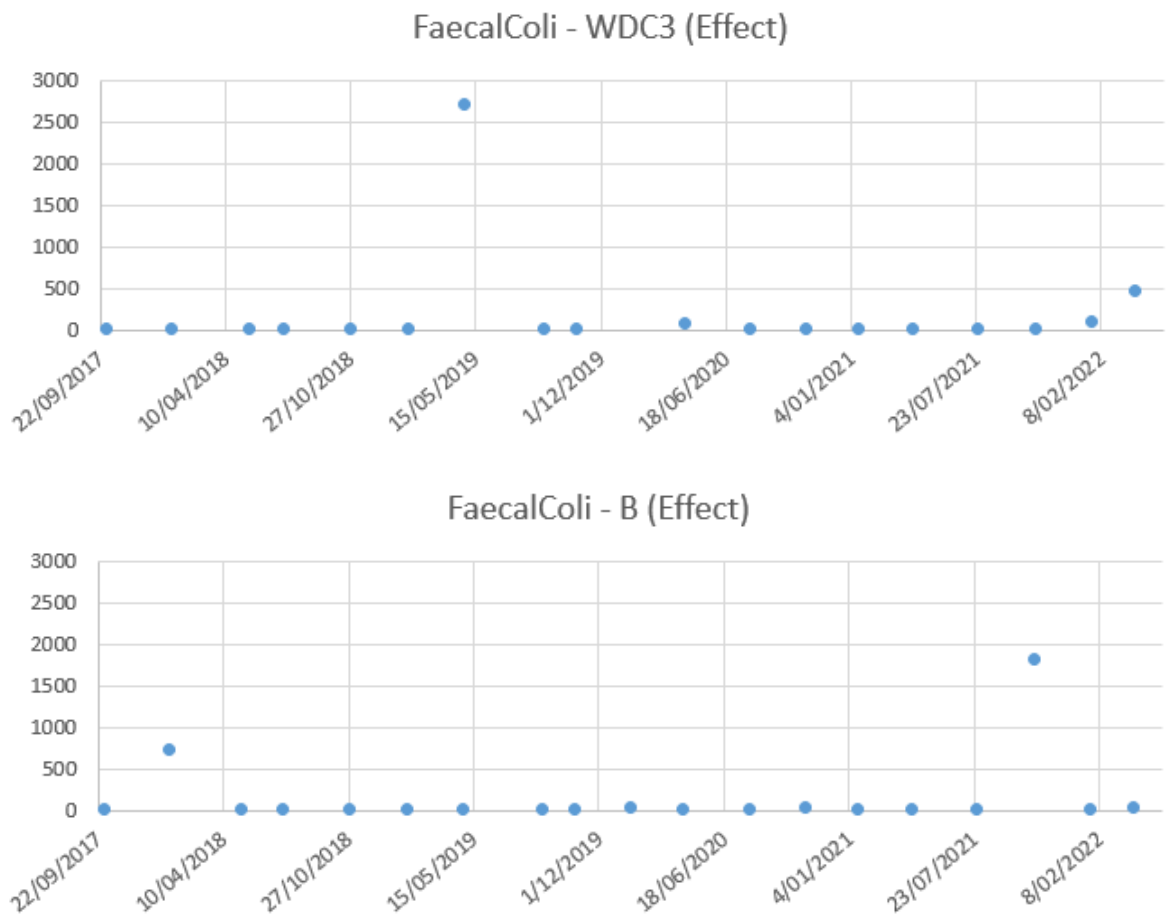


Figure 25: Faecal coliforms in Kaiapoi WWTP monitoring bores between July 2017 and April 2022

3.3. Condition 6 – Operating and Reporting

There were no major works undertaken at the Kaiapoi WWTP in the 2021/22 monitoring period.

3.4. Summary of Compliance – CRC041049

WDC has complied with the monitoring and reporting requirements of resource consent CRC041049 (Table 14). Groundwater monitoring of five bores in the vicinity of Kaiapoi WWTP in 2021/22 indicated that the WWTP influences groundwater quality down gradient, similar to that identified in previous monitoring periods.

Table 14: Summary of compliance for 2021/22 under CRC041049.

Consent condition	Description	Compliance
Condition 2	Groundwater monitoring	Full compliance
Condition 6	Annual reporting	Full compliance

4. CRC168391 – FROM WOODEND WASTEWATER TREATMENT PLANT

4.1. Overview

The Woodend WWTP is located approximately 23 km north of Christchurch (Figure 27) and receives wastewater from Woodend, Waikuku Beach, Pegasus, Tuahiwi and Woodend Beach. The WWTP

consists of an inlet screen, two aeration basins, settling pond and a wetland. Treated wastewater passes through an ultraviolet (UV) disinfection system before being pumped to the ocean outfall in Pegasus Bay between The Pines Beach and Woodend Beach, north of the Waimakariri River mouth.

Figure 27: Location of Woodend WWTP and groundwater monitoring sites.

Resource consent compliance for the period 1 July 2021 to 30 June 2022 (the monitoring period) has been assessed using monitoring data provided by WDC. WDC undertakes additional monitoring at the WWTP which, although is not required by the consent, is included in this report where relevant.

4.2. Conditions 5 – 6: Seepage

4.2.1. Record keeping for daily volumes

The resource consent requires WDC to keep records of daily volumes received by the Woodend WWTP and daily volumes discharged to the ocean outfall. As shown in Figure 28, the Woodend WWTP receives influent wastewater from six wastewater pump stations. These are:

- Gladstone Road pump station
- Petries Road pump station
- Woodend Beach pump station
- Waikuku Beach WWTP
- Pegasus Main Street pump station
- Mary Ellen Street pump station

- Kesteven Place pump station

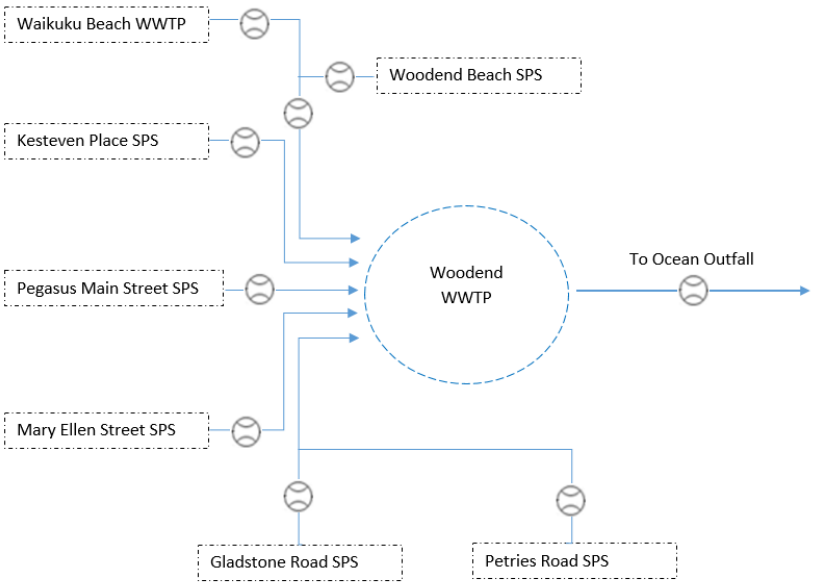
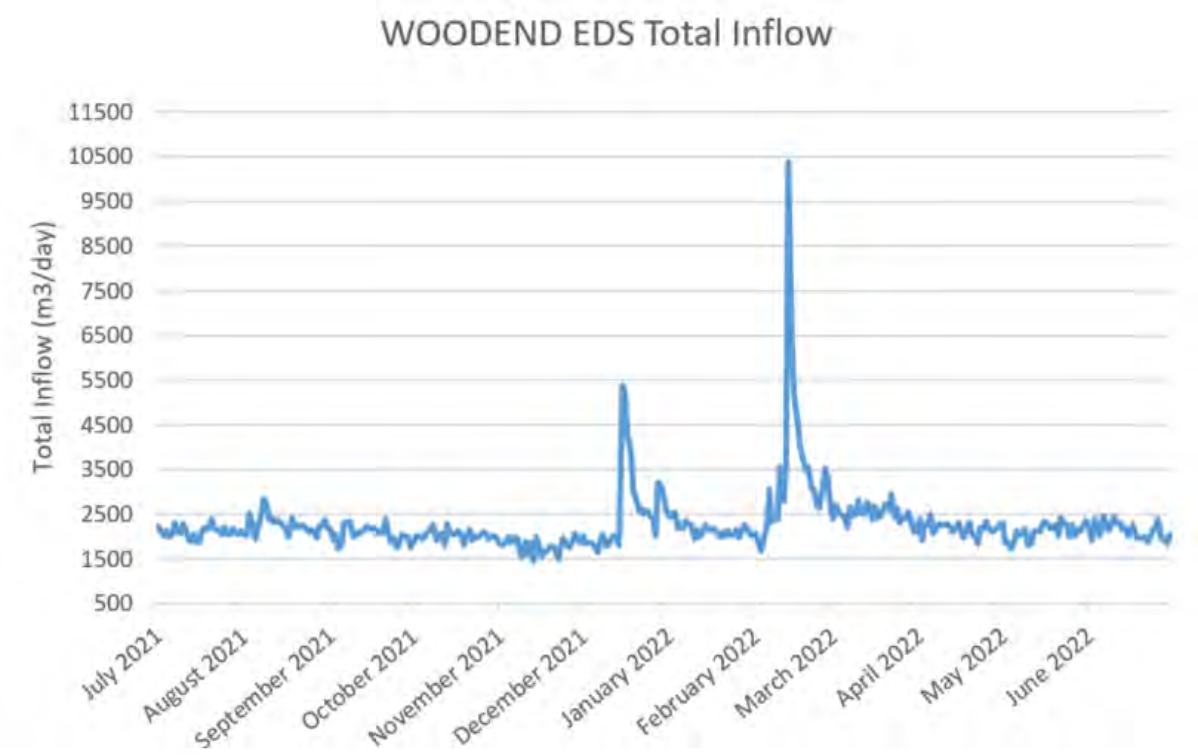


Figure 28: Schematic Woodend sewer network

Inflow records from the electromagnetic flow meters at Gladstone Road, Petries Road, Woodend Beach, Waikuku Beach WWTP, Pegasus Main Street, Mary Ellen Street and Kesteven Place for the monitoring period were recorded by the WDC SCADA system. These volumes are presented as the combined daily inflow volumes in Figure 29. Rainfall data from the Woodend, Gladstone weather station for the corresponding period is also presented on the same figure for comparison.



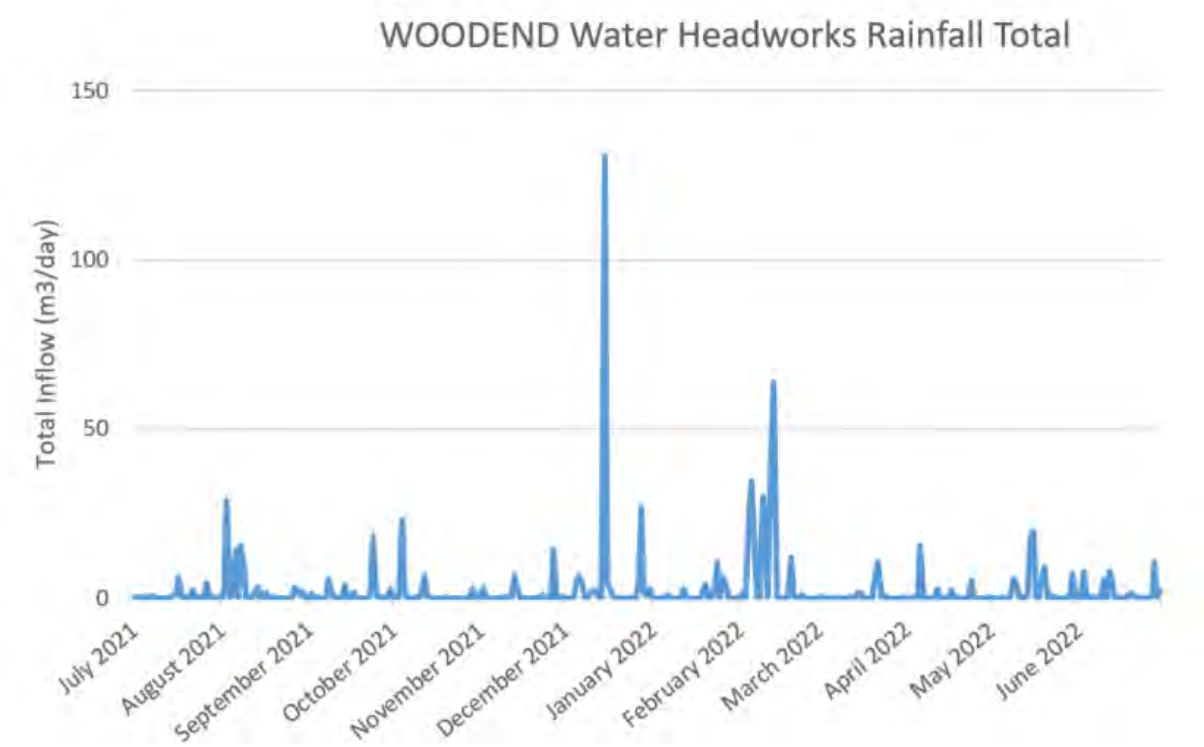


Figure 29: Daily inflow volumes July 2021 to June 2022 plotted with rainfall at Woodend.

Outflow data is measured by an electromagnetic flow meter and logged via a SCADA system. Flows from Woodend WWTP to the ocean outfall for the 2021/22 monitoring period are shown in Figure 30. Flow data is available upon request.

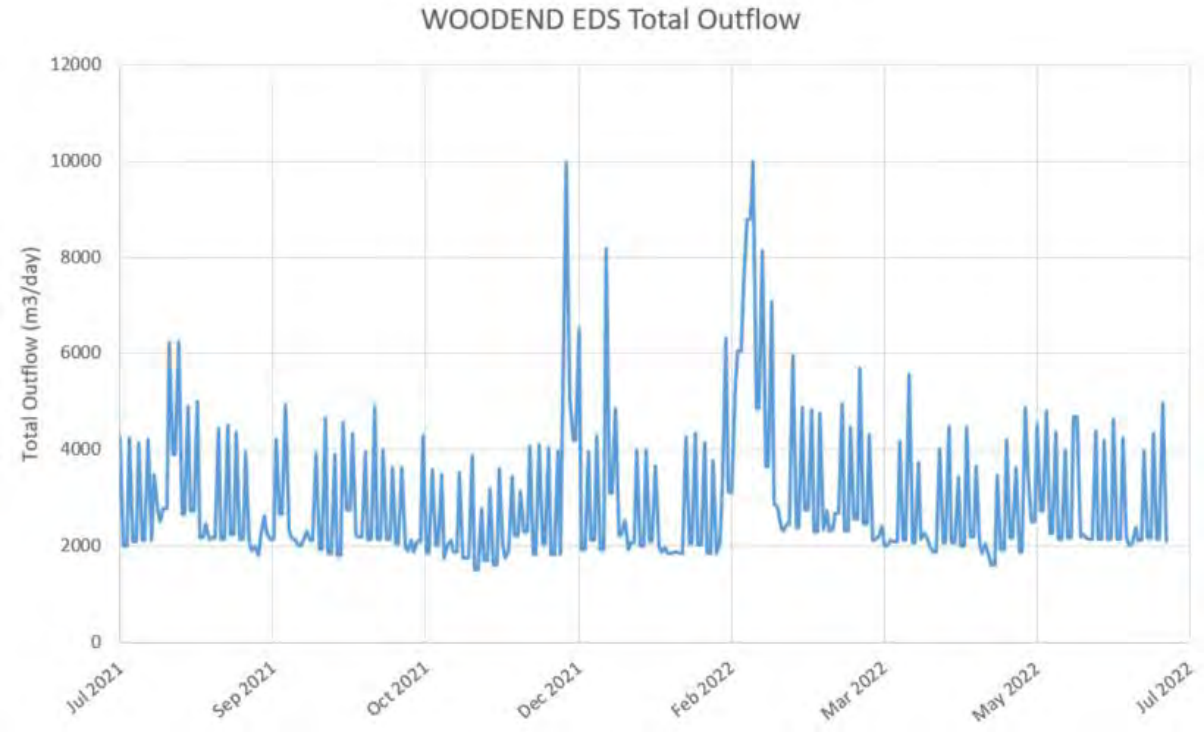


Figure 30: Daily outflow volumes (m^3/day) from Woodend WWTP to ocean outfall July 2021 and June 2022

4.2.2. Daily seepage discharge volumes

The resource consent states that the volume of treated wastewater discharged via seepage should be calculated by subtracting the volume of wastewater discharged to the ocean outfall from the volume of wastewater received at the WWTP. Calculated seepage volumes for the monitoring period are shown in Figure 31. Please note seepage values have not been calculated when either inflow or outflow data are missing. The prescribed method for calculating the discharge via seepage does not account for:

- Pond / wetland attenuation and fluctuating water levels
- Rainfall
- Evaporation from pond/wetland water surfaces and evapotranspiration from wetland plants
- Pond buffering (this can be significant during changes in plant operation)

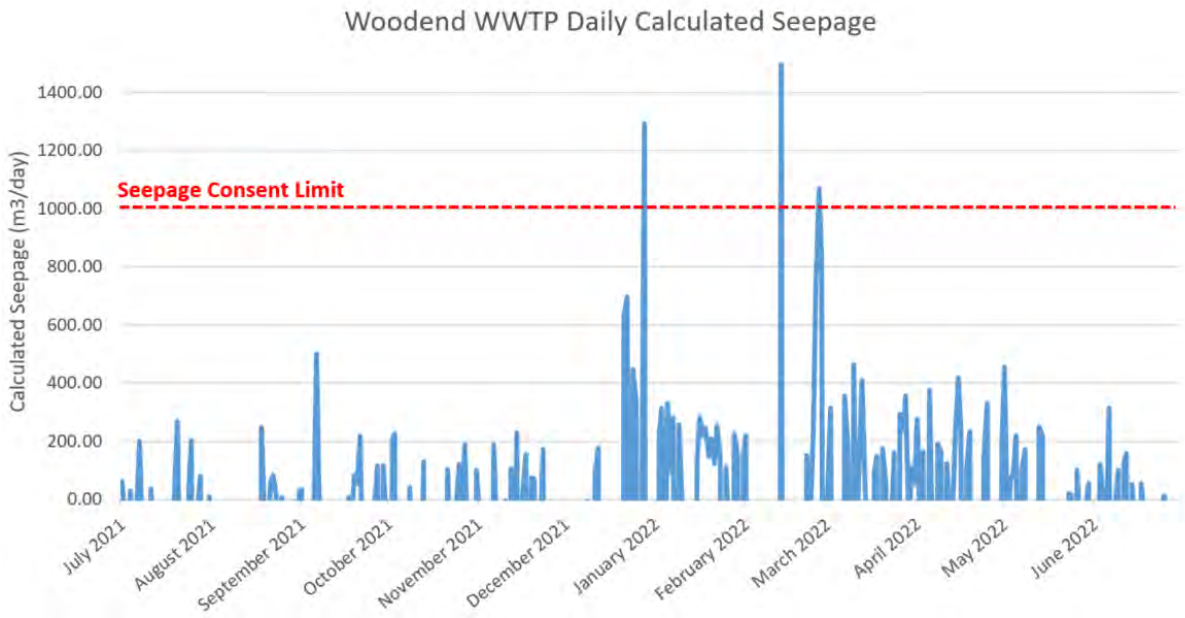


Figure 31: Calculated daily seepage volumes (m^3/day) July 2021 to June 2022

Condition 5 states that;

> "the volume of treated effluent discharged to land via seepage shall not exceed 1000 cubic metres per day."

The data implies that over the 2021/22 monitoring period WDC has generally complied with the daily seepage volume consent limit of 1,000 m^3/day. However, the calculated seepage volumes using the method prescribed in the consent exceeded the consented limit on three occasions on the 28 December 2021, 13 February 2022 and 26 February 2022 (refer Figure 31). In reality, the difference between the inflow and outflow under these conditions is predominantly due to an increase in storage levels within the ponds and wetlands rather than actual discharge to land via seepage as set out below.

- 28 December 2021 the difference in inflow less outflow volume was 1,291m^3 – The level in Wetland 2A rose from 74.7% to 96.3%, which is estimated to be 1,252.8m^3 of storage. If the change in storage volume were taken into account in the calculation, then this would reduce the seepage value to well under the limit of 1,000m^3/day.

- 13 February 2022 the difference in inflow less outflow volume was 1,587m^3 – The change in the level of Wetland 2A from 88.2% to 131.6% (this is the maximum level the transducer can measure), which is estimated to be 2,517.2m^3 of storage. While this figure is higher than the seepage, the rainfall that occurred that day of 63.8mm would have accounted for approximately 1,530m^3 this increase in storage level. Therefore the net seepage value (inflow and rainfall, less outflow and storage) is less than limit of 1,000m^3/day.
- 26 February 2022 the difference in inflow less outflow volume was 1,068 m^3 – The change in the level of Wetland 2A from 65.3% to 79.5% of storage, which accounts for 823.6m^3 of storage. Therefore the actual seepage value is less than limit of 1,000m^3/day.

The data indicates that over the 2021/22 monitoring period compliance with the daily seepage volume consent limit has been achieved.

4.3. Conditions 9 to 11 – Groundwater Monitoring

4.3.1. Monitoring requirements

Condition 9 of the resource consent requires two monitoring bores (south-east and west) to be sampled at three-monthly intervals. The south-east bore is located down-gradient of the WWTP and the west bore is located up-gradient (Figure 27 above).

In accordance with the Groundwater Monitoring Plan (WDC 2008), which is required under Condition 15, WDC began monitoring two domestic bores in February 2007, located on the Robinson and McKenzie properties directly to the west (up-gradient) of the WWTP (shown in Figure 27 above). Although the bores on these properties are consented for domestic water supply, both properties have an alternative water source supplied by WDC where they now receive a restricted water supply (2 m^3/day) from the Woodend water supply.

4.3.2. Depth to groundwater

Depth to groundwater was measured in the south-east and west bores on 4 occasions, as required, during the 2020/21 monitoring period (Table 15). Therefore, compliance with Condition 10 was met in full.

4.3.3. Groundwater quality

Groundwater samples were collected and analysed for nitrate-N, ammoniacal-N and faecal coliforms, as per Condition 11. The results are shown in Figures 31 to 33 and summarised in Table 15 below. There are no consent limits for these parameters.

Table 15: Groundwater quality monitoring at Woodend WWTP from 2020 to 2022

Sample	Bore	Top Water Level (m)	Ammoniacal-N (g/m^3)	Nitrate-N (g/m^3)	Faecal coliforms (cfu/100ml)
July/August 2020	McKenzie (up-gradient)	N/A	<0.010	<0.002	<1
	Robinsons (up-gradient)	N/A	0.021	<0.002	<1
	West (up-gradient)	3.6	0.95	<0.002	1
	South-east (down-gradient)	2.8	2.4	2.6	<1

October/November 2020	McKenzie (up-gradient)	N/A	<0.010	<0.002	<1
	Robinsons (up-gradient)	N/A	0.015	<0.002	<1
	West (up-gradient)	3.8	0.88	<0.02	1
	South-east (down-gradient)	3.0	2.4	<0.02	1
January 2021	McKenzie (up-gradient)	N/A	0.010	0.002	1
	Robinsons (up-gradient)	N/A	0.015	0.002	1
	West (up-gradient)	3.9	0.89	0.02	1
	South-east (down-gradient)	3.1	3	0.002	1
April 2021	McKenzie (up-gradient)	N/A	0.010	0.002	1
	Robinsons (up-gradient)	N/A	0.016	0.002	1
	West (up-gradient)	3.6	0.89	0.02	1
	South-east (down-gradient)	3.2	2.4	0.002	1
January 2022	McKenzie (up-gradient)	N/A	0.01	0.002	1
	Robinsons (up-gradient)	N/A	0.021	0.02	1
	West (up-gradient)	Not recorded	0.89	0.002	1
	South-east (down-gradient)	Not recorded	0.62	22	1
April 2022	McKenzie (up-gradient)	N/A	0.01	0.002	1
	Robinsons (up-gradient)	N/A	0.018	0.02	1
	West (up-gradient)	Not recorded	0.2	0.2	1
	South-east (down-gradient)	Not recorded	0.3	6.2	1

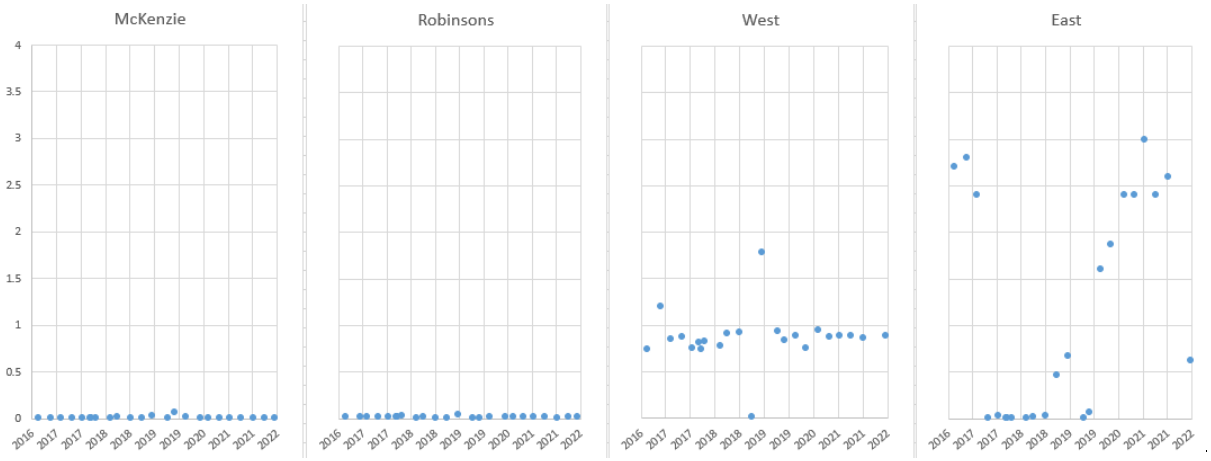


Figure 32: Ammoniacal-N concentration on groundwater monitoring bores from 2016 to 2022

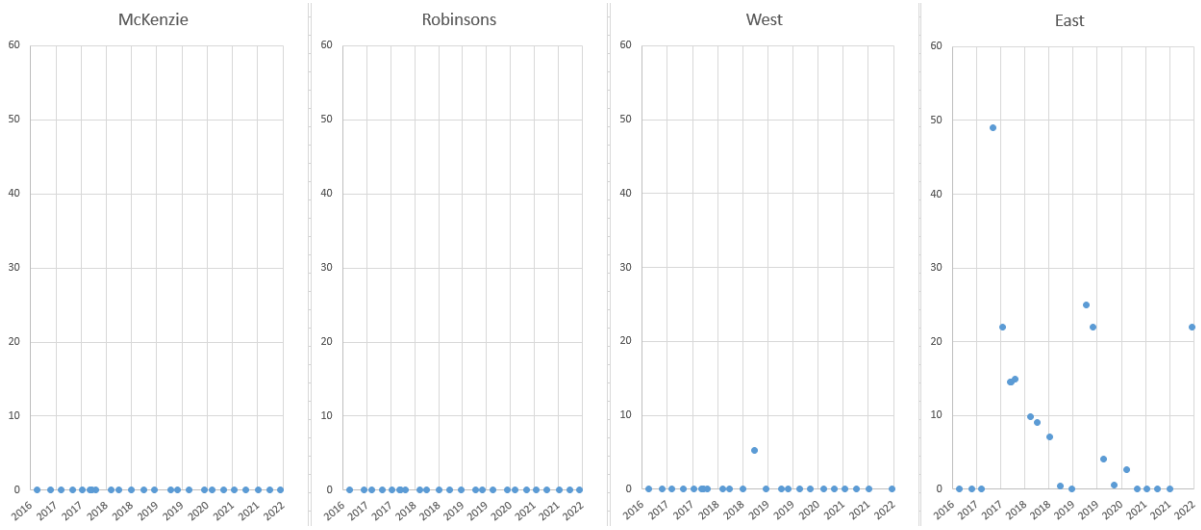


Figure 33: Nitrate-N concentration in groundwater monitoring bores from 2016 to 2022

Faecal coliforms were detected in the East bore (10 cfu/100 mL, September 2019) and the Robinson bore (10 cfu/100 mL, September 2019), but have not been detected since. Any results lower than detection are graphed as one.

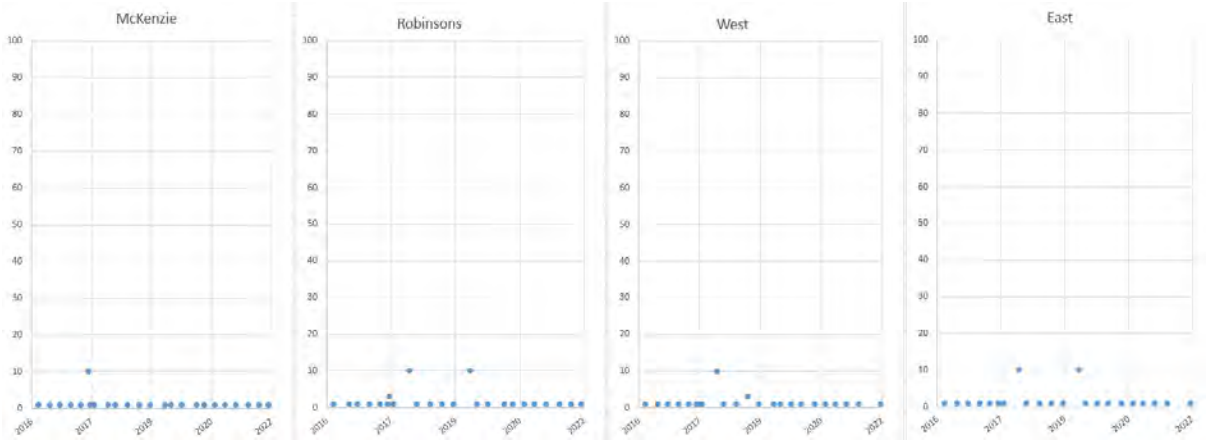


Figure 34: Faecal coliforms numbers in groundwater monitoring bores from 2016 to 2022

4.4. Operations and Maintenance

During the 2021/22 monitoring period there were no major capital works. The plant operation and maintenance has been standard with no significant unplanned maintenance needed to occur.

4.5. Summary of Compliance – CRC168391

Record keeping of wastewater volumes complied with the requirements of the resource consent and enabled seepage volumes to be calculated. Seepage volumes for the 2021/22 monitoring period met the requirements of Conditions 5 and 6.

Groundwater monitoring records for 2021/22 were complete, with groundwater levels (at the two bores where it is possible to take readings; some of the well heads are sealed) and water quality samples being collected on four occasions. Therefore, the requirements of Conditions 9, 10 and 11 were met in full.

The groundwater monitoring undertaken in 2021/22 indicates that:

- Ammoniacal-N concentrations in groundwater down-gradient of the Woodend WWTP was higher than that measured from the up-gradient bores; however. The Woodend WWTP is a likely contributor to elevated ammoniacaI-N concentrations in down-gradient groundwater.
- Nitrate-N concentrations in the down gradient bore has elevate levels compared to the up-gradient bores. On review of data over a 15 years period the concentrations of Nitrate-N have reduced. Prior to 2009 levels were recorded at 95 g/m^3. Concentrations in the down gradient bore have stabilised in the last 5 years.

Overall, WDC has achieved compliance with the conditions of resource consent CRC168391.

5. CRC031724 – DISCHARGE TO JOCKEY BAKER CREEK

5.1. Monitoring and Reporting Requirements

Resource consent CRC031724 was granted in 2004 to groundwater from subsoil drains and toe drains around infiltration wetland into the coastal marine area of Jockey Baker Creek.

In the event a discharge occurs into Jockey Baker Creek an alarm is raised in SCADA to inform the operators the event has occurred. If this occurs samples are to be taken as per Conditions 5 and 6.

There was no discharge into Jockey Baker Creek during the 2021/22 monitoring period.

6. CRC145027 – DESLUDGING AT RANGIORA WASTEWATER TREATMENT PLANT

6.1. Monitoring and Reporting Requirements

Resource consent CRC145027 was granted in October 2014 to permit the discharge of dewatered sludge removed from wastewater Pond 1A at the Rangiora WWTP to land. Sludge is suction dredged, then piped via a closed system to geotextile bags for storage and dewatering.

The existing geotextile bags are slowly dewatering, Council will be assessing long term options for disposal of the biosolids in the future.

The monitoring requirements are set out in Conditions 16 and 17:

Condition 16

"On completion of the pond dredging operation and commencement of the dewatering phase, the consent shall either:

a) Sampling the drainage water from the dewatering/dewatered sludge at six monthly intervals for the following parameters:
Arsenic
Copper
Cadmium
Chromium
Lead
Mercury
Nickel
Zinc, with all metals in the soluble form; and
Total Nitrogen
Ammoniacal Nitrogen
Dissolved Reactive Phosphorus; or

b) A subsequent sampling regime and timeframe that has received written approval from the Chief Executive of the Canterbury Regional Council or delegate shall be undertaken."

Condition 17

"The consent holder shall either:

a) Monitor the downstream monitoring bore M35/9177 at six monthly intervals (generally September and April) for the following parameters:
pH
Ammoniacal Nitrogen
Total Nitrogen
Metals (Zinc, Copper and Arsenic in the soluble form); or

b) A subsequent sampling regime and timeframe that has received written approval from the Chief Executive of the Canterbury Regional Council or delegate shall be undertaken."

The reporting requirements are set out in Condition 20 and state that the annual report is to include the following details:

- The discharge point of drainage water.
- Findings of the three monthly inspections of the liner, bund and drainage.
- Results of laboratory analyses undertaken in the previous 12-month period.
- Details of any spills.

6.2. Monitoring Results

6.2.1. Drainage water discharge point

All discharge from the discharge chamber is currently pumped back into Pond 1A at the Rangiora WWTP. There is no intention to move the discharge of drainage water to land discharge. Drainage water will be permanently discharged to the treatment plant for further treatment.

6.2.2. Three monthly inspections

Inspections of the sludge pond are done on a weekly basis, which is more regular than the three-monthly frequency required by the resource consent. There have been no reports of any issues

associated with the liner, pump, bund or drainage from the sludge pond during the 2021/22 monitoring period.

6.2.3. Laboratory analyses

Samples from the sludge pond pump chamber and M35/9177 were collected on the following dates:

- 31st August 2021
- 30th March 2022

If the discharge is below the trigger levels, the drainage water can be discharged direct to ground. Condition 16 of the resource consent requires two samples to be collected annually, at six monthly intervals, thus compliance with the monitoring requirements of Condition 16 was met during the 2021/22 monitoring period.

Table 16: Dewatering sample results and comparison with trigger values

Parameter (gm/m^3)	Aug-21	Apr-22	Trigger Levels[1]
Arsenic	<0.02	<0.02	0.2
Cadmium	0.046	0.023	
Chromium	0.011	<0.010	
Copper	1.79	1.33	
Lead	0.011	0.01	
Mercury	<0.00008	<0.00008	
Nickel	0.29	0.138	1.6
Zinc	29	9.9	30
Total Nitrogen	60	48	224
Ammoniacal-N	35	16.4	30
Dissolved Reactive Phosphorus	0.038	<0.04	

Condition 17 of the resource consent requires two samples to be collected annually, at six monthly intervals. Therefore, compliance with the requirements of Condition 17 were met in full during the 2021/22 monitoring period.

The results are shown in Table 17, and compared with 80% of the relevant maximum allowable value (MAV) reported in the New Zealand Drinking-Water Standards (NZDWS) (MoH 2008). Condition 14 states that should subsequent groundwater monitoring under Condition 17 show an upward trend extending over four consecutive sampling events, or a trigger level reaches 80% of the relevant MAV, then the discharge of dewatering water to land must cease and be returned to the treatment pond. All parameters recorded concentrations less than their respective 80% of MAV (where applicable), while pH was within the recommended range (MoH 2008). The only trend evident was the continued decrease in TN concentrations.

It is noted that WDC is not discharging to land so groundwater quality will not be affected by the sludge pond.

Table 17: Groundwater monitoring results for Bore M35/9177

Parameter	15-Aug-20	30-Mar-21	31-Aug-21	1-Apr-22	80% of MAV[1]
pH	7.3	7.2	7.1	7.5	7.0-8.52
Total Nitrogen	0.84	0.73	0.85	0.93	-
Ammoniacal-N	<0.0010	<0.010	<0.010	<0.010	1.2
Soluble Arsenic	<1.0010	<0.02	<0.0010	<0.0010	0.008
Soluble Copper	<1.0005	<0.0005	<0.0005	<0.0005	1.6
Soluble Zinc	0.001	<0.0010	0.0021	<0.0010	1.2

6.2.4. Spills

There were no spills during the 2021/22 monitoring period.

6.3. Operations and Management

There have been no significant operational changes that have an effect on CRC145027. The long-term plan for the discharge is to continue to return the drainage water back to the treatment plant. Discharge to ground will not be undertaken. Options to obtain a variation to the consent need to be assessed.

6.4. Summary Compliance – CRC145027

The monitoring and sampling results completed during the 2021/22 monitoring period are fully comply with Conditions 16 and 17.

7. CRC173124 – DISCHARGE CONTAMINANTS TO AIR - RANGIORA WASTEWATER TREATMENT PLANT

7.1. Monitoring and Reporting Requirements

The following is an extract from the consent that outlines the sampling requirements.

Condition 2

The wastewater treatment ponds and aeration basin shall be operated so that the dissolved oxygen concentrations of the wastewater in the ponds are maintained at levels of no less than two grams per cubic metre, based on the ten percentile of annual results during the hours of measurement as stated in Condition 3.

Condition 3

Dissolved oxygen levels shall be measured in each pond between the hours of 11am and 2pm on one day in every seven day period.

Condition 4

The consent holder shall maintain a record of dissolved oxygen measurements which shall include the following information:

- The date and time the measurements were taken; and
- Water temperature at the time the measurements were taken; and
- Dissolved oxygen concentrations; and
- Identification of the pond in which the measurements were taken.

7.2. Monitoring Results

7.2.1. Dissolved Oxygen Concentration

A total of 204 samples were taken for dissolved oxygen during the 2021/22 monitoring period (refer Figure 35). The ten percentile of annual results was 2.25 g/m^3, which is above the minimum level in the consent condition. Therefore the ponds are being appropriately managed to achieve compliance with condition 2.

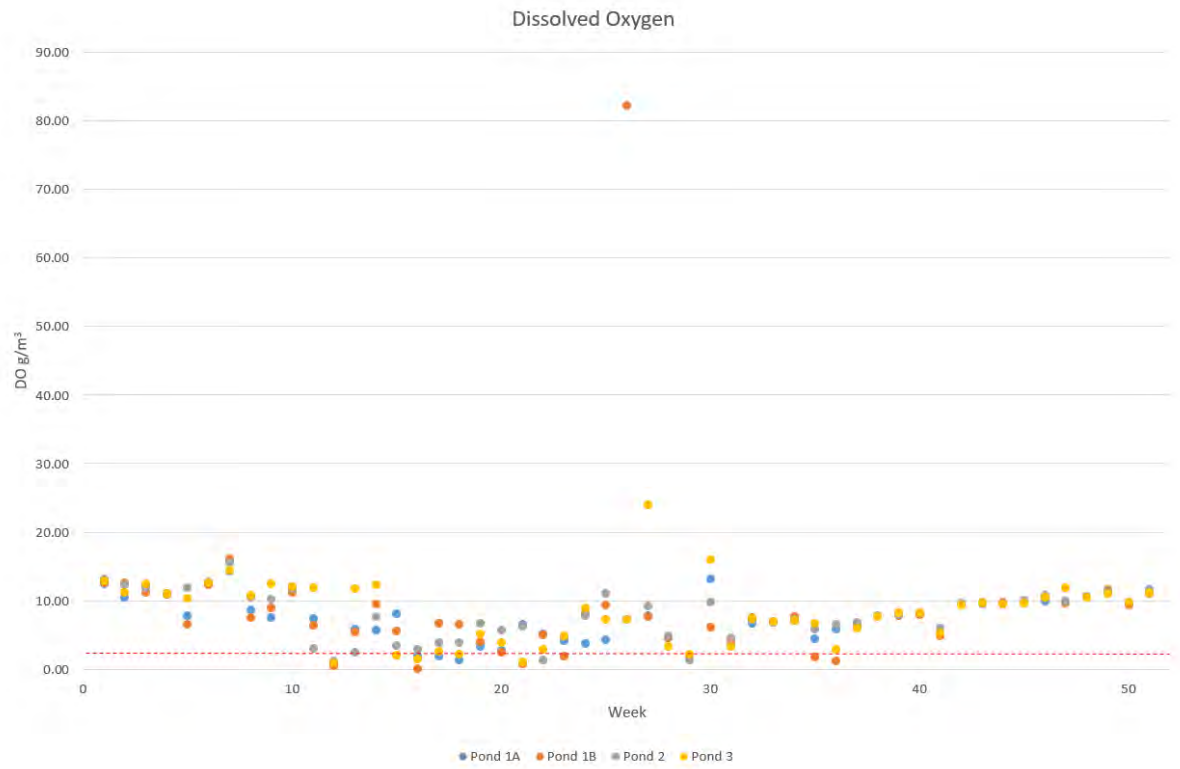


Figure 35: Dissolved oxygen levels in Ponds 1A, 1B, 2 and 3

The operators visit the sites weekly and record the data that is electronically recorded. This data has been forwarded to ECan electronically and is available upon request. It is noted that only about half of the samples were taken within the required timeframes. WDC has put in measures to ensure compliance with Condition 3 in the future and is also currently reviewing whethee a variation to this condition should be sought. Note complying with Condition 3 is considered to be a technical non-compliance with no actual or potrential environmental effects.

Note that Conditions 9, 10, 11, 12 are no longer applicable. These relate to the using of sprays that were used to remove NH4. These have been decommissioned. A variation should be sort from ECan in the future to update the consent.

7.3. Odour Complaints

There were no odour complaints for the 2021/22 monitoring period.

7.4. Summary of Compliance

Compliance has been fully met for CRC173124.

APPENDIX A

Ocean Outfall Discharge Monitoring Results – Organochlorine Pesticides, PCBs and PAHs

Record No. 220830149017

CRC041162

Hill Laboratories
TRIED, TESTED AND TRUSTED

R J Hill Laboratories Limited
28 Duke Street Frankton 3204
Private Bag 3205
Hamilton 3240 New Zealand

T 0508 HILL LAB (44 555 22)
T +64 7 858 2000
E mail@hill-labs.co.nz
W www.hill-laboratories.com

Certificate of Analysis

Client:	Waimakariri District Council	**Lab No:**	2908428	SPv1
Contact:	Darryn Williams	**Date Received:**	08-Mar-2022	
	C/- Waimakariri District Council	**Date Reported:**	16-Mar-2022	
	Private Bag 1005	**Quote No:**	53943	
	Rangiora 7440	**Order No:**		
		Client Reference:	Consent: CRC041162.2	
		Submitted By:	Darryn Williams	

Sample Type: Aqueous

		Sample Name:	DWS22 - Junction Ocean Outfall - Annual 08-Mar-2022 9:50 am				
		Lab Number:	2908428.1				
Individual Tests							
pH	pH Units		8.1	-	-	-	-
Total Suspended Solids	g/m³		60	-	-	-	-
Total Nitrogen	g/m³		6.2	-	-	-	-
Total Ammoniacal-N	g/m³		1.39	-	-	-	-
Nitrate-N + Nitrite-N	g/m³		0.60	-	-	-	-
Total Kjeldahl Nitrogen (TKN)	g/m³		5.6	-	-	-	-
Dissolved Reactive Phosphorus	g/m³		2.5	-	-	-	-
Total Phosphorus	g/m³		3.8	-	-	-	-
Dissolved Total Biochemical Oxygen Demand ($TBOD_5$)	g O_2/m³		3	-	-	-	-
Total Biochemical Oxygen Demand ($TBOD_5$)	g O_2/m³		15	-	-	-	-
Enterococci	MPN / 100mL		> 2,420	-	-	-	-
Campylobacter*	per 500mL		Not Detected	-	-	-	-
Salmonella*	per 500mL		Not Detected	-	-	-	-
Faecal Coliforms and E. coli profile							
Faecal Coliforms	cfu / 100mL		40 #1	-	-	-	-
Escherichia coli	cfu / 100mL		20 #1	-	-	-	-
Organochlorine Pesticides Screening in Water, By Liq/Liq							
Aldrin	g/m³		< 0.00010	-	-	-	-
alpha-BHC	g/m³		< 0.0002	-	-	-	-
beta-BHC	g/m³		< 0.0002	-	-	-	-
delta-BHC	g/m³		< 0.0002	-	-	-	-
gamma-BHC (Lindane)	g/m³		< 0.0002	-	-	-	-
cis-Chlordane	g/m³		< 0.00010	-	-	-	-
trans-Chlordane	g/m³		< 0.00010	-	-	-	-
2,4'-DDD	g/m³		< 0.0002	-	-	-	-
4,4'-DDD	g/m³		< 0.0002	-	-	-	-
2,4'-DDE	g/m³		< 0.0002	-	-	-	-
4,4'-DDE	g/m³		< 0.0002	-	-	-	-
2,4'-DDT	g/m³		< 0.0002	-	-	-	-
4,4'-DDT	g/m³		< 0.0002	-	-	-	-
Dieldrin	g/m³		< 0.00010	-	-	-	-
Endosulfan I	g/m³		< 0.0002	-	-	-	-
Endosulfan II	g/m³		< 0.0002	-	-	-	-
Endosulfan sulphate	g/m³		< 0.0002	-	-	-	-

Sample Type: Aqueous						
Sample Name:		DWS22 - Junction Ocean Outfall - Annual 08-Mar-2022 9:50 am				
Lab Number:		2908428.1				
Organochlorine Pesticides Screening in Water, By Liq/Liq						
Endrin	g/m³	< 0.00010	-	-	-	-
Endrin aldehyde	g/m³	< 0.00010	-	-	-	-
Endrin ketone	g/m³	< 0.0002	-	-	-	-
Heptachlor	g/m³	< 0.00010	-	-	-	-
Heptachlor epoxide	g/m³	< 0.00010	-	-	-	-
Hexachlorobenzene	g/m³	< 0.0008	-	-	-	-
Methoxychlor	g/m³	< 0.00010	-	-	-	-
Polycyclic Aromatic Hydrocarbons Screening in Water, By Liq/Liq						
Acenaphthene	g/m³	< 0.0004	-	-	-	-
Acenaphthylene	g/m³	< 0.0004	-	-	-	-
Anthracene	g/m³	< 0.0004	-	-	-	-
Benzo[a]anthracene	g/m³	< 0.0004	-	-	-	-
Benzo[a]pyrene (BAP)	g/m³	< 0.0004	-	-	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	g/m³	< 0.0004	-	-	-	-
Benzo[g,h,i]perylene	g/m³	< 0.0004	-	-	-	-
Benzo[k]fluoranthene	g/m³	< 0.0004	-	-	-	-
Chrysene	g/m³	< 0.0004	-	-	-	-
Dibenzo[a,h]anthracene	g/m³	< 0.0004	-	-	-	-
Fluoranthene	g/m³	< 0.0004	-	-	-	-
Fluorene	g/m³	< 0.0004	-	-	-	-
Indeno(1,2,3-c,d)pyrene	g/m³	< 0.0004	-	-	-	-
Naphthalene	g/m³	< 0.002	-	-	-	-
Phenanthrene	g/m³	< 0.0004	-	-	-	-
Pyrene	g/m³	< 0.0004	-	-	-	-
Polychlorinated Biphenyls Screening in Water, By Liq/Liq						
PCB-18	g/m³	< 0.0004	-	-	-	-
PCB-28	g/m³	< 0.0004	-	-	-	-
PCB-31	g/m³	< 0.0004	-	-	-	-
PCB-44	g/m³	< 0.0004	-	-	-	-
PCB-49	g/m³	< 0.0004	-	-	-	-
PCB-52	g/m³	< 0.0004	-	-	-	-
PCB-60	g/m³	< 0.0004	-	-	-	-
PCB-77	g/m³	< 0.0004	-	-	-	-
PCB-81	g/m³	< 0.0004	-	-	-	-
PCB-86	g/m³	< 0.0004	-	-	-	-
PCB-101	g/m³	< 0.0004	-	-	-	-
PCB-105	g/m³	< 0.0004	-	-	-	-
PCB-110	g/m³	< 0.0004	-	-	-	-
PCB-114	g/m³	< 0.0004	-	-	-	-
PCB-118	g/m³	< 0.0004	-	-	-	-
PCB-121	g/m³	< 0.0004	-	-	-	-
PCB-123	g/m³	< 0.0004	-	-	-	-
PCB-126	g/m³	< 0.0004	-	-	-	-
PCB-128	g/m³	< 0.0004	-	-	-	-
PCB-138	g/m³	< 0.0004	-	-	-	-
PCB-141	g/m³	< 0.0004	-	-	-	-
PCB-149	g/m³	< 0.0004	-	-	-	-
PCB-151	g/m³	< 0.0004	-	-	-	-
PCB-153	g/m³	< 0.0004	-	-	-	-
PCB-156	g/m³	< 0.0004	-	-	-	-
PCB-157	g/m³	< 0.0004	-	-	-	-
PCB-159	g/m³	< 0.0004	-	-	-	-

Sample Type: Aqueous						
Sample Name:	DWS22 - Junction Ocean Outfall - Annual 08-Mar-2022 9:50 am					
Lab Number:	2908428.1					
Polychlorinated Biphenyls Screening in Water, By Liq/Liq						
PCB-167	g/m³	< 0.0004	-	-	-	-
PCB-169	g/m³	< 0.0004	-	-	-	-
PCB-170	g/m³	< 0.0004	-	-	-	-
PCB-180	g/m³	< 0.0004	-	-	-	-
PCB-189	g/m³	< 0.0004	-	-	-	-
PCB-194	g/m³	< 0.0004	-	-	-	-
PCB-206	g/m³	< 0.0004	-	-	-	-
PCB-209	g/m³	< 0.0004	-	-	-	-
Total PCB (Sum of 35 congeners)	g/m³	< 0.014	-	-	-	-

Analyst's Comments

#1 Statistically estimated count based on the theoretical countable range for the stated method.

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Laboratories, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Aqueous			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Individual Tests			
Filtration, Glass Fibre for Soluble BOD	Sample filtration through glass fibre filter.	-	1
Filtration, Unpreserved	Sample filtration through 0.45µm membrane filter. Performed at Hill Laboratories - Chemistry; 101c Waterloo Road, Christchurch.	-	1
pH	pH meter. Analysed at Hill Laboratories - Chemistry; 101c Waterloo Road, Christchurch. APHA 4500-H^+ B 23rd ed. 2017. Note: It is not possible to achieve the APHA Maximum Storage Recommendation for this test (15 min) when samples are analysed upon receipt at the laboratory, and not in the field. Samples and Standards are analysed at an equivalent laboratory temperature (typically 18 to 22 °C). Temperature compensation is used.	0.1 pH Units	1
Total Suspended Solids	Filtration using Whatman 934 AH, Advantec GC-50 or equivalent filters (nominal pore size 1.2 - 1.5µm), gravimetric determination. Analysed at Hill Laboratories - Chemistry; 101c Waterloo Road, Christchurch. APHA 2540 D (modified) 23rd ed. 2017.	3 g/m³	1
Total Nitrogen	Calculation: TKN + Nitrate-N + Nitrite-N. Please note: The Default Detection Limit of 0.05 g/m³ is only attainable when the TKN has been determined using a trace method utilising duplicate analyses. In cases where the Detection Limit for TKN is 0.10 g/m³, the Default Detection Limit for Total Nitrogen will be 0.11 g/m³. In-house calculation.	0.05 g/m³	1
Total Ammoniacal-N	Filtered Sample from Christchurch. Phenol/hypochlorite colourimetry. Flow injection analyser. (NH_4-N = NH_4^+-N + NH_3-N). APHA 4500-NH_3 H (modified) 23rd ed. 2017.	0.010 g/m³	1
Nitrate-N + Nitrite-N	Filtered sample from Christchurch. Total oxidised nitrogen. Automated cadmium reduction, flow injection analyser. APHA 4500-NO_3^- I (modified) 23rd ed. 2017.	0.002 g/m³	1
Total Kjeldahl Nitrogen (TKN)	Total Kjeldahl digestion, phenol/hypochlorite colorimetry. Discrete Analyser. APHA 4500-N_{org} D (modified) 4500 NH_3 F (modified) 23rd ed. 2017.	0.10 g/m³	1
Dissolved Reactive Phosphorus	Filtered sample from Christchurch. Molybdenum blue colourimetry. Flow injection analyser. APHA 4500-P G (modified) 23rd ed. 2017.	0.004 g/m³	1
Total Phosphorus	Total phosphorus digestion, automated ascorbic acid colorimetry. Flow Injection Analyser. APHA 4500-P H 23rd ed. 2017.	0.002 g/m³	1
Dissolved Total Biochemical Oxygen Demand ($TBOD_5$)	Filtered sample (1.2um glass fibre filter), Incubation 5 days, DO meter, no nitrification inhibitor added, seeded. Analysed at Hill Laboratories - Chemistry; 101c Waterloo Road, Christchurch. APHA 5210 B (modified) 23rd ed. 2017.	2 g O_2/m³	1

Sample Type: Aqueous			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Total Biochemical Oxygen Demand ($TBOD_5$)	Incubation 5 days, DO meter, no nitrification inhibitor added, seeded. Analysed at Hill Laboratories - Chemistry; 101c Waterloo Road, Christchurch. APHA 5210 B (modified) 23rd ed. 2017.	2 g O_2/m^3	1
Enterococci	MPN count using Enterolert, Incubated at 41°C for 24 hours. Analysed at Hill Laboratories - Microbiology; 101c Waterloo Road, Hornby, Christchurch. MIMM 12.4, APHA 9230 D 23rd ed. 2017.	1 MPN / 100mL	1
Campylobacter*	Presence / Absence. Bolton broth, CCDA agar. Latex confirmation. Analysed at Hill Laboratories - Microbiology; 101c Waterloo Road, Hornby, Christchurch. APHA 30 5th Ed.	-	1
Salmonella*	Detection of Salmonella by qualitative real-time PCR. In-house method. Analysis performed at Hill Laboratories - Microbiology, 101C Waterloo Road, Christchurch.	-	1
Organochlorine Pesticides Screening in Water, By Liq/Liq	Liquid / liquid extraction, GC-ECD analysis. In-house based on US EPA 8081.	0.00010 - 0.0008 g/m^3	1
Polycyclic Aromatic Hydrocarbons Screening in Water, By Liq/Liq	Liquid / liquid extraction, GC-MS analysis. In-house based on US EPA 8270.	0.00010 - 0.0005 g/m^3	1
Polychlorinated Biphenyls Screening in Water, By Liq/Liq	Liquid / liquid extraction, GC-MS analysis. In-house based on US EPA 8270.	0.00010 - 0.005 g/m^3	1
Faecal Coliforms and E. coli profile			
Faecal Coliforms	Membrane Filtration, Count on mFC agar, Incubated at 44.5°C for 22 hours, Confirmation Analysed at Hill Laboratories - Microbiology; 101c Waterloo Road, Hornby, Christchurch. APHA 9222 D 23rd ed. 2017.	1 cfu / 100mL	1
Escherichia coli	Membrane filtration, Count on mFC agar, Incubated at 44.5°C for 22 hours, Confirmation Analysed at Hill Laboratories - Microbiology; 101c Waterloo Road, Hornby, Christchurch. APHA 9222 I 23rd ed. 2017.	1 cfu / 100mL	1

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Testing was completed between 09-Mar-2022 and 16-Mar-2022. For completion dates of individual analyses please contact the laboratory.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

Martin Cowell - BSc
Client Services Manager - Environmental

Hill Laboratories
TRIED, TESTED AND TRUSTED

R J Hill Laboratories Limited
28 Duke Street Frankton 3204
Private Bag 3205
Hamilton 3240 New Zealand

T 0508 HILL LAB (44 555 22)
T +64 7 858 2000
E mail@hill-labs.co.nz
W www.hill-laboratories.com

Certificate of Analysis

Client:	Waimakariri District Council	**Lab No:**	2908428	SPv1
Contact:	Darryn Williams	**Date Received:**	08-Mar-2022	
	C/- Waimakariri District Council	**Date Reported:**	16-Mar-2022	
	Private Bag 1005	**Quote No:**	53943	
	Rangiora 7440	**Order No:**		
		Client Reference:	Consent: CRC041162.2	
		Submitted By:	Darryn Williams	

Sample Type: Aqueous

		Sample Name:	DWS22 - Junction Ocean Outfall - Annual 08-Mar-2022 9:50 am				
		Lab Number:	2908428.1				
Individual Tests							
pH	pH Units		8.1	-	-	-	-
Total Suspended Solids	g/m³		60	-	-	-	-
Total Nitrogen	g/m³		6.2	-	-	-	-
Total Ammoniacal-N	g/m³		1.39	-	-	-	-
Nitrate-N + Nitrite-N	g/m³		0.60	-	-	-	-
Total Kjeldahl Nitrogen (TKN)	g/m³		5.6	-	-	-	-
Dissolved Reactive Phosphorus	g/m³		2.5	-	-	-	-
Total Phosphorus	g/m³		3.8	-	-	-	-
Dissolved Total Biochemical Oxygen Demand ($TBOD_5$)	g O_2/m³		3	-	-	-	-
Total Biochemical Oxygen Demand ($TBOD_5$)	g O_2/m³		15	-	-	-	-
Enterococci	MPN / 100mL		> 2,420	-	-	-	-
Campylobacter*	per 500mL		Not Detected	-	-	-	-
Salmonella*	per 500mL		Not Detected	-	-	-	-
Faecal Coliforms and E. coli profile							
Faecal Coliforms	cfu / 100mL		40 #1	-	-	-	-
Escherichia coli	cfu / 100mL		20 #1	-	-	-	-
Organochlorine Pesticides Screening in Water, By Liq/Liq							
Aldrin	g/m³		< 0.00010	-	-	-	-
alpha-BHC	g/m³		< 0.0002	-	-	-	-
beta-BHC	g/m³		< 0.0002	-	-	-	-
delta-BHC	g/m³		< 0.0002	-	-	-	-
gamma-BHC (Lindane)	g/m³		< 0.0002	-	-	-	-
cis-Chlordane	g/m³		< 0.00010	-	-	-	-
trans-Chlordane	g/m³		< 0.00010	-	-	-	-
2,4'-DDD	g/m³		< 0.0002	-	-	-	-
4,4'-DDD	g/m³		< 0.0002	-	-	-	-
2,4'-DDE	g/m³		< 0.0002	-	-	-	-
4,4'-DDE	g/m³		< 0.0002	-	-	-	-
2,4'-DDT	g/m³		< 0.0002	-	-	-	-
4,4'-DDT	g/m³		< 0.0002	-	-	-	-
Dieldrin	g/m³		< 0.00010	-	-	-	-
Endosulfan I	g/m³		< 0.0002	-	-	-	-
Endosulfan II	g/m³		< 0.0002	-	-	-	-
Endosulfan sulphate	g/m³		< 0.0002	-	-	-	-

Sample Type: Aqueous						
Sample Name:		DWS22 - Junction Ocean Outfall - Annual 08-Mar-2022 9:50 am				
Lab Number:		2908428.1				
Organochlorine Pesticides Screening in Water, By Liq/Liq						
Endrin	g/m³	< 0.00010	-	-	-	-
Endrin aldehyde	g/m³	< 0.00010	-	-	-	-
Endrin ketone	g/m³	< 0.0002	-	-	-	-
Heptachlor	g/m³	< 0.00010	-	-	-	-
Heptachlor epoxide	g/m³	< 0.00010	-	-	-	-
Hexachlorobenzene	g/m³	< 0.0008	-	-	-	-
Methoxychlor	g/m³	< 0.00010	-	-	-	-
Polycyclic Aromatic Hydrocarbons Screening in Water, By Liq/Liq						
Acenaphthene	g/m³	< 0.0004	-	-	-	-
Acenaphthylene	g/m³	< 0.0004	-	-	-	-
Anthracene	g/m³	< 0.0004	-	-	-	-
Benzo[a]anthracene	g/m³	< 0.0004	-	-	-	-
Benzo[a]pyrene (BAP)	g/m³	< 0.0004	-	-	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	g/m³	< 0.0004	-	-	-	-
Benzo[g,h,i]perylene	g/m³	< 0.0004	-	-	-	-
Benzo[k]fluoranthene	g/m³	< 0.0004	-	-	-	-
Chrysene	g/m³	< 0.0004	-	-	-	-
Dibenzo[a,h]anthracene	g/m³	< 0.0004	-	-	-	-
Fluoranthene	g/m³	< 0.0004	-	-	-	-
Fluorene	g/m³	< 0.0004	-	-	-	-
Indeno(1,2,3-c,d)pyrene	g/m³	< 0.0004	-	-	-	-
Naphthalene	g/m³	< 0.002	-	-	-	-
Phenanthrene	g/m³	< 0.0004	-	-	-	-
Pyrene	g/m³	< 0.0004	-	-	-	-
Polychlorinated Biphenyls Screening in Water, By Liq/Liq						
PCB-18	g/m³	< 0.0004	-	-	-	-
PCB-28	g/m³	< 0.0004	-	-	-	-
PCB-31	g/m³	< 0.0004	-	-	-	-
PCB-44	g/m³	< 0.0004	-	-	-	-
PCB-49	g/m³	< 0.0004	-	-	-	-
PCB-52	g/m³	< 0.0004	-	-	-	-
PCB-60	g/m³	< 0.0004	-	-	-	-
PCB-77	g/m³	< 0.0004	-	-	-	-
PCB-81	g/m³	< 0.0004	-	-	-	-
PCB-86	g/m³	< 0.0004	-	-	-	-
PCB-101	g/m³	< 0.0004	-	-	-	-
PCB-105	g/m³	< 0.0004	-	-	-	-
PCB-110	g/m³	< 0.0004	-	-	-	-
PCB-114	g/m³	< 0.0004	-	-	-	-
PCB-118	g/m³	< 0.0004	-	-	-	-
PCB-121	g/m³	< 0.0004	-	-	-	-
PCB-123	g/m³	< 0.0004	-	-	-	-
PCB-126	g/m³	< 0.0004	-	-	-	-
PCB-128	g/m³	< 0.0004	-	-	-	-
PCB-138	g/m³	< 0.0004	-	-	-	-
PCB-141	g/m³	< 0.0004	-	-	-	-
PCB-149	g/m³	< 0.0004	-	-	-	-
PCB-151	g/m³	< 0.0004	-	-	-	-
PCB-153	g/m³	< 0.0004	-	-	-	-
PCB-156	g/m³	< 0.0004	-	-	-	-
PCB-157	g/m³	< 0.0004	-	-	-	-
PCB-159	g/m³	< 0.0004	-	-	-	-

Sample Type: Aqueous						
Sample Name:	DWS22 - Junction Ocean Outfall - Annual 08-Mar-2022 9:50 am					
Lab Number:	2908428.1					
Polychlorinated Biphenyls Screening in Water, By Liq/Liq						
PCB-167	g/m³	< 0.0004	-	-	-	-
PCB-169	g/m³	< 0.0004	-	-	-	-
PCB-170	g/m³	< 0.0004	-	-	-	-
PCB-180	g/m³	< 0.0004	-	-	-	-
PCB-189	g/m³	< 0.0004	-	-	-	-
PCB-194	g/m³	< 0.0004	-	-	-	-
PCB-206	g/m³	< 0.0004	-	-	-	-
PCB-209	g/m³	< 0.0004	-	-	-	-
Total PCB (Sum of 35 congeners)	g/m³	< 0.014	-	-	-	-

Analyst's Comments

#1 Statistically estimated count based on the theoretical countable range for the stated method.

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Laboratories, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Aqueous			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Individual Tests			
Filtration, Glass Fibre for Soluble BOD	Sample filtration through glass fibre filter.	-	1
Filtration, Unpreserved	Sample filtration through 0.45µm membrane filter. Performed at Hill Laboratories - Chemistry; 101c Waterloo Road, Christchurch.	-	1
pH	pH meter. Analysed at Hill Laboratories - Chemistry; 101c Waterloo Road, Christchurch. APHA 4500-H^+ B 23rd ed. 2017. Note: It is not possible to achieve the APHA Maximum Storage Recommendation for this test (15 min) when samples are analysed upon receipt at the laboratory, and not in the field. Samples and Standards are analysed at an equivalent laboratory temperature (typically 18 to 22 °C). Temperature compensation is used.	0.1 pH Units	1
Total Suspended Solids	Filtration using Whatman 934 AH, Advantec GC-50 or equivalent filters (nominal pore size 1.2 - 1.5µm), gravimetric determination. Analysed at Hill Laboratories - Chemistry; 101c Waterloo Road, Christchurch. APHA 2540 D (modified) 23rd ed. 2017.	3 g/m³	1
Total Nitrogen	Calculation: TKN + Nitrate-N + Nitrite-N. Please note: The Default Detection Limit of 0.05 g/m³ is only attainable when the TKN has been determined using a trace method utilising duplicate analyses. In cases where the Detection Limit for TKN is 0.10 g/m³, the Default Detection Limit for Total Nitrogen will be 0.11 g/m³. In-house calculation.	0.05 g/m³	1
Total Ammoniacal-N	Filtered Sample from Christchurch. Phenol/hypochlorite colourimetry. Flow injection analyser. (NH_4-N = NH_4^+-N + NH_3-N). APHA 4500-NH_3 H (modified) 23rd ed. 2017.	0.010 g/m³	1
Nitrate-N + Nitrite-N	Filtered sample from Christchurch. Total oxidised nitrogen. Automated cadmium reduction, flow injection analyser. APHA 4500-NO_3^- I (modified) 23rd ed. 2017.	0.002 g/m³	1
Total Kjeldahl Nitrogen (TKN)	Total Kjeldahl digestion, phenol/hypochlorite colorimetry. Discrete Analyser. APHA 4500-N_{org} D (modified) 4500 NH_3 F (modified) 23rd ed. 2017.	0.10 g/m³	1
Dissolved Reactive Phosphorus	Filtered sample from Christchurch. Molybdenum blue colourimetry. Flow injection analyser. APHA 4500-P G (modified) 23rd ed. 2017.	0.004 g/m³	1
Total Phosphorus	Total phosphorus digestion, automated ascorbic acid colorimetry. Flow Injection Analyser. APHA 4500-P H 23rd ed. 2017.	0.002 g/m³	1
Dissolved Total Biochemical Oxygen Demand ($TBOD_5$)	Filtered sample (1.2um glass fibre filter), Incubation 5 days, DO meter, no nitrification inhibitor added, seeded. Analysed at Hill Laboratories - Chemistry; 101c Waterloo Road, Christchurch. APHA 5210 B (modified) 23rd ed. 2017.	2 g O_2/m³	1

Sample Type: Aqueous			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Total Biochemical Oxygen Demand ($TBOD_5$)	Incubation 5 days, DO meter, no nitrification inhibitor added, seeded. Analysed at Hill Laboratories - Chemistry; 101c Waterloo Road, Christchurch. APHA 5210 B (modified) 23rd ed. 2017.	2 g O_2/m^3	1
Enterococci	MPN count using Enterolert, Incubated at 41°C for 24 hours. Analysed at Hill Laboratories - Microbiology; 101c Waterloo Road, Hornby, Christchurch. MIMM 12.4, APHA 9230 D 23rd ed. 2017.	1 MPN / 100mL	1
Campylobacter*	Presence / Absence. Bolton broth, CCDA agar. Latex confirmation. Analysed at Hill Laboratories - Microbiology; 101c Waterloo Road, Hornby, Christchurch. APHA 30 5th Ed.	-	1
Salmonella*	Detection of Salmonella by qualitative real-time PCR. In-house method. Analysis performed at Hill Laboratories - Microbiology, 101C Waterloo Road, Christchurch.	-	1
Organochlorine Pesticides Screening in Water, By Liq/Liq	Liquid / liquid extraction, GC-ECD analysis. In-house based on US EPA 8081.	0.00010 - 0.0008 g/m^3	1
Polycyclic Aromatic Hydrocarbons Screening in Water, By Liq/Liq	Liquid / liquid extraction, GC-MS analysis. In-house based on US EPA 8270.	0.00010 - 0.0005 g/m^3	1
Polychlorinated Biphenyls Screening in Water, By Liq/Liq	Liquid / liquid extraction, GC-MS analysis. In-house based on US EPA 8270.	0.00010 - 0.005 g/m^3	1
Faecal Coliforms and E. coli profile			
Faecal Coliforms	Membrane Filtration, Count on mFC agar, Incubated at 44.5°C for 22 hours, Confirmation Analysed at Hill Laboratories - Microbiology; 101c Waterloo Road, Hornby, Christchurch. APHA 9222 D 23rd ed. 2017.	1 cfu / 100mL	1
Escherichia coli	Membrane filtration, Count on mFC agar, Incubated at 44.5°C for 22 hours, Confirmation Analysed at Hill Laboratories - Microbiology; 101c Waterloo Road, Hornby, Christchurch. APHA 9222 I 23rd ed. 2017.	1 cfu / 100mL	1

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Testing was completed between 09-Mar-2022 and 16-Mar-2022. For completion dates of individual analyses please contact the laboratory.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

Martin Cowell - BSc
Client Services Manager - Environmental

APPENDIX B

NIWA report on Waimakariri District Council outfall: sixth post construction survey

Record No. 220513076587

May 2022

CRC041162.2

NIWA
Taihoro Nukurangi

Waimakariri District Council outfall: sixth post construction survey

Prepared for Waimakariri District Council

May 2022

Prepared by:
Kimberley Seaward, Andrew Miller, Chris Woods, Lily Pryor-Rodgers

For any information regarding this report please contact:

Kimberley Seaward
Marine Ecology Technician
Marine Ecosystems & Biosecurity
+64 3 343 8063
kimberley.seaward@niwa.co.nz

National Institute of Water & Atmospheric Research Ltd
PO Box 8602
Riccarton
Christchurch 8011

Phone +64 3 348 8987

NIWA CLIENT REPORT No: 2022093CH
Report date: May 2022
NIWA Project: WDC22501

Revision	Description	Date
Version 1.0	Final Report	13 May 2022

Quality Assurance Statement		
	Reviewed by:	Chris Woods
	Formatting checked by:	Rachel Wright
	Approved for release by:	Helen Rouse

Contents

Tables

Figures

Executive summary

Monitoring conditions for the Waimakariri District Council marine sub-aqueous ocean outfall diffuser in Pegasus Bay are specified under Environment Canterbury (ECAN) resource consent CRC41162.2, with the locations, details, and methods of the monitoring covered under Resource Consent conditions 15–26 inclusive. These conditions were issued in 2009 and apply through until 2039. Monitoring at this level is required every five years with the last survey being undertaken in 2017 (Brown 2017).

This report presents the results of the sixth post-construction survey after the commissioning of the outfall and follows previous baseline and post-construction reports (Willis et al. 2007, Brown et al. 2008, Cole et al. 2009, Environment Canterbury 2009, Handley et al. 2012, Brown 2017).

The objectives of the survey were to classify and sample marine sediments and identify benthic biota (infauna) at stations located along transects running north and south of the outfall. Epifaunal samples were also undertaken to maintain consistency with previous reports but are not part of consent condition requirements. Surveying water quality within the discharge plume at predetermined distances away from the outfall diffuser to detect any significant effects resulting from the outfall discharge also occurred. Survey results were analysed and compared with previous monitoring surveys.

The survey found no significant effects from the outfall, based on sampling and analysis of physical, chemical, and bacteriological parameters of surface waters, sediment physicochemical properties and seabed infaunal and epifaunal assemblages.

Bacteria levels (enterococci and faecal coliforms) in the surface waters, and trace metal contaminant concentrations in sediments were significantly below trigger levels that if exceeded, prompt further action according to updated and previously accepted guidelines (ANZECC 2000, ANZECC 2022). Comparison of sediment physicochemical results from all post-construction survey years provided no evidence of significant effects from the outfall.

No significant effects attributable to the outfall discharge were evident from our analysis of the spatial and temporal distribution of benthic biota living in and around the seabed when comparing the results of this survey with previous post-construction surveys.

1 Introduction

The Waimakariri District Council is required to monitor the water quality, sediments, and benthic infauna at locations around the marine sub-aqueous ocean outfall diffuser in Pegasus Bay (Figure 1-1Figure 1-1). Monitoring conditions are specified under consent CRC41162.2, with the locations, details, and methods of the monitoring covered under Resource Consent conditions 15–26 inclusive (Environment Canterbury 2009).

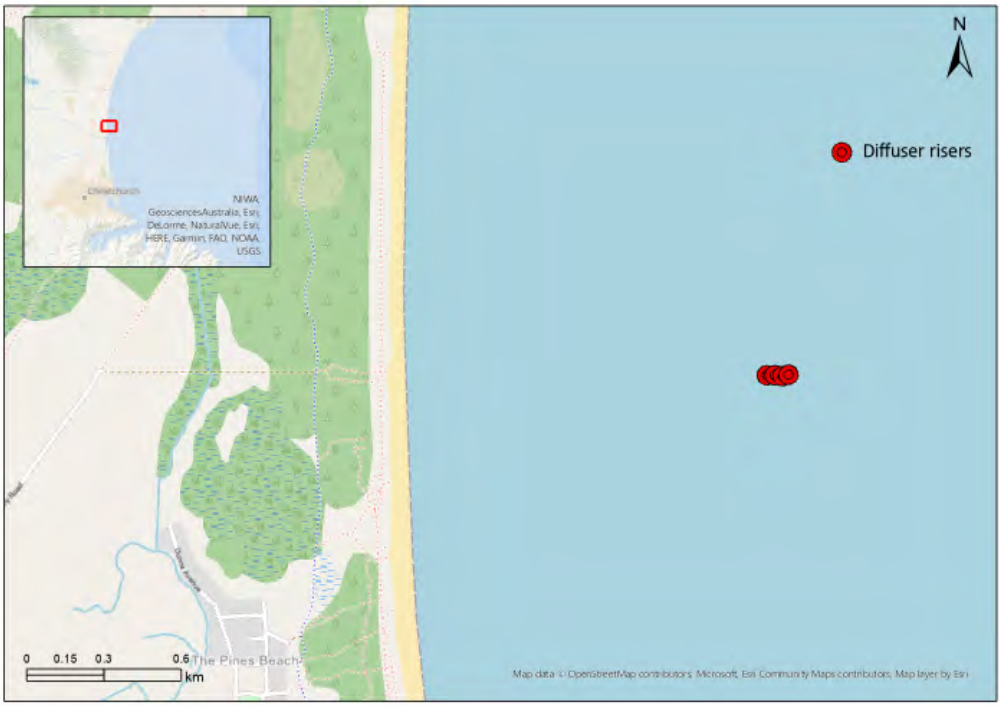


Figure 1-1: Map showing location of the Waimakariri District Council outfall diffuser risers relative to the city of Christchurch and Pines Beach.

2 Method

2.1 Sampling and analysis of samples

2.1.1 Water quality

Water quality sampling, according to methods in the consent conditions, was undertaken on 15 March 2022 following the direction of the discharge plume from the outfall diffuser determined using a trackable drogue. Collection points were immediately adjacent (0–25 m), 100, 200, 500 and 1000 m from the centre point of the diffuser. At each collection point, 1.4 L of seawater was collected manually using sterile polyethylene terephthalate (PET) containers as the drogue passed over those distances from the diffuser. Water quality monitoring commenced on the first third of the rising tide and notes were made of:

- geographical coordinates (latitude, longitude) of each sample
- visual observations for scums, foams, and other floatable material
- dissolved oxygen (% saturation)
- temperature (°C)
- salinity (psu).

Water quality samples were analysed at each site for total suspended solids (g/m^3), total nitrogen (TN mg/m^3), ammoniacal nitrogen (NH4-N, mg/m^3), nitrate (NO3, mg/m^3 N-dry wt), total phosphorus (TP mg/m^3), dissolved reactive phosphorus (DRP mg/m^3), faecal coliforms (1 cfu/100 mL), and enterococci (1 cfu/100 mL). All water quality samples were sent to Hill Laboratories for analysis and they provided all methods and detection limits which can be seen in Appendix A.

2.1.2 Sediment quality

A Van Veen benthic grab was used to sample benthic sediments. The Van Veen benthic grab has a volume of ~23 L and samples an area of seafloor of ~37 cm x 30 cm to a maximum depth of 22 cm (sediment type permitting). Sediment within the grab retains its overall profile structure. The Van Veen benthic grab was used to collect three replicate sediment cores (13 cm diameter and 10 cm deep) at sites immediately adjacent (0–25 m), 100, 250, 500 and 1000 m from the centre point of the diffuser in a northerly direction and at sites 100, 250, 500 and 1000 m from the centre point of the diffuser in a southerly direction (n=27 cores).

Samples were analysed for sediment physicochemical parameters including sediment grain size (% weight using Udden-Wentworth grain size classification (Wentworth 1922)) and total organic carbon (TOC, %-dry wt). Total nutrient content was analysed using total nitrogen (TN, mg/kg N-dry wt) and total phosphorus (TP mg/kg P-dry wt). Sediment cores were also analysed for metal content including arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc (all measured as mg/kg-dry wt). Sediment samples were also sent to Hill Laboratories for analyses, with methods and detections limits provided listed below (Appendix B).

During collection, all cores were examined, and information recorded on their general appearance including texture, colour, occurrence of anthropogenic debris, odour, apparent redox potential discontinuity layer (visual assessment only), and a photographic record taken.

As specified in the consent conditions, only the top 20 mm of any core was processed for physiochemical analyses and each replicate at each site was examined separately. However, three replicate sediment cores from each site were combined for analysis of metal content.

Grain size analysis was performed by NIWA Christchurch. Samples were dried in a 60°C oven until they reached a constant weight and then sieved into five size class fractions:

- > 2 mm gravel
- > 1–2 mm coarse sand
- > 0.5–1 mm medium sand
- > 0.063–0.5 mm fine to very fine sand
- <0.063 mm silt/mud.

The weights of each separate 'sand' size class were combined to give an overall value for comparison with previous surveys.

2.1.3 Benthic infauna

The Van Veen benthic grab was also used to collect five replicate infauna cores (13 cm diameter and 10 cm deep) from the nine sites mentioned previously (n=45 cores). They were collected from each site and sieved through 0.5 mm mesh and preserved in 70% ethanol. In the laboratory, infauna were stained using Rose Bengal which attaches to proteins in organisms and changes their colour to pink, allowing separation of infauna from detritus. Infauna were separated into general phyla, counted, and identified to the lowest practical taxonomic level for each replicate and preserved. Identifications were cross-referenced with previously collected specimens to ensure taxonomic accuracy between surveys. All biological material was retained to enhance the infauna reference collection.

2.1.4 Benthic epifauna

Although not specified in the consent conditions, for consistency between post-construction reports, epibenthic organisms were sampled using an epibenthic sled. A total of 4 x ~100-m tows were undertaken at approximately 100 m and 1000 m to the north and south of the diffuser. Start and end coordinates of the tows were recorded, and all organisms were retained, identified, counted, and compared with previous surveys.

2.2 Data analysis

The analysis of data is consistent with previous reports. Analyses focus on confirming the structure of the sediments, as well as establishing whether there have been any changes in the water quality and sediment parameters from previous monitoring surveys, including baseline data. Faunal analyses focus on species diversity, invertebrate abundance, community composition and any important or indicator species. Various univariate and multivariate statistical procedures were used to assess the significance of variation away from the centre of the diffuser.

Count data of infaunal species were statistically analysed with non-metric multi-dimensional scaling. Non-metric multi-dimensional scaling (nMDS) is an ordination (dimension-reduction method) that is more robust than conventional approaches based on matrix division and is explained in Clarke (1993). Its algorithm attempts to minimise "stress" among samples in a lower number of dimensions than there are (in the present case) species. Thus, instead of attempting to interpret differences

among stations on the basis of 98 taxa, the ordination displays patterns among the stations in 2 (derived) dimensions. In this report, nMDS analyses are presented based on Bray-Curtis distance (a measure based on presence or absence of each species). These nMDS plots are usually presented with a stress value that is a measure of how well the analysis fits the data; stress values > 0.05 provides an excellent representation in reduced dimensions, > 0.1 is very good >0.2 is considered essentially random, and stress > 0.3 provides a poor representation.

3 Results

3.1 Water quality

For the entirety of the sampling the sea was calm, with less than 1 m swell and a maximum northeast wind speed of ~7 kn. No scum, foam, floating material, or plumes were visible at any point during the water quality sampling. In comparison to previous years where the drogue drifted south, firstly, the drogue drifted west, then in a northerly direction, with sampling occurring between the time of 11:00 and 15:00 (Figure 3-1).

Water quality appears to be consistent with previous surveys. Salinity did not vary with distance from the diffuser. Temperature varied by less than a degree over the course of the sampling and dissolved oxygen varied by less than two per cent (Table 3-3). Faecal coliforms were detected at 1/100 mL at 100 m from the diffuser but collections at all other distances provided no detections. Enterococci were detected at 1/100 mL adjacent to the diffuser, but no other detections were recorded. Total nitrogen was consistent across all stations and the variation between all other chemical analyses by stations is negligible (Table 3-2).

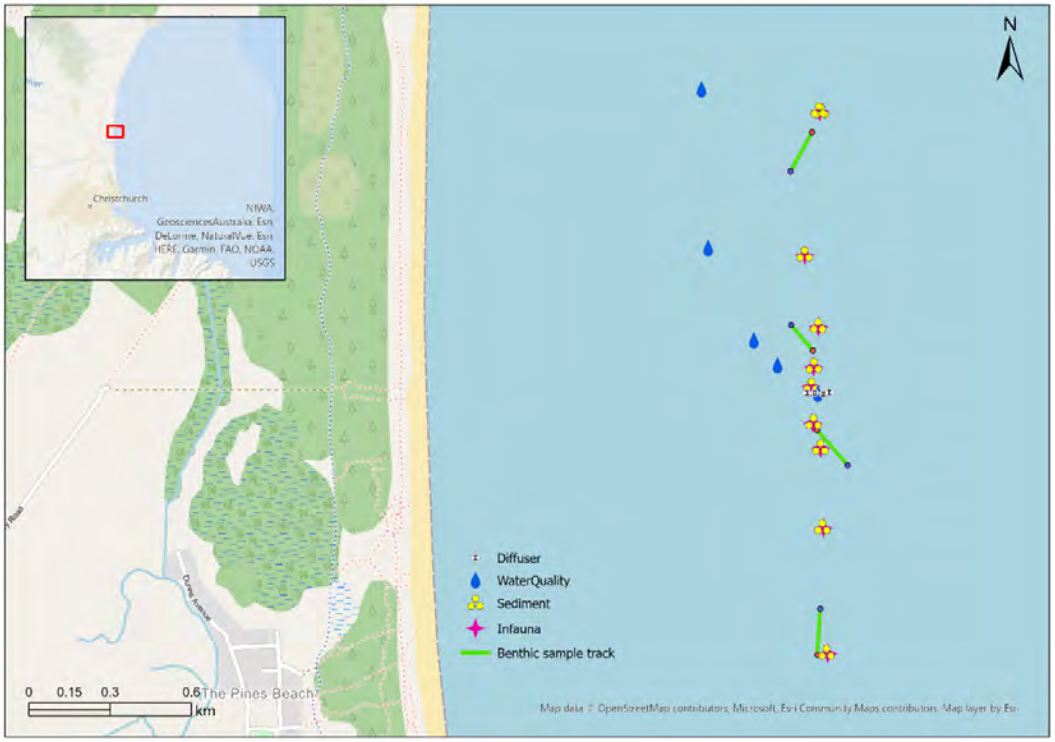


Figure 3-1: Map showing location of the outfall diffuser relative to the city of Christchurch and Pines Beach. Locations of sediment grabs for chemical analysis and infauna counts, water quality samples and benthic sampling tows are also included.

Table 3-1: Faecal coliform and enterococci levels at increasing distances from the Waimakariri District Council outfall diffuser. Methods and detection limits in Appendix A.

			Faecal Coliforms	Enterococci
Distance (m)	Sample	Date received	cfu/100 mL	cfu/100 mL
0	WQ 1 15-Mar-2022	16-Mar-2022	< 1[1]	1[1]
100	WQ 2 15-Mar-2022	16-Mar-2022	1[1]	< 1[1]
200	WQ 3 15-Mar-2022	16-Mar-2022	< [1]1	< 1[1]
500	WQ 4 15-Mar-2022	16-Mar-2022	< 1[1]	< 1[1]
1000	WQ 5 15-Mar-2022	16-Mar-2022	< 1[1]	< 1[1]

[1] Statistically estimated count based on the theoretical countable range for the stated method.

Table 3-2: Water quality data. Chemical analyses of water samples at increasing distances from the outfall diffuser. 'Distance' denotes distance from diffuser, along path of drift of the drogue. Detection limits and methods given in Appendix A

	Distance (m)	0-diffuser	100	200	500	1000
Sample		WQ 1 15-Mar-2022	WQ 2 15-Mar-2022	WQ 3 15-Mar-2022	WQ 4 15-Mar-2022	WQ 5 15-Mar-2022
Date received		16-Mar-2022	16-Mar-2022	16-Mar-2022	16-Mar-2022	16-Mar-2022
Total Suspended Solids	g/m^3	5	4	3	4	4
Total Nitrogen	g/m^3	0.27	0.24	0.21	0.23	0.24
Total Ammoniacal-N	g/m^3	0.049	< 0.005	< 0.005	< 0.005	< 0.005
Nitrite-N	g/m^3	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Nitrate-N	g/m^3	0.02	0.0187	0.006	< 0.001	< 0.001
Nitrate-N + Nitrite-N	g/m^3	0.02	0.0187	0.006	< 0.001	< 0.001
Dissolved Reactive Phosphorus	g/m^3	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Total Phosphorus	g/m^3	< 0.004	0.006	0.007	0.006	0.004
Total Phosphate	g/m^3	< 0.02	< 0.02	0.02	< 0.02	< 0.02

Table 3-3: Drogue positions, time, dissolved oxygen, temperature, and salinity values. Samples taken as drogue passed over increasing distances from the Waimakariri District Council outfall diffuser.

Distance (m)	Latitude (WGS84)	Longitude (WGS84)	Time	Scum	Foam	Other floatable materials	Dissolved oxygen (DO) (%)	Temp ºC	Salinity
0-diffuser	-43.3653	172.727801	11:20	nil	nil	nil	106.1	17.3	33
100	-43.3644	172.725972	12:13	nil	nil	nil	105.6	17.9	33
200	-43.3636	172.724898	13:07	nil	nil	nil	106.8	17.5	33
500	-43.3605	172.72283	14:26	nil	nil	nil	107.6	17	33
1000	-43.3552	172.722551	14:55	nil	nil	nil	107.7	17	33

Figure 3-2: Deploying the drifting drogue for water quality sample collection.

3.2 Sediment quality

3.2.1 Sediment composition 2022

Sediment composition varied little over 1 km north and south of the Waimakariri District Council outfall diffuser. Silt or mud (<0.063 mm) and coarse sand (>1 mm) was greatest at the southernmost station (S 1000). The northernmost station (N 1000) and the diffuser station consisted of equal percentages of fine to very fine sand (> 0.063 mm, 92 per cent) and the only station with greater than one per cent gravel was the station 100 m south (Figure 3-3).

No material of human origin was detected, and no significant levels of terrestrial material were recorded. Sediments were not odorous, and no obvious redox layers were noted in the sediment cores or overall grabs. Examples of the composition of the sediment cores are provided in Figure 3-4 to help visualise the separation of the size classes of sediments.

To test for data normality, quantile-quantile (QQ) plots were created as they draw correlations between data and the normal distribution between silt and year of sampling. All plots appeared to fall approximately along the reference line for the 2022 samples so we can assume data normality (Appendix C).

Analysis of variance (ANOVA) tests of the significance of mean percentages of silt with distance, direction from the diffuser and sampling year as orthogonal factors showed that there was a significant difference in mean percentages of silt between years as well as significant interactions between year, distance, and direction. However, although analyses show that there was a change through time it was not as a result of proximity to the diffuser (distance) (Table 3-4). Sediment composition data for all stations and replicates are provided in Appendix D.

Table 3-4: ANOVA tests of significance of mean percentage of silt where year, direction (north or south) and distance (from the outfall diffuser) are orthogonal factors. Significant results (at $P < 0.05$) are denoted in bold type.

Source	df	Mean sq.	F-Ratio	P-Value
Between subjects				
Direction	2	259.7	2.939	0.056489
Distance	3	46.6	0.528	0.664152
Direction x Distance	3	585.4	6.626	**0.000339**
Within subjects				
Year	7	326.7	3.698	**0.001127**
Year x Direction	10	743.5	8.416	**2.00E-10**
Year x Distance	21	350.6	3.968	**5.72E-07**
Year x Direction x Distance	21	502.2	5.684	**1.51E-10**

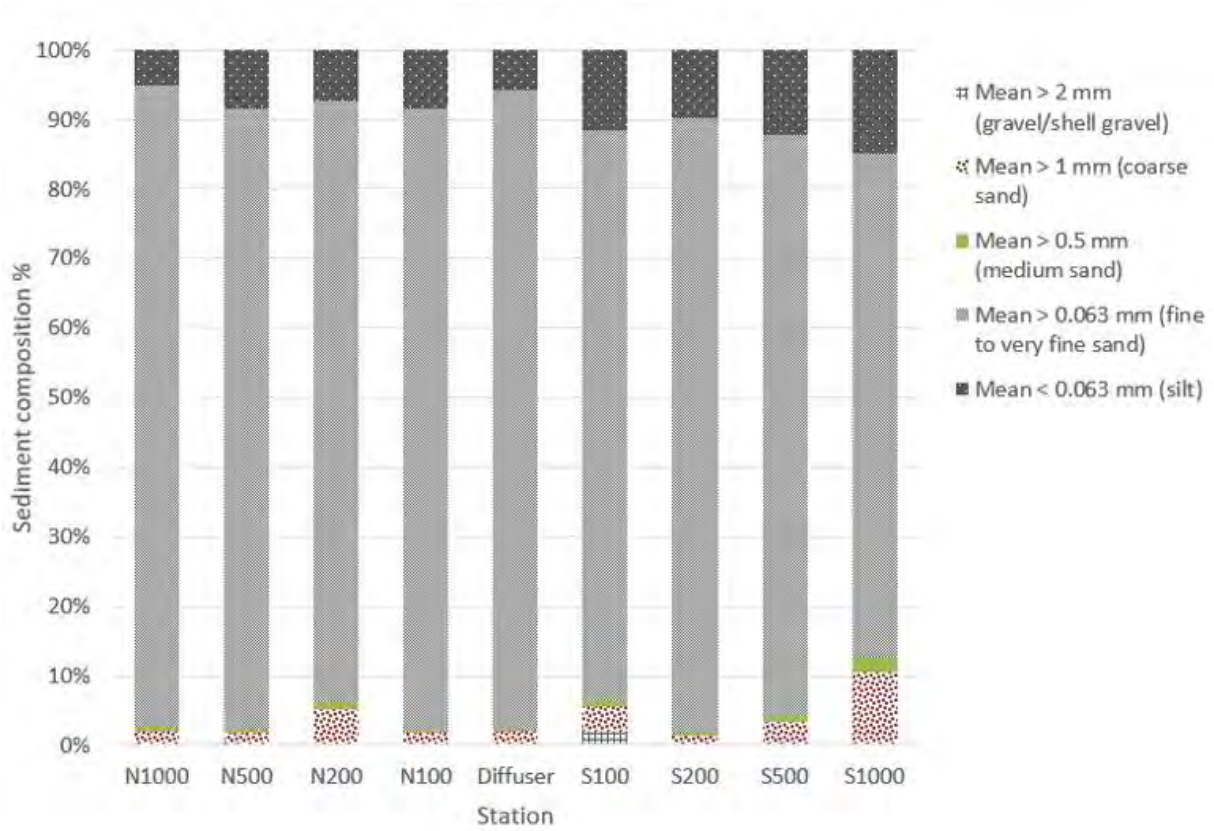


Figure 3-3: Average percentage sediment composition of samples taken at intervals north and south of the Waimakariri District Council outfall diffuser.

Figure 3-4: Photograph of examples of the five Wentworth sediment composition classification levels at three sampling stations.

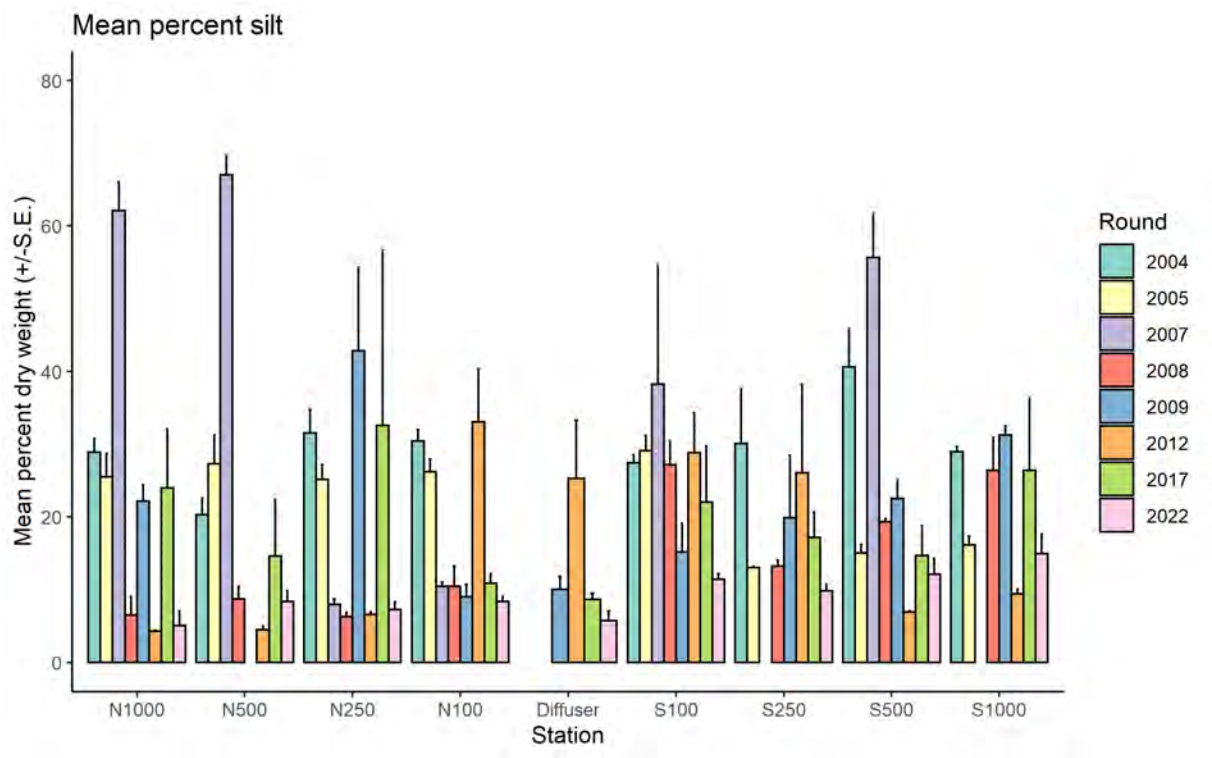


Figure 3-5: Mean percentage dry weight of silt/mud (<0.063 mm) (+/- SE).

3.2.2 Sediment chemistry

Although the collection methods used during baseline surveys in 2004 and 2005 (cores collected by divers, see Kingett-Mitchell (2004), Kingett-Mitchell (2005)) differed from that used from the first post construction survey in 2007 onwards (benthic grab sampling, see Willis et al. (2007)), the core dimensions and the laboratory analytical methods were identical in all years. Thus, samples should be comparable between years (Brown et al. 2008).

To maintain consistency with previous reports, summaries of mean values at each station for physicochemical characteristics are presented for all years (Figure 3-6 to Figure 3-11). Baseline values (Kingett-Mitchell 2004, Kingett-Mitchell 2005) are included for all distances along the transect except at zero metres (location of the outfall diffuser) as these were taken pre-construction.

The most notable differences in sediment physicochemical characteristics from previous years is the overall increase in levels at station S1000. Arsenic (Ar), cadmium (Cd), total organic carbon (TOC), copper (Cu), lead (Pb), mercury (Hg), nickel (Ni), phosphorus (P), and zinc (Zn) were all recorded at higher levels than those recorded in 2017. However, all these increases are smaller than the values recorded for the same chemical compounds in 2007. All levels recorded are below the ISQG-low trigger values for marine water (Table 3-5) (ANZECC 2000, ANZECC 2022).

Table 3-5: Australian and New Zealand trigger levels for sediment contaminants Full trigger level values can be found on the updated website (ANZECC 2022).

Contaminant	ISQG-Low	ISQG-High
METALS (mg/kg dry wt)		
Cadmium	1.5	10
Chromium	80	370
Copper	65	270
Lead	50	220
Mercury	0.15	1
Zinc	200	400
METALLOIDS (mg/kg dry wt)		
Arsenic 20 70	20	70

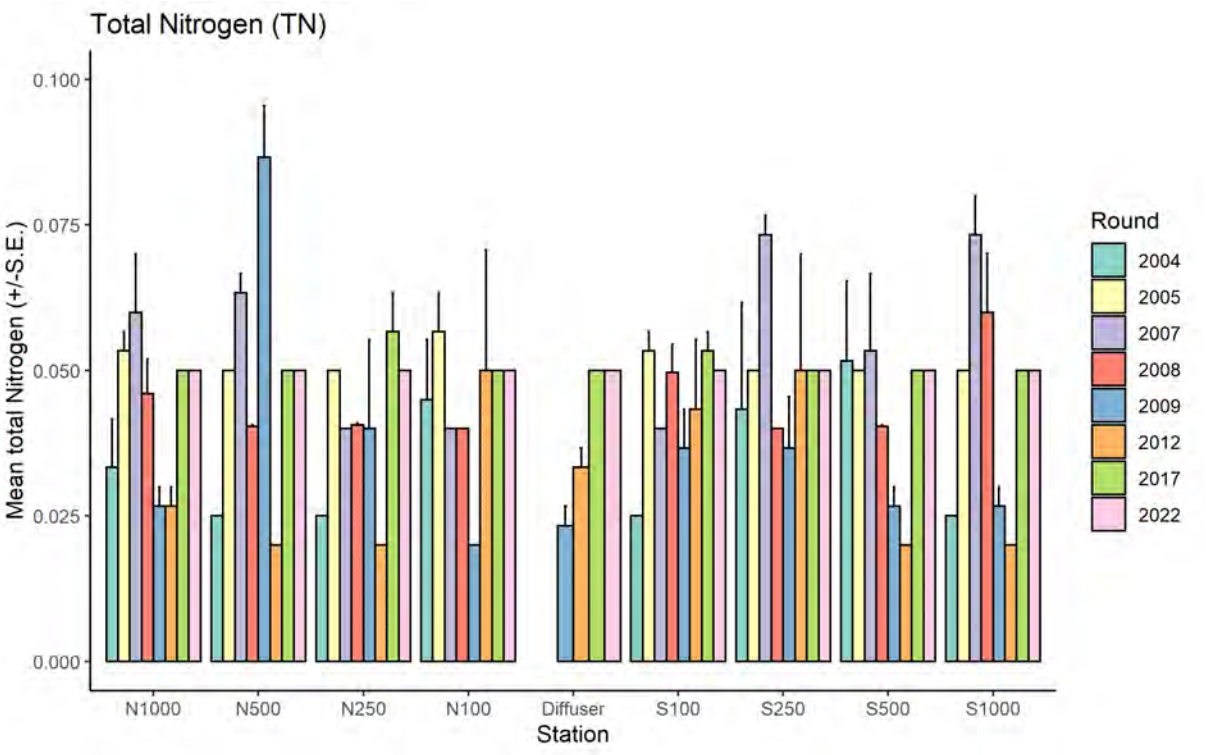


Figure 3-6: Mean total nitrogen (TN) at each station for each sampling year (Round) (+/- SE).

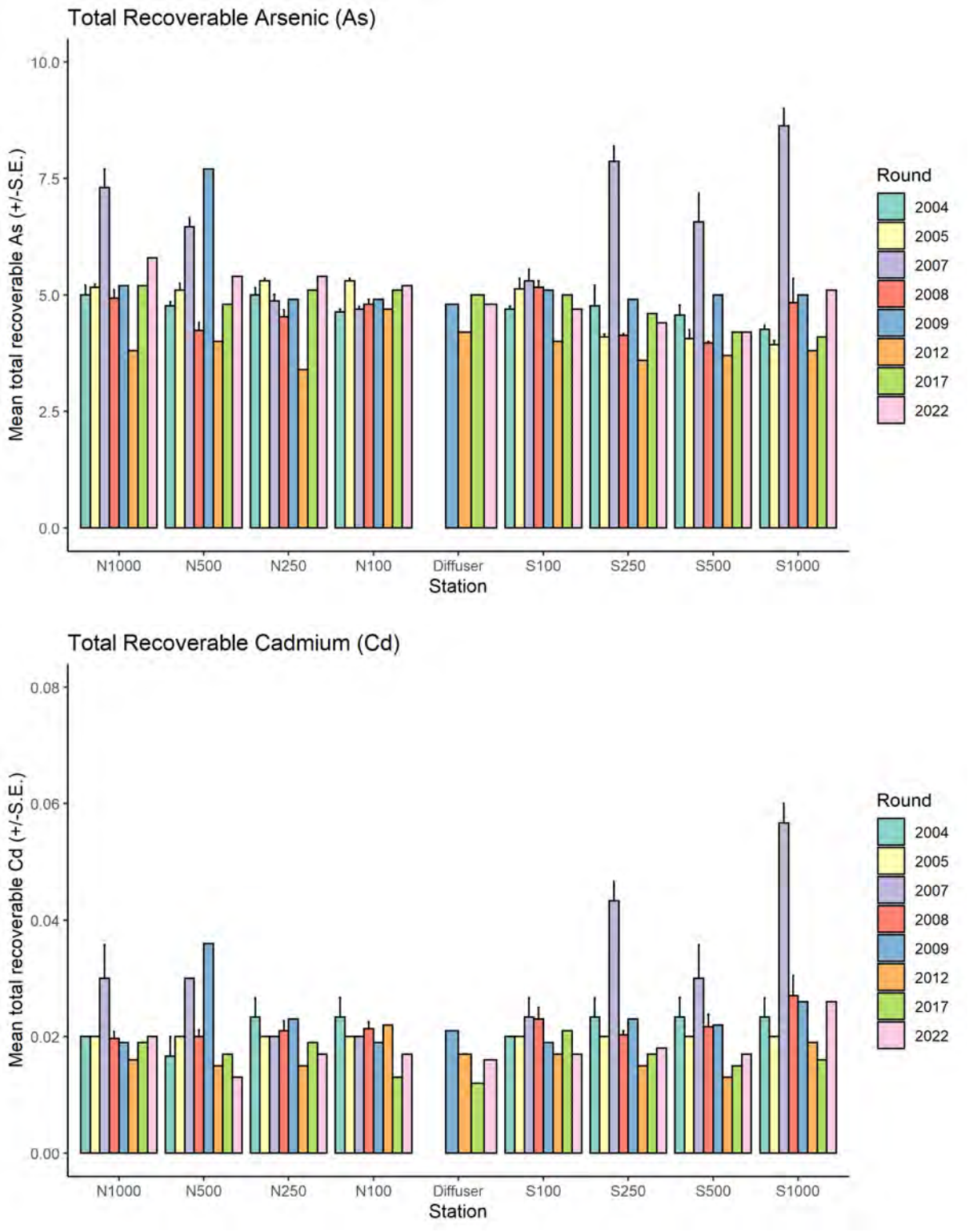


Figure 3-7: Mean total recoverable arsenic (As)(top) and mean total cadmium Cd (bottom) at each station for each sampling year (Round) (+/- SE).

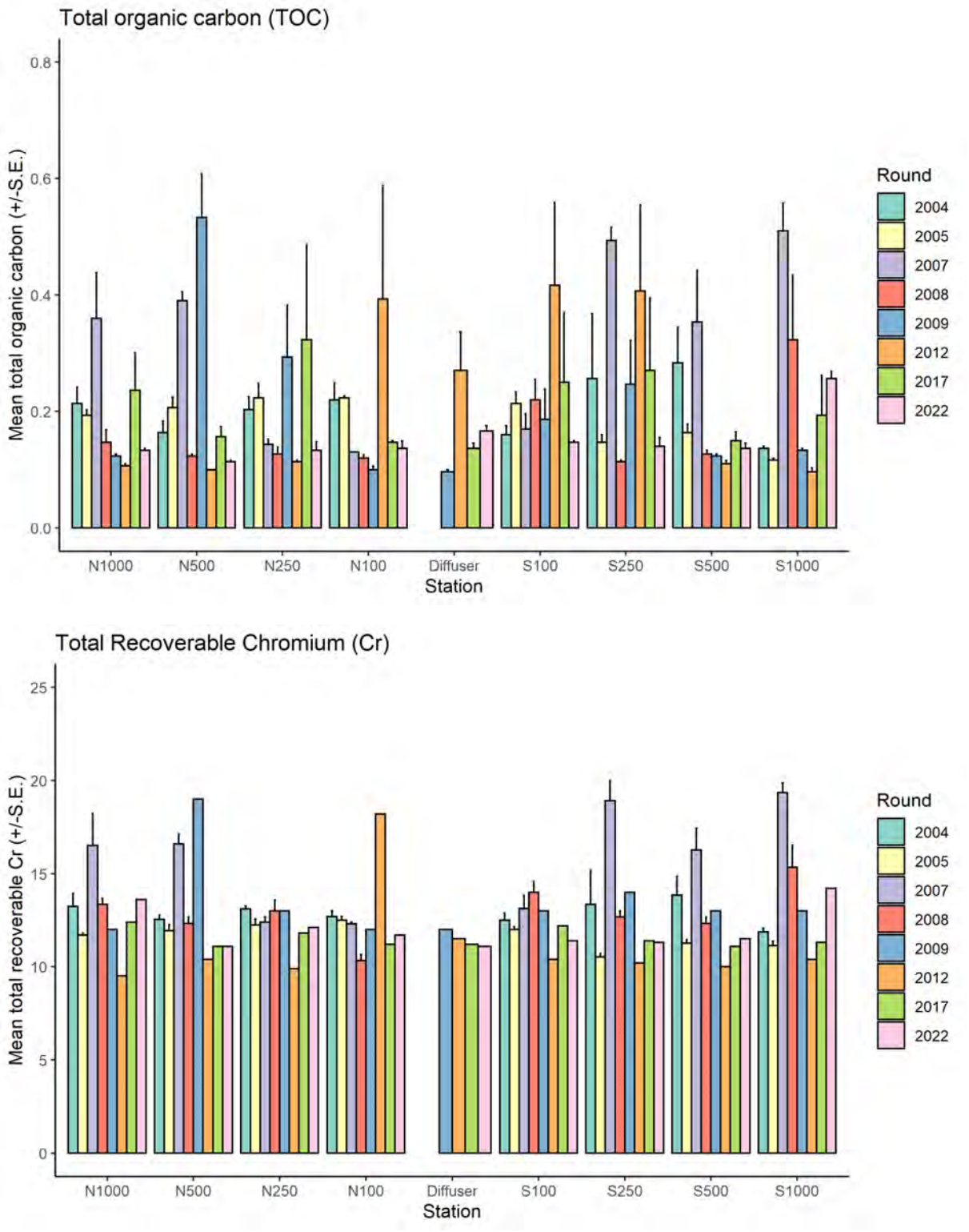


Figure 3-8: Mean total organic carbon (TOC) (top) and mean total chromium (Cr) (bottom) at each station for each sampling year (Round) (+/- SE).

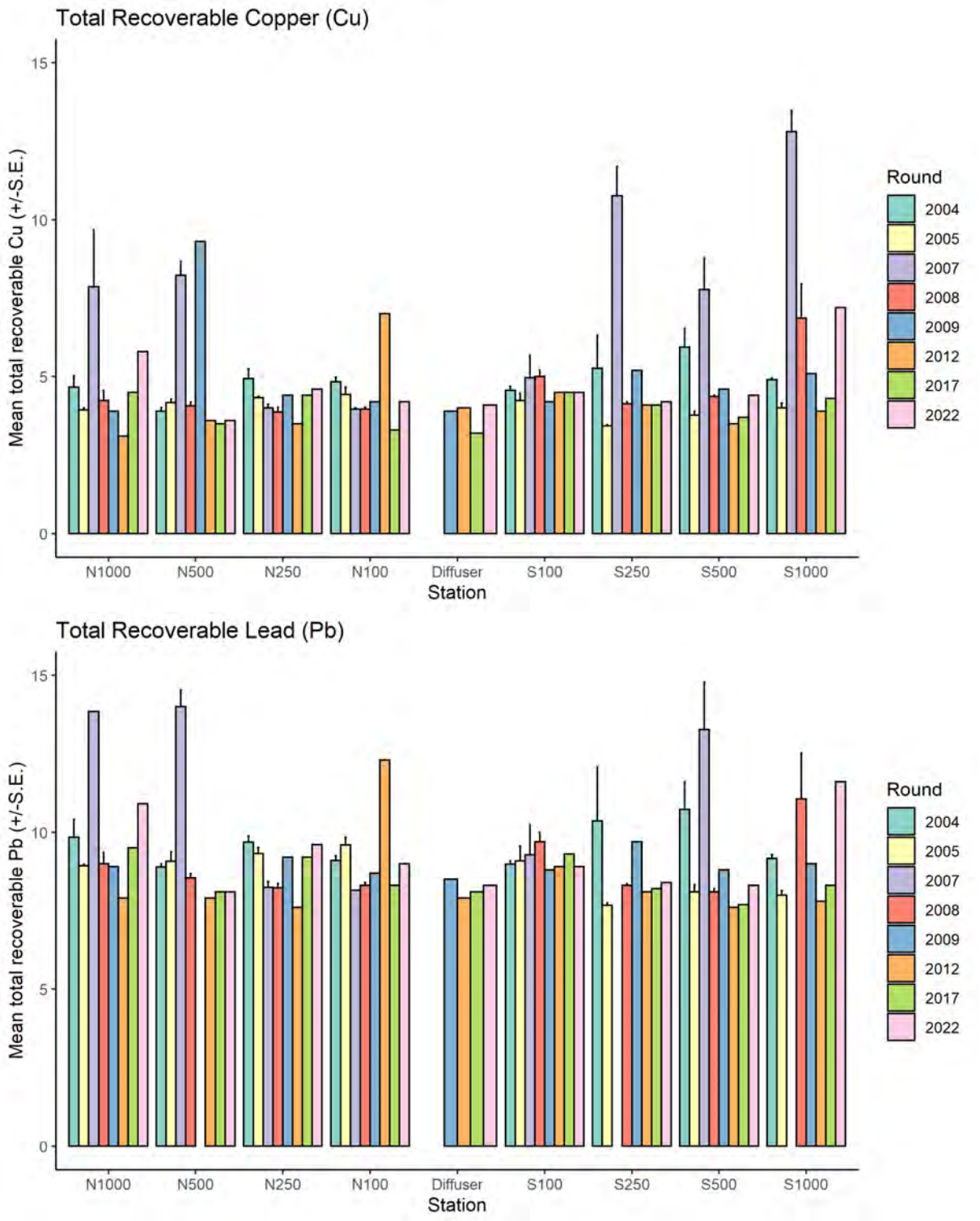


Figure 3-9: Mean total recoverable copper (Cu) (top) and mean total recoverable lead (Pb) (bottom) at each station for each sampling year (Round) (+/- SE).

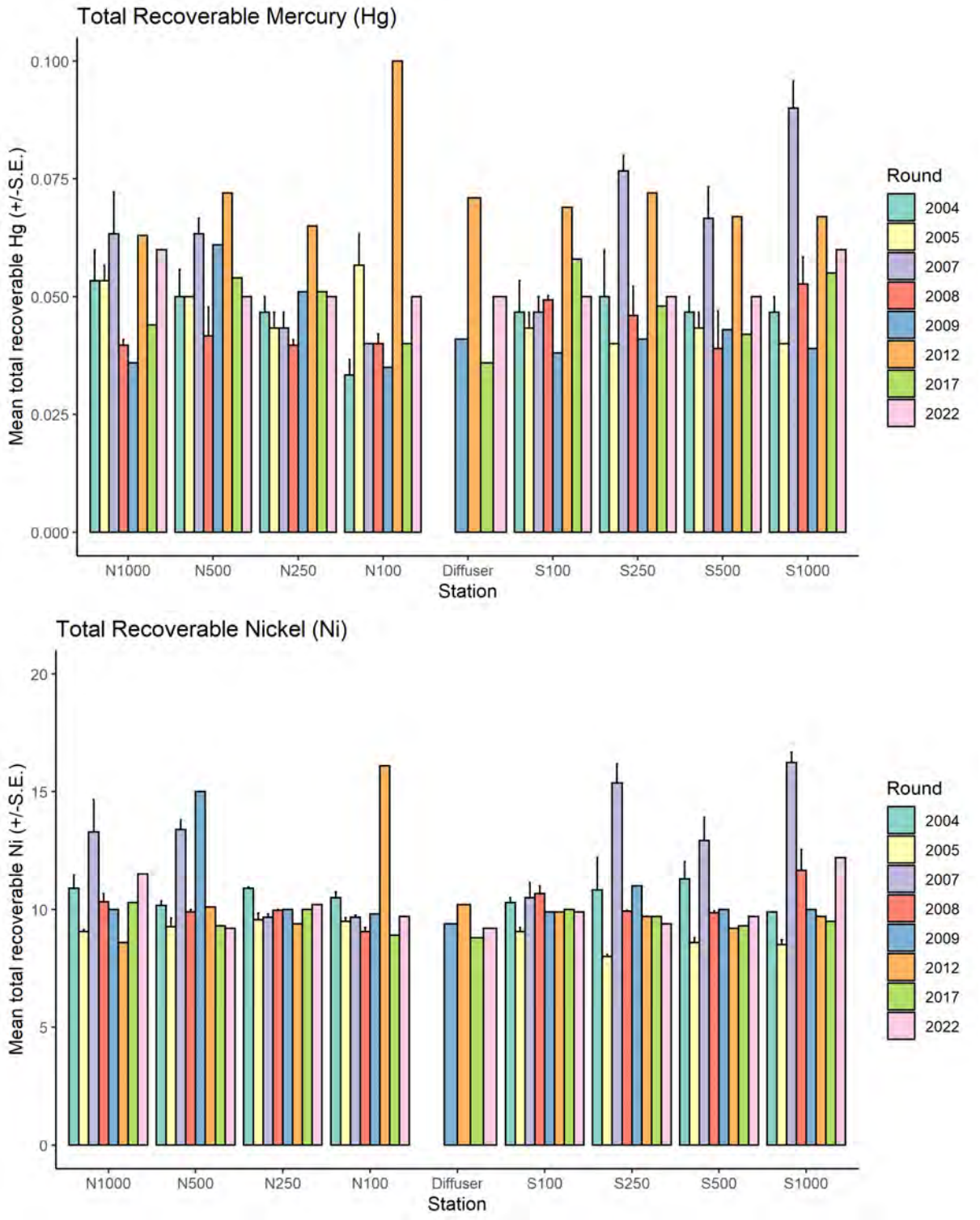


Figure 3-10: Mean total recoverable mercury (Hg) (top) and mean total recoverable nickel (Ni) (bottom) at each station for each sampling year (Round) (+/- SE).

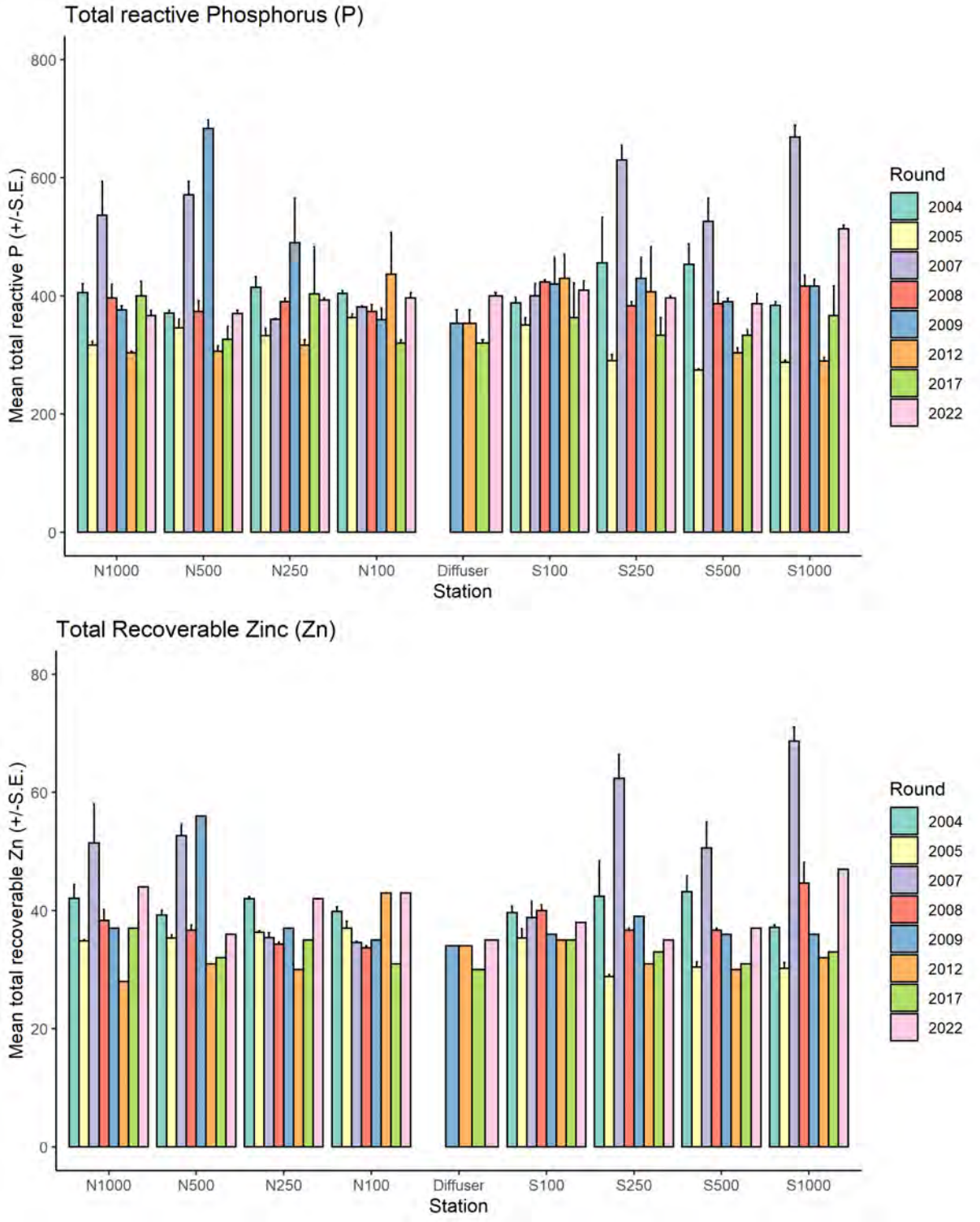


Figure 3-11: Mean total reactive phosphorus (P) (top) and mean total recoverable zinc (Zn) (bottom) at each station for each sampling year (Round) (+/- SE).

A principal coordinate ordination (PCO) analysis based on the sediment chemistry of samples taken from the 2007, 2008, 2009, 2012, 2017 and 2022 surveys was carried out to compare samples between years and distances from the diffuser (Figure 3-12). Data were first normalised, to equalise the scale of the contribution of each sediment variable to the analysis. The greatest amount of variation was along PCO axis 1 (PCO1); it accounted for 75.9 per cent of the variation and shows the values for the most recent 2022 survey clumped together with few outliers (shown in purple). The PCO was overlaid with a Pearson's correlation vector to show the direction of correlation with vector length providing an indication of the strength of the correlation. Most chemical components are clumped together, except for silt, phosphorus (P), mercury (Hg), total nitrogen (TN) and total organic carbon (TOC). In previous analyses (especially from 2012) mercury was shown to be an extreme outlier, however, results from this survey show mercury levels are no longer such a strong predictor of similarity (Handley et al. 2012). Silt and total nitrogen (TN) have also been strongly correlated in the past, however, with the addition of recent data, silt and phosphorus seem to have a greater correlation. These correlations, however, do not extend to significant differences between distances from the outfall diffuser. An analysis of similarities (ANOSIM) of the data collected in the most recent survey round (2022) show a low sample statistic (R) indicating that the diffuser is having little effect on the presence of chemicals within 1 km to the north and south of its location (One-way A, ANOSIM, R = 0.421, significance level = 0.2%).

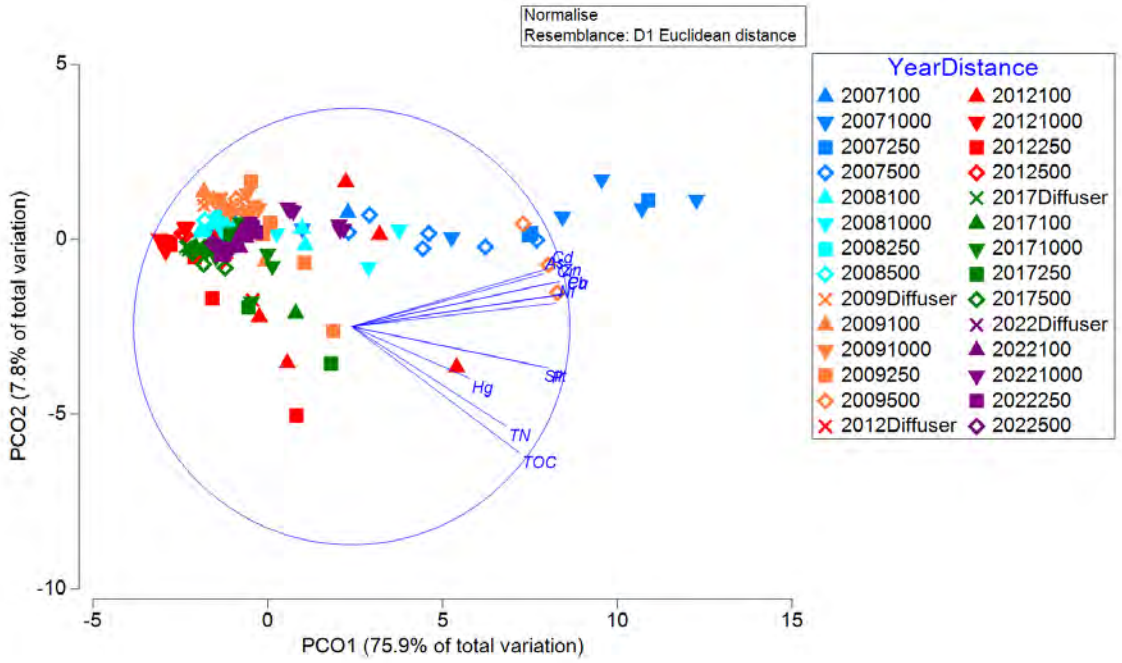


Figure 3-12: Two-dimensional depiction of a principal coordinate ordination (PCO) analysis of sediment physicochemical parameters within samples from the six surveys since, and including 2007. Pearson's correlation vectors are overlaid showing direction of correlation and vector length gives an indication of the strength of the correlation.

3.3 Infauna

There appeared to be no clear patterns in the number of taxa, or the number of individuals collected from infaunal grabs from the sampling undertaken in March 2022. A total of 71 taxa were sampled in infaunal grabs from all stations; these were comprised of mostly polychaetes and arthropods (18 taxa from each phylum). There were 12 species of bivalve, as well as a small number of echinoderms, nemerteans, and cnidarians (all raw data in Appendix E). The highest number of taxa were found at the station 250 m north of the diffuser, at the diffuser (0 m), and at the closest station south of the diffuser at 100 m (Figure 3-13). The lowest number of mean individual taxa were found at 1000 m south of the diffuser, with the highest variation in species found also at site 250 m north (this was due to one sample replicate having almost double the number of *Capitellidae* than other the others) (Figure 3-13).

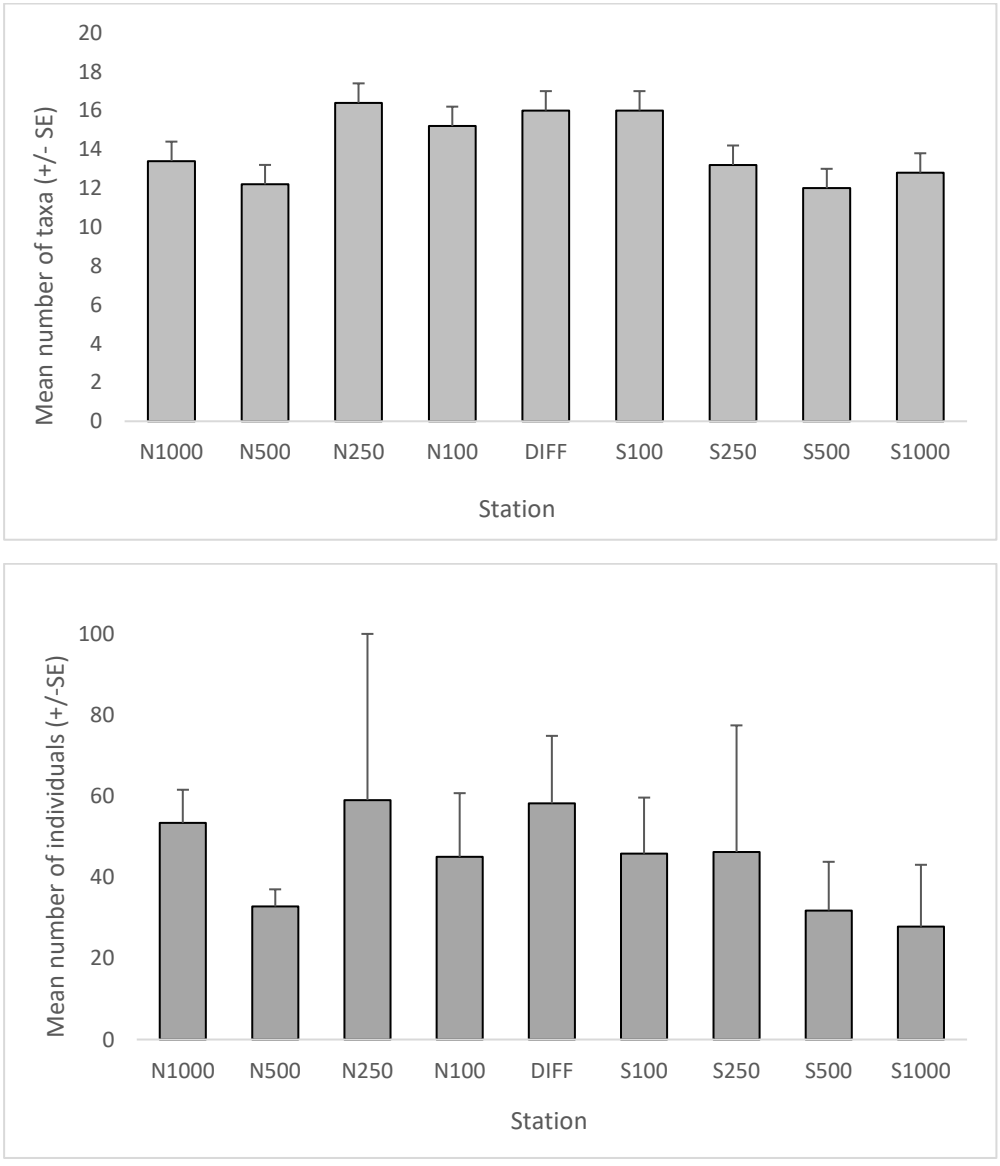


Figure 3-13: Number of infauna taxa (top), and individuals (bottom), found at different distances north and south of the outfall diffuser. (+/-) SE. Stations north (N) to south (S) (left to right) as found along the transect with the diffuser (DIFF) in the centre.

A non-metric multi-dimensional scaling (nMDS) plot was created using similar methods performed in the previous (2017) report (Brown 2017). A fourth root transformation was used to increase the importance of less common taxa, however, with a stress level of 0.2, the results are on the border of reliability for interpretation. Other transformation options also caused high stress levels and unreliability so the nMDS performed on a fourth root transformed Bray-Curtis similarity matrix was retained (Figure 3-14). A Pearson correlation vector plot was overlaid to show the species contributing to similarity between sites. One of the replicates from the diffuser (yellow triangle) is most dissimilar to the other replicates taken, likely due to a slightly increased number of nutshell bivalves *Nucula nitidula.* However, all other replicates show no obvious pattern of dissimilarity of species assemblages with distance from the diffuser.

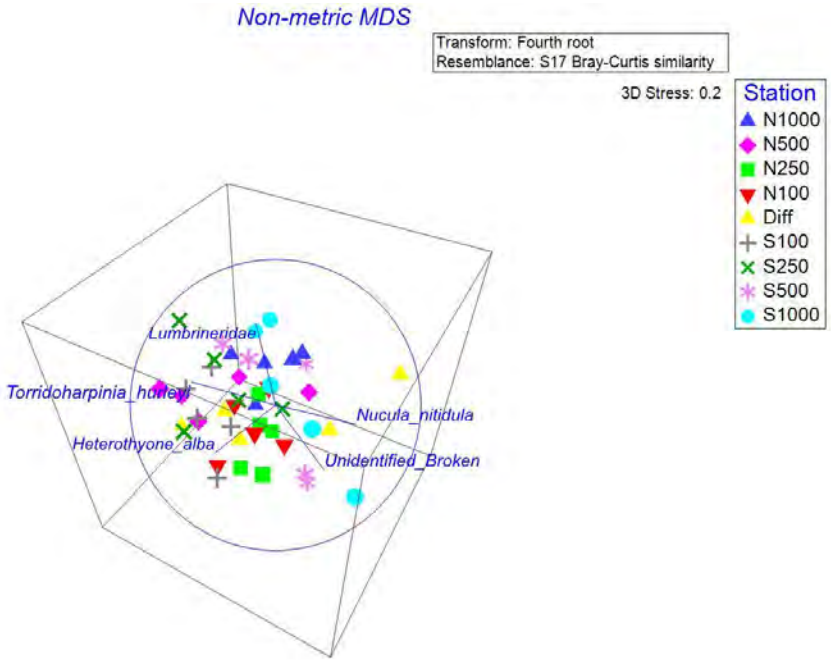


Figure 3-14: Non-metric multidimensional scaling (nMDS) plot depicting similarity among infaunal assemblages. Data from 2022 only, performed on untransformed Bray-Curtis similarity matrix, overlaid with Pearson correlation vectors exhibiting directional correlation values > 0.55.

To examine changes through time, a permutational multivariate analysis of variance (MANOVA) (PERMANOVA) on square root transformed data and Bray-Curtis similarity matrix with year (data from all post-construction surveys) and distance (at sampling stations from the diffuser) as factors, show that along each of the two directions there were significant changes to the infaunal assemblage between years, and also among stations (in terms of distance from the diffuser). However, the year x distance interaction was also significant which indicated that in either direction (north or south), the variation among sites at varying distances from the diffuser was not consistent among years (Table 3-6).

Table 3-6: Results of PERMANOVA analyses of differences to infaunal assemblages among years (2007, 2008, 2009, 2012, 2017 and 2022). Significant results are denoted in bold.

Source	df	SS	MS	Pseudo-F	P(perm)
Year	5	1.92E+05	38429	27.407	**0.001**
Distance	4	12913	3228.2	2.3023	**0.001**
year x distance	18	53574	2976.3	2.1227	**0.001**

3.4 Epifauna

Epifauna benthic tows are not stipulated as a consent requirement, however, to maintain consistency between years they were also performed during the sampling exercise (Brown 2017). Results were similar to previous years with the echinoderm *Fellaster zelandiae* (sand dollar), gastropod *Xymene plebeius* and spider crabs being recorded. However, after more material to examine, it is thought the previously reported spider crab *Halicarcinus whitei* is likely to be the species *Hymenosoma depressum* (Appendix F).

4 Discussion

Results of the survey of water quality, sediment quality and seabed fauna at the Waimakariri District Council outfall diffuser were similar to those reported in previous sampling exercises (Willis et al. 2007, Brown et al. 2008, Cole et al. 2009, Handley et al. 2012, Brown 2017). The survey found no significant effects from the outfall based on sampling and analysis of physical, chemical, and bacteriological parameters of surface waters, sediment physicochemical properties and seabed faunal assemblages.

Bacteria levels (enterococci and faecal coliforms) sampled in the surface waters, and trace metal contaminant concentrations in sediments were below recognised trigger levels that if exceeded, prompt further action according to recently updated as well as previously recognised guidelines. However, it should be noted that marine trigger levels for arsenic (As) are not provided in the guidelines due to insufficient data (ANZECC 2000, ANZECC 2022). Comparison of temporal differences in sediment physicochemical results from all post-construction survey years provided no evidence of significant effects from the outfall.

No significant patterns of change attributable to the outfall discharge were evident from our analyses of the spatial and temporal distribution of animals living at the seabed. Significant differences in the similarities of infauna at varying distances from the outfall diffuser, and among successive surveys, were found; however there was no distinct pattern in relation to the distance of sample stations away from the diffuser. Consequently, effects to the seabed faunal community caused by the outfall (that are detectable by the sampling methods employed) are likely to be minor, and not distinguishable from natural marine processes in the area.

5 References

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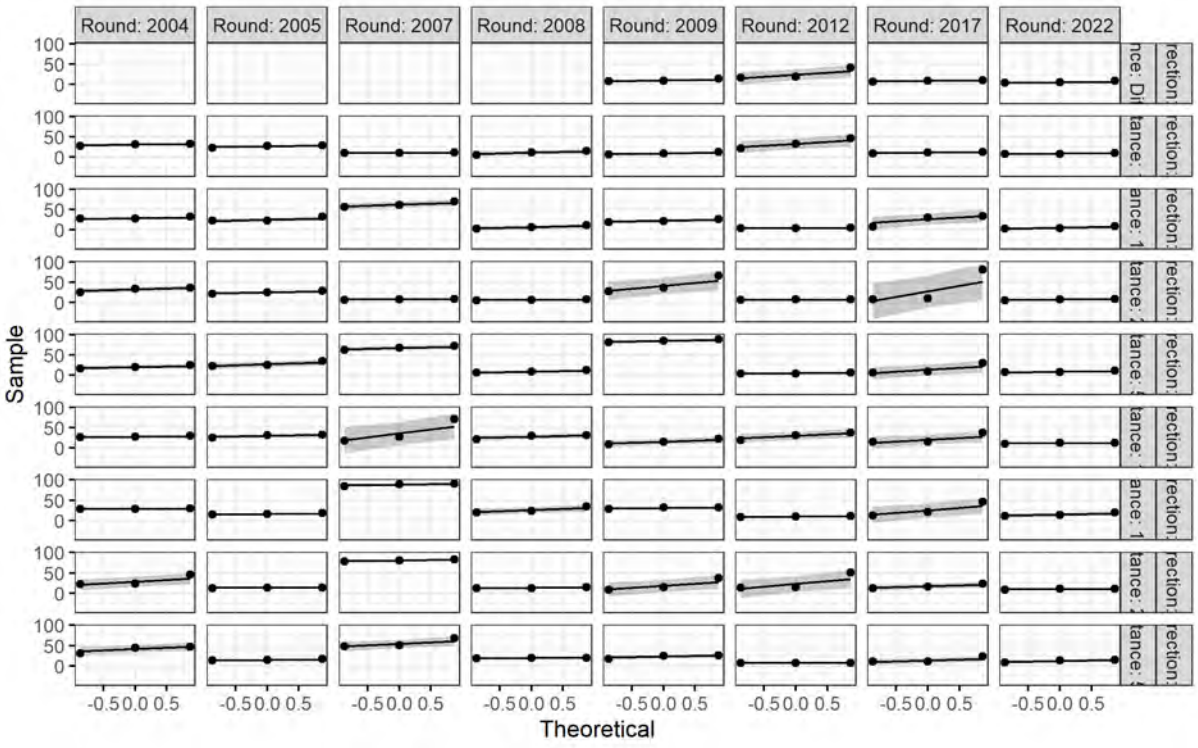
Appendix A Water quality methods and detection limits provided by Hill Laboratories

Sample Type: Saline		
Test	**Method Description**	**Default Detection Limit**
Individual Tests		
Total Nitrogen Digestion	Caustic persulphate digestion. APHA 4500-N C 23rd ed. 2017.	-
Filtration, Unpreserved*	Sample filtration through 0.45µm membrane filter. Performed at Hill Laboratories - Chemistry; 101c Waterloo Road, Christchurch.	-
Total Phosphorus Digestion*	Acid persulphate digestion.	-
Total Suspended Solids*	Saline sample. Filtration using Whatman 934 AH, Advantec GC-50 or equivalent filters (nominal pore size 1.2 - 1.5µm), gravimetric determination. Analysed at Hill Laboratories - Chemistry; 101c Waterloo Road, Christchurch. APHA 2540 D (modified) 23rd ed. 2017.	3 g/m^3
Total Nitrogen	Alkaline persulphate digestion, automated Cd reduction/sulphanilamide colorimetry. APHA 4500-N C & 4500-$NO3^-$ I (modified) 23rd ed. 2017.	0.010 g/m^3
Total Ammoniacal-N	Filtered saline sample from Christchurch. Phenol/hypochlorite colorimetry. Flow injection analyser. (NH4-N = NH4+-N + NH3-N). APHA 4500-NH_3 H 23rd ed. 2017.	0.005 g/m^3
Nitrite-N	Filtered saline sample from Christchurch. Automated Azo dye colorimetry, Flow injection analyser. APHA 4500-NO_3^- I (modified) 23rd ed. 2017.	0.0010 g/m^3
Nitrate-N	Calculation: (Nitrate-N + Nitrite-N) - NO2N. In-House	0.0010 g/m^3
Nitrate-N + Nitrite-N*	Filtered saline sample from Christchurch. Total oxidised nitrogen. Automated cadmium reduction, Flow injection analyser.	0.0010 g/m^3
Dissolved Reactive Phosphorus	Filtered saline sample from Christchurch. Molybdenum blue colorimetry. Flow injection analyser. APHA 4500-P G 23rd ed. 2017.	0.0010 g/m^3
Total Phosphorus*	Total phosphorus digestion, ascorbic acid colorimetry. Flow Injection Analyser. APHA 4500-P H 23rd ed. 2017.	0.004 g/m^3
Total Phosphate*	Calculation: from Total Phosphorus (TP) * Molecular weight of Phosphate ion (PO_4^{3-}) / Atomic weight of Phosphorus (P). In-house calculation.	0.02 g/m^3
Faecal Coliforms	Membrane Filtration, Count on mFC agar, Incubated at 44.5°C for 22 hours, Confirmation Analysed at Hill Laboratories - Microbiology; 101c Waterloo Road, Hornby, Christchurch. APHA 9222 D 23rd ed. 2017.	1 cfu / 100mL
Enterococci	Membrane filtration, Count on mE agar, Incubated at 41°C for 48 hours, Confirmation. Analysed at Hill Laboratories - Microbiology; 101c Waterloo Road, Hornby, Christchurch. APHA 9230 C (modified) 23rd ed. 2017.	1 cfu / 100mL

Appendix B Sediment sampling chemical analyses, methods used, and detection limits provided by Hill Laboratories

Sample Type: Sediment		
Test	**Method Description**	**Default Detection Limit**
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation May contain a residual moisture content of 2-5%.	-
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2	-
Total Recoverable Phosphorus	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2	40 mg/kg dry wt
Total Nitrogen*	Catalytic Combustion (900°C, O2), separation, Thermal Conductivity Detector [Elementar Analyser].	0.05 g/100g dry wt
Total Organic Carbon*	Acid pretreatment to remove carbonates present followed by Catalytic Combustion (900°C, O2), separation, Thermal Conductivity Detector [Elementar Analyser].	0.05 g/100g dry wt
Heavy metals, trace As,Cd,Cr,Cu,Ni,Pb,Zn,Hg		
Total Recoverable Arsenic	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, trace level. US EPA 200.2	0.2 mg/kg dry wt
Total Recoverable Cadmium	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, trace level. US EPA 200.2	0.010 mg/kg dry wt
Total Recoverable Chromium	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, trace level. US EPA 200.2	0.2 mg/kg dry wt
Total Recoverable Copper	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, trace level. US EPA 200.2	0.2 mg/kg dry wt
Total Recoverable Lead	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, trace level. US EPA 200.2	0.08 mg/kg dry wt
Total Recoverable Mercury	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, trace level. US EPA 200.2	0.02 mg/kg dry wt
Total Recoverable Nickel	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, trace level. US EPA 200.2	0.2 mg/kg dry wt
Total Recoverable Zinc	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, trace level. US EPA 200.2	0.8 mg/kg dry wt

Appendix C Silt QQ plot testing for data normality



Appendix D Sediment composition percentages

Direction	Distance	Rep	Date	> 2 mm (gravel/shell gravel)	> 1 mm (coarse sand)	> 0.5 mm (medium sand)	> 0.063 mm (fine to very fine sand)	< 0.063 mm (silt)
N	1000	1	15/03/22	7.3105E-05	0.004386	0.002486	0.954455735	0.038599
N	1000	2	15/03/22	0	0.04739	0.013334	0.849632866	0.089644
N	1000	3	15/03/22	0	0.00841	0.004099	0.964078942	0.023412
N	500	1	15/03/22	0.00775375	0.010837	0.00724	0.86174039	0.112429
N	500	2	15/03/22	0.00011423	0.020828	0.002627	0.908540532	0.06789
N	500	3	15/03/22	7.4683E-05	0.015459	0.004444	0.907916355	0.072106
N	250	1	15/03/22	0.00503805	0.096259	0.015972	0.803944689	0.078787
N	250	2	15/03/22	0.00038621	0.032007	0.008014	0.872598243	0.086994
N	250	3	15/03/22	0.00128101	0.021835	0.009083	0.91551182	0.052288
N	100	1	15/03/22	0.00044606	0.023892	0.002481	0.894117647	0.079063
N	100	2	15/03/22	0.00028082	0.015258	0.002106	0.885519049	0.096836
N	100	3	15/03/22	0.00069533	0.012077	0.001866	0.908618481	0.076743
Diffuser	0	1	15/03/22	0.00145828	0.036742	0.001363	0.876236368	0.0842
Diffuser	0	2	15/03/22	0.00028902	0.018364	0.004535	0.934636164	0.042175
Diffuser	0	3	15/03/22	5.1098E-05	0.003126	0.001713	0.949091816	0.046018
S	100	1	15/03/22	0.00140386	0.096549	0.007563	0.774431664	0.120053
S	100	2	15/03/22	0.05746805	0.004291	0.006624	0.831700718	0.099916
S	100	3	15/03/22	0.00056483	0.008661	0.009414	0.85816493	0.123196
S	250	1	15/03/22	0.00252447	0.011386	0.006234	0.871458011	0.108398
S	250	2	15/03/22	0.00310468	0.012784	0.001388	0.902622544	0.080101
S	250	3	15/03/22	0.00368221	0.004686	0.00848	0.876478465	0.106673
S	500	1	16/03/22	0.00411106	0.024793	0.004649	0.887483398	0.078964
S	500	2	16/03/22	0.00157818	0.017676	0.005839	0.823117227	0.15179
S	500	3	16/03/22	0.00068184	0.04807	0.016194	0.802778488	0.132276
S	1000	1	16/03/22	0.00054348	0.211831	0.044649	0.608988294	0.133988
S	1000	2	16/03/22	0.00176568	0.024288	0.008397	0.763321039	0.202229
S	1000	3	16/03/22	0.0017843	0.072676	0.011701	0.801358817	0.11248

Appendix E Infauna counts and identifications

Station	Count	AphiaID	Scientific Name	Phylum	Class	Order	Family	Genus	Species
2022N10001	2	981	Ampharetidae	Annelida	Polychaeta	Terebellida	Ampharetidae		
2022N10001	1	878315	*Ardeamya spenceri*	Mollusca	Bivalvia	Cardiida	Tellinidae	Ardeamya	spenceri
2022N10001	25	921	Capitellidae	Annelida	Polychaeta	Scolecida	Capitellidae		
2022N10001	1	414226	*Fellaster zelandiae*	Echinodermata	Echinoidea	Clypeasteroida	Arachnoididae	Fellaster	zelandiae
2022N10001	4	953	Goniadidae	Annelida	Polychaeta	Phyllodocida	Goniadidae		
2022N10001	1	967	Lumbrineridae	Annelida	Polychaeta	Eunicida	Lumbrineridae		
2022N10001	1	724054	*Maorimactra ordinaria*	Mollusca	Bivalvia	Venerida	Mactidae	Maorimactra	ordinaria
2022N10001	1	506638	*Nucula nitidula*	Mollusca	Bivalvia	Nuculoida	Nuculidae	Nucula	nitidula
2022N10001	1	965	Onuphidae	Annelida	Polychaeta	Eunicida	Onuphidae		
2022N10001	1		Ostracod A						
2022N10001	3	943	Sigalionidae	Annelida	Polychaeta	Phyllodocida	Sigalionidae		
2022N10001	5	913	Spionidae	Annelida	Polychaeta	Spionida	Spionidae		
2022N10002	7	981	Ampharetidae	Annelida	Polychaeta	Terebellida	Ampharetidae		
2022N10002	1	101368	Aoridae	Arthropoda	Malacostraca	Amphipoda	Aoridae		
2022N10002	3	878315	*Ardeamya spenceri*	Mollusca	Bivalvia	Cardiida	Tellinidae	Ardeamya	spenceri
2022N10002	2	394153	*Arthritica* sp.	Mollusca	Bivalvia	Galeommatida	Lasaeidae	Arthritica	
2022N10002	1	137700	*Buccinulum* sp.	Mollusca	Gastropoda	Neogastropoda	Buccinidae	Buccinulum	
2022N10002	24	921	Capitellidae	Annelida	Polychaeta	Scolecida	Capitellidae		
2022N10002	1	976	Flabelligeridae	Annelida	Polychaeta	Terebellida	Flabelligeridae		
2022N10002	6	953	Goniadidae	Annelida	Polychaeta	Phyllodocida	Goniadidae		
2022N10002	1	489274	*Litogynodiastylis laevis*	Arthropoda	Malacostraca	Cumacea	Gynodiastylidae	Litogynodiastylis	laevis
2022N10002	2	414267	*Heterothyone alba*	Echinodermata	Holothuroidea	Dendrochirotida	Heterothyonidae	Heterothyone	alba
2022N10002	4	506638	*Nucula nitidula*	Mollusca	Bivalvia	Nuculoida	Nuculidae	Nucula	nitidula
2022N10002	1	975	Oweniidae	Annelida	Polychaeta	Sabellida	Oweniidae		

Station	Count	AphiaID	Scientific Name	Phylum	Class	Order	Family	Genus	Species
2022N10002	2	505757	*Scalpomactra scalpellum*	Mollusca	Bivalvia	Veneroida	Mactridae	Scalpomactra	scalpellum
2022N10002	3	182871	*Scleroconcha* sp.	Arthropoda	Ostracoda	Myodocopida	Philomedidae	Scleroconcha	
2022N10002	1	943	Sigalionidae	Annelida	Polychaeta	Phyllodocida	Sigalionidae		
2022N10002	3	913	Spionidae	Annelida	Polychaeta	Spionida	Spionidae		
2022N10002	1	237055	*Torridoharpinia hurleyi*	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	Torridoharpinia	hurleyi
2022N10003	3	980	Pectinariidae	Annelida	Polychaeta	Terebellida	Pectinariidae		
2022N10003	2	981	Ampharetidae	Annelida	Polychaeta	Terebellida	Ampharetidae		
2022N10003	1	101368	Aoridae	Arthropoda	Malacostraca	Amphipoda	Aoridae		
2022N10003	5	878315	*Ardeamya spenceri*	Mollusca	Bivalvia	Cardiida	Tellinidae	Ardeamya	spenceri
2022N10003	6	394153	*Arthritica* sp.	Mollusca	Bivalvia	Galeommatida	Lasaeidae	Arthritica	
2022N10003	12	921	Capitellidae	Annelida	Polychaeta	Scolecida	Capitellidae		
2022N10003	1	451102	*Diasterope grisea*	Arthropoda	Ostracoda	Myodocopida	Cylindroleberididae	Diasterope	grisea
2022N10003	5	953	Goniadidae	Annelida	Polychaeta	Phyllodocida	Goniadidae		
2022N10003	1	946	Hesionidae	Annelida	Polychaeta	Phyllodocida	Hesionidae		
2022N10003	1	468190	*Limnoporeia* sp.	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	Limnoporeia	
2022N10003	2	967	Lumbrineridae	Annelida	Polychaeta	Eunicida	Lumbrineridae		
2022N10003	2	724054	*Maorimactra ordinaria*	Mollusca	Bivalvia	Venerida	Mactidae	Maorimactra	ordinaria
2022N10003	1	956	Nephtyidae	Annelida	Polychaeta	Phyllodocida	Nephtyidae		
2022N10003	6	506638	*Nucula nitidula*	Mollusca	Bivalvia	Nuculoida	Nuculidae	Nucula	nitidula
2022N10003	1		Ostracod A						
2022N10003	3	182871	*Scleroconcha* sp.	Arthropoda	Ostracoda	Myodocopida	Philomedidae	Scleroconcha	
2022N10003	1	943	Sigalionidae	Annelida	Polychaeta	Phyllodocida	Sigalionidae		
2022N10003	6	913	Spionidae	Annelida	Polychaeta	Spionida	Spionidae		
2022N10003	2	237055	*Torridoharpinia hurleyi*	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	Torridoharpinia	hurleyi

Station	Count	AphiaID	Scientific Name	Phylum	Class	Order	Family	Genus	Species
2022N10004	2	981	Ampharetidae	Annelida	Polychaeta	Terebellida	Ampharetidae		
2022N10004	28	921	Capitellidae	Annelida	Polychaeta	Scolecida	Capitellidae		
2022N10004	1	976	Flabelligeridae	Annelida	Polychaeta	Terebellida	Flabelligeridae		
2022N10004	2	414267	*Heterothyone alba*	Echinodermata	Holothuroidea	Dendrochirotida	Heterothyonidae	Heterothyone	alba
2022N10004	2	967	Lumbrineridae	Annelida	Polychaeta	Eunicida	Lumbrineridae		
2022N10004	2	724054	*Maorimactra ordinaria*	Mollusca	Bivalvia	Venerida	Mactidae	Maorimactra	ordinaria
2022N10004	1	943	Sigalionidae	Annelida	Polychaeta	Phyllodocida	Sigalionidae		
2022N10004	9	913	Spionidae	Annelida	Polychaeta	Spionida	Spionidae		
2022N10004	3	237055	*Torridoharpinia hurleyi*	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	Torridoharpinia	hurleyi
2022N10004	1		Unidentified Platyhelminthes						
2022N10005	1	981	Ampharetidae	Annelida	Polychaeta	Terebellida	Ampharetidae		
2022N10005	30	921	Capitellidae	Annelida	Polychaeta	Scolecida	Capitellidae		
2022N10005	2	953	Goniadidae	Annelida	Polychaeta	Phyllodocida	Goniadidae		
2022N10005	1	946	Hesionidae	Annelida	Polychaeta	Phyllodocida	Hesionidae		
2022N10005	1	967	Lumbrineridae	Annelida	Polychaeta	Eunicida	Lumbrineridae		
2022N10005	1	506638	*Nucula nitidula*	Mollusca	Bivalvia	Nuculoida	Nuculidae	Nucula	nitidula
2022N10005	7	913	Spionidae	Annelida	Polychaeta	Spionida	Spionidae		
2022N10005	2	237055	*Torridoharpinia hurleyi*	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	Torridoharpinia	hurleyi
2022N10005	1		Unidentified Platyhelminthes						
2022N1001	1	980	Pectinariidae	Annelida	Polychaeta	Terebellida	Pectinariidae		
2022N1001	2	981	Ampharetidae	Annelida	Polychaeta	Terebellida	Ampharetidae		
2022N1001	1	981	Ampharetidae	Annelida	Polychaeta	Terebellida	Ampharetidae		
2022N1001	23	921	Capitellidae	Annelida	Polychaeta	Scolecida	Capitellidae		
2022N1001	1	919	Cirratulidae	Annelida	Polychaeta	Terebellida	Cirratulidae		

Station	Count	AphiaID	Scientific Name	Phylum	Class	Order	Family	Genus	Species
2022N1001	1	919	*Divalucina cumingi*	Mollusca	Bivalvia	Veneroida	Lucinidae	Divalucina	cumingi
2022N1001	1	283535	*Edwardsia neozelanica*	Cnidaria	Anthozoa	Actiniaria	Edwardsiidae	Edwardsia	neozelanica
2022N1001	1	976	Flabelligeridae	Annelida	Polychaeta	Terebellida	Flabelligeridae		
2022N1001	6	953	Goniadidae	Annelida	Polychaeta	Phyllodocida	Goniadidae		
2022N1001	6	414267	*Heterothyone alba*	Echinodermata	Holothuroidea	Dendrochirotida	Heterothyonidae	Heterothyone	alba
2022N1001	1	414267	*Heterothyone alba*	Echinodermata	Holothuroidea	Dendrochirotida	Heterothyonidae	Heterothyone	alba
2022N1001	1	451063	*Leuroleberis zealandica*	Arthropoda	Ostracoda	Myodocopida	Cylindroleberididae	Leuroleberis	zealandica
2022N1001	1	724054	*Maorimactra ordinaria*	Mollusca	Bivalvia	Venerida	Mactidae	Maorimactra	ordinaria
2022N1001	2	152391	Nemertea	Nemertea					
2022N1001	2	152391	*Nucula nitidula*	Mollusca	Bivalvia	Nuculoida	Nuculidae	Nucula	nitidula
2022N1001	3	506638	*Paracaudina* sp.	Echinodermata	Holothuroidea	Molpadiida	Caudinidae	Paracaudina	
2022N1001	1	414281	*Rynkatorpa uncinata*	Echinodermata	Holothuroidea	Apodida	Synaptidae	Rynkatorpa	uncinata
2022N1001	1	913	Spionidae	Annelida	Polychaeta	Spionida	Spionidae		
2022N1001	2	237055	*Torridoharpinia hurleyi*	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	Torridoharpinia	hurleyi
2022N1002	1	129194	*Aphrodita* sp.	Annelida	Polychaeta	Phyllodocida	Aphroditidae	Aphrodita	
2022N1002	1	394153	*Arthritica* sp.	Mollusca	Bivalvia	Galeommatida	Lasaeidae	Arthritica	
2022N1002	4	921	Capitellidae	Annelida	Polychaeta	Scolecida	Capitellidae		
2022N1002	1	919	Cirratulidae	Annelida	Polychaeta	Terebellida	Cirratulidae		
2022N1002	4	953	Goniadidae	Annelida	Polychaeta	Phyllodocida	Goniadidae		
2022N1002	1	489274	*Litogynodiastylis laevis*	Arthropoda	Malacostraca	Cumacea	Gynodiastylidae	Litogynodiastylis	laevis
2022N1002	4	414267	*Heterothyone alba*	Echinodermata	Holothuroidea	Dendrochirotida	Heterothyonidae	Heterothyone	alba
2022N1002	1	724054	*Maorimactra ordinaria*	Mollusca	Bivalvia	Venerida	Mactidae	Maorimactra	ordinaria
2022N1002	2	956	Nephtyidae	Annelida	Polychaeta	Phyllodocida	Nephtyidae		
2022N1002	4	506638	*Nucula nitidula*	Mollusca	Bivalvia	Nuculoida	Nuculidae	Nucula	nitidula
2022N1002	1	225803	*Paracaudina* sp.	Echinodermata	Holothuroidea	Molpadiida	Caudinidae	Paracaudina	

Station	Count	AphiaID	Scientific Name	Phylum	Class	Order	Family	Genus	Species
2022N1002	2	414281	*Rynkatorpa uncinata*	Echinodermata	Holothuroidea	Apodida	Synaptidae	Rynkatorpa	uncinata
2022N1002	1	943	Sigalionidae	Annelida	Polychaeta	Phyllodocida	Sigalionidae		
2022N1002	2	913	Spionidae	Annelida	Polychaeta	Spionida	Spionidae		
2022N1003	2	980	Pectinariidae	Annelida	Polychaeta	Terebellida	Pectinariidae		
2022N1003	1	981	Ampharetidae	Annelida	Polychaeta	Terebellida	Ampharetidae		
2022N1003	1	394153	*Arthritica* sp.	Mollusca	Bivalvia	Galeommatida	Lasaeidae	Arthritica	
2022N1003	35	921	Capitellidae	Annelida	Polychaeta	Scolecida	Capitellidae		
2022N1003	5	953	Goniadidae	Annelida	Polychaeta	Phyllodocida	Goniadidae		
2022N1003	1	489274	*Litogynodiastylis laevis*	Arthropoda	Malacostraca	Cumacea	Gynodiastylidae	Litogynodiastylis	laevis
2022N1003	1	414267	*Heterothyone alba*	Echinodermata	Holothuroidea	Dendrochirotida	Heterothyonidae	Heterothyone	alba
2022N1003	1	101610	*Hippomedon* sp.	Arthropoda	Malacostraca	Amphipoda	Tryphosidae	Hippomedon	
2022N1003	1	967	Lumbrineridae	Annelida	Polychaeta	Eunicida	Lumbrineridae		
2022N1003	1	956	Nephtyidae	Annelida	Polychaeta	Phyllodocida	Nephtyidae		
2022N1003	2	506638	*Nucula nitidula*	Mollusca	Bivalvia	Nuculoida	Nuculidae	Nucula	nitidula
2022N1003	2	225803	*Paracaudina* sp.	Echinodermata	Holothuroidea	Molpadiida	Caudinidae	Paracaudina	
2022N1003	2	414281	*Rynkatorpa uncinata*	Echinodermata	Holothuroidea	Apodida	Synaptidae	Rynkatorpa	uncinata
2022N1003	1	943	Sigalionidae	Annelida	Polychaeta	Phyllodocida	Sigalionidae		
2022N1003	3	913	Spionidae	Annelida	Polychaeta	Spionida	Spionidae		
2022N1003	3	237055	*Torridoharpinia hurleyi*	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	Torridoharpinia	hurleyi
2022N1003	1		Unidentified Bivalve 1						
2022N1003	1	101412	Urothoidae	Arthropoda	Malacostraca	Amphipoda	Urothoidae		
2022N1004	3	137700	*Buccinulum* sp.	Mollusca	Gastropoda	Neogastropoda	Buccinidae	Buccinulum	
2022N1004	3	921	Capitellidae	Annelida	Polychaeta	Scolecida	Capitellidae		
2022N1004	6	953	Goniadidae	Annelida	Polychaeta	Phyllodocida	Goniadidae		
2022N1004	11	414267	*Heterothyone alba*	Echinodermata	Holothuroidea	Dendrochirotida	Heterothyonidae	Heterothyone	alba

Station	Count	AphiaID	Scientific Name	Phylum	Class	Order	Family	Genus	Species
2022N1004	1	451063	*Leuroleberis zealandica*	Arthropoda	Ostracoda	Myodocopida	Cylindroleberididae	Leuroleberis	zealandica
2022N1004	1	967	Lumbrineridae	Annelida	Polychaeta	Eunicida	Lumbrineridae		
2022N1004	1	724054	*Maorimactra ordinaria*	Mollusca	Bivalvia	Venerida	Mactidae	Maorimactra	ordinaria
2022N1004	3	956	Nephtyidae	Annelida	Polychaeta	Phyllodocida	Nephtyidae		
2022N1004	9	506638	*Nucula nitidula*	Mollusca	Bivalvia	Nuculoida	Nuculidae	Nucula	nitidula
2022N1004	3	225803	*Paracaudina* sp.	Echinodermata	Holothuroidea	Molpadiida	Caudinidae	Paracaudina	
2022N1004	1	943	Sigalionidae	Annelida	Polychaeta	Phyllodocida	Sigalionidae		
2022N1004	2	913	Spionidae	Annelida	Polychaeta	Spionida	Spionidae		
2022N1004	1	237055	*Torridoharpinia hurleyi*	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	Torridoharpinia	hurleyi
2022N1005	1	878315	*Ardeamya spenceri*	Mollusca	Bivalvia	Cardiida	Tellinidae	Ardeamya	spenceri
2022N1005	1	394153	*Arthritica* sp.	Mollusca	Bivalvia	Galeommatida	Lasaeidae	Arthritica	
2022N1005	3	921	Capitellidae	Annelida	Polychaeta	Scolecida	Capitellidae		
2022N1005	5	953	Goniadidae	Annelida	Polychaeta	Phyllodocida	Goniadidae		
2022N1005	1	489274	*Litogynodiastylis laevis*	Arthropoda	Malacostraca	Cumacea	Gynodiastylidae	Litogynodiastylis	laevis
2022N1005	1	967	Lumbrineridae	Annelida	Polychaeta	Eunicida	Lumbrineridae		
2022N1005	2	956	Nephtyidae	Annelida	Polychaeta	Phyllodocida	Nephtyidae		
2022N1005	3	506638	*Nucula nitidula*	Mollusca	Bivalvia	Nuculoida	Nuculidae	Nucula	nitidula
2022N1005	7	225803	*Paracaudina* sp.	Echinodermata	Holothuroidea	Molpadiida	Caudinidae	Paracaudina	
2022N1005	3	943	Sigalionidae	Annelida	Polychaeta	Phyllodocida	Sigalionidae		
2022N1005	1	913	Spionidae	Annelida	Polychaeta	Spionida	Spionidae		
2022N1005	2	237055	*Torridoharpinia hurleyi*	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	Torridoharpinia	hurleyi
2022N2001	1	981	Ampharetidae	Annelida	Polychaeta	Terebellida	Ampharetidae		
2022N2001	2	394153	*Arthritica* sp.	Mollusca	Bivalvia	Galeommatida	Lasaeidae	Arthritica	
2022N2001	24	921	Capitellidae	Annelida	Polychaeta	Scolecida	Capitellidae		
2022N2001	2	451102	*Diasterope grisea*	Arthropoda	Ostracoda	Myodocopida	Cylindroleberididae	Diasterope	grisea

Station	Count	AphiaID	Scientific Name	Phylum	Class	Order	Family	Genus	Species
2022N2001	6	953	Goniadidae	Annelida	Polychaeta	Phyllodocida	Goniadidae		
2022N2001	1	489274	*Litogynodiastylis laevis*	Arthropoda	Malacostraca	Cumacea	Gynodiastylidae	Litogynodiastylis	laevis
2022N2001	3	414267	*Heterothyone alba*	Echinodermata	Holothuroidea	Dendrochirotida	Heterothyonidae	Heterothyone	alba
2022N2001	1	451063	*Leuroleberis zealandica*	Arthropoda	Ostracoda	Myodocopida	Cylindroleberididae	Leuroleberis	zealandica
2022N2001	1	147031	*Nebalia* sp.	Arthropoda	Malacostraca	Nebaliacea	Nebaliidae	Nebalia	
2022N2001	1	152391	Nemertea	Nemertea					
2022N2001	1	506638	*Nucula nitidula*	Mollusca	Bivalvia	Nuculoida	Nuculidae	Nucula	nitidula
2022N2001	1	515386	*Ogyrides delli*	Arthropoda	Malacostraca	Decapoda	Ogyrididae	Ogyrides	delli
2022N2001	5	225803	*Paracaudina* sp.	Echinodermata	Holothuroidea	Molpadiida	Caudinidae	Paracaudina	
2022N2001	1	432533	*Phenatoma* sp.	Mollusca	Gastropoda	Neogastropoda	Borsoniidae	Phenatoma	
2022N2001	2	414281	*Rynkatorpa uncinata*	Echinodermata	Holothuroidea	Apodida	Synaptidae	Rynkatorpa	uncinata
2022N2001	4	913	Spionidae	Annelida	Polychaeta	Spionida	Spionidae		
2022N2001	2	237055	*Torridoharpinia hurleyi*	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	Torridoharpinia	hurleyi
2022N2001	1		Unidentified Platyhelminthes						
2022N2002	2	981	Ampharetidae	Annelida	Polychaeta	Terebellida	Ampharetidae		
2022N2002	1	878315	*Ardeamya spenceri*	Mollusca	Bivalvia	Cardiida	Tellinidae	Ardeamya	spenceri
2022N2002	8	921	Capitellidae	Annelida	Polychaeta	Scolecida	Capitellidae		
2022N2002	3	953	Goniadidae	Annelida	Polychaeta	Phyllodocida	Goniadidae		
2022N2002	3	414267	*Heterothyone alba*	Echinodermata	Holothuroidea	Dendrochirotida	Heterothyonidae	Heterothyone	alba
2022N2002	1	724054	*Maorimactra ordinaria*	Mollusca	Bivalvia	Venerida	Mactidae	Maorimactra	ordinaria
2022N2002	1	956	Nephtyidae	Annelida	Polychaeta	Phyllodocida	Nephtyidae		
2022N2002	1	506638	*Nucula nitidula*	Mollusca	Bivalvia	Nuculoida	Nuculidae	Nucula	nitidula
2022N2002	1	225803	*Paracaudina* sp.	Echinodermata	Holothuroidea	Molpadiida	Caudinidae	Paracaudina	
2022N2002	1	931	Phyllodocidae	Annelida	Polychaeta	Phyllodocida	Phyllodocidae		

Station	Count	AphiaID	Scientific Name	Phylum	Class	Order	Family	Genus	Species
2022N2002	2	174737	Pseudidotheidae	Arthropoda	Malacostraca	Isopoda	Pseudidotheidae		
2022N2002	3	414281	*Rynkatorpa uncinata*	Echinodermata	Holothuroidea	Apodida	Synaptidae	Rynkatorpa	uncinata
2022N2002	1	943	Sigalionidae	Annelida	Polychaeta	Phyllodocida	Sigalionidae		
2022N2002	3	913	Spionidae	Annelida	Polychaeta	Spionida	Spionidae		
2022N2002	2	237055	*Torridoharpinia hurleyi*	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	Torridoharpinia	hurleyi
2022N2003	1	919	Cirratulidae	Annelida	Polychaeta	Terebellida	Cirratulidae		
2022N2003	3	953	Goniadidae	Annelida	Polychaeta	Phyllodocida	Goniadidae		
2022N2003	1	414267	*Heterothyone alba*	Echinodermata	Holothuroidea	Dendrochirotida	Heterothyonidae	Heterothyone	alba
2022N2003	2	101610	*Hippomedon* sp.	Arthropoda	Malacostraca	Amphipoda	Tryphosidae	Hippomedon	
2022N2003	6	724054	*Maorimactra ordinaria*	Mollusca	Bivalvia	Venerida	Mactidae	Maorimactra	ordinaria
2022N2003	5	506638	*Nucula nitidula*	Mollusca	Bivalvia	Nuculoida	Nuculidae	Nucula	nitidula
2022N2003	1	225803	*Paracaudina* sp.	Echinodermata	Holothuroidea	Molpadiida	Caudinidae	Paracaudina	
2022N2003	1	414281	*Rynkatorpa uncinata*	Echinodermata	Holothuroidea	Apodida	Synaptidae	Rynkatorpa	uncinata
2022N2003	1	943	Sigalionidae	Annelida	Polychaeta	Phyllodocida	Sigalionidae		
2022N2003	3	913	Spionidae	Annelida	Polychaeta	Spionida	Spionidae		
2022N2003	4	237055	*Torridoharpinia hurleyi*	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	Torridoharpinia	hurleyi
2022N2004	2	981	Ampharetidae	Annelida	Polychaeta	Terebellida	Ampharetidae		
2022N2004	85	921	Capitellidae	Annelida	Polychaeta	Scolecida	Capitellidae		
2022N2004	1		Decapoda crab juv						
2022N2004	1	507573	*Dosinia anus*	Mollusca	Bivalvia	Veneroida	Veneridae	Dosinia	anus
2022N2004	3	953	Goniadidae	Annelida	Polychaeta	Phyllodocida	Goniadidae		
2022N2004	4	489274	*Litogynodiastylis laevis*	Arthropoda	Malacostraca	Cumacea	Gynodiastylidae	Litogynodiastylis	laevis
2022N2004	1	946	Hesionidae	Annelida	Polychaeta	Phyllodocida	Hesionidae		
2022N2004	3	414267	*Heterothyone alba*	Echinodermata	Holothuroidea	Dendrochirotida	Heterothyonidae	Heterothyone	alba
2022N2004	1	967	Lumbrineridae	Annelida	Polychaeta	Eunicida	Lumbrineridae		

Station	Count	AphiaID	Scientific Name	Phylum	Class	Order	Family	Genus	Species
2022N2004	2	724054	*Maorimactra ordinaria*	Mollusca	Bivalvia	Venerida	Mactidae	Maorimactra	ordinaria
2022N2004	7	506638	*Nucula nitidula*	Mollusca	Bivalvia	Nuculoida	Nuculidae	Nucula	nitidula
2022N2004	1	225803	*Paracaudina* sp.	Echinodermata	Holothuroidea	Molpadiida	Caudinidae	Paracaudina	
2022N2004	1	931	Phyllodocidae	Annelida	Polychaeta	Phyllodocida	Phyllodocidae		
2022N2004	1	174737	Pseudidotheidae	Arthropoda	Malacostraca	Isopoda	Pseudidotheidae		
2022N2004	2	414281	*Rynkatorpa uncinata*	Echinodermata	Holothuroidea	Apodida	Synaptidae	Rynkatorpa	uncinata
2022N2004	1	182871	*Scleroconcha* sp.	Arthropoda	Ostracoda	Myodocopida	Philomedidae	Scleroconcha	
2022N2004	1	943	Sigalionidae	Annelida	Polychaeta	Phyllodocida	Sigalionidae		
2022N2004	4	913	Spionidae	Annelida	Polychaeta	Spionida	Spionidae		
2022N2004	1	948	Syllidae	Annelida	Polychaeta	Phyllodocida	Syllidae		
2022N2004	1	1133	Tanaidacea	Arthropoda	Malacostraca	Tanaidacea			
2022N2004	3	237055	*Torridoharpinia hurleyi*	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	Torridoharpinia	hurleyi
2022N2004	1		Unidentified Bivalve 1						
2022N2004	2	101412	Urothoidae	Arthropoda	Malacostraca	Amphipoda	Urothoidae		
2022N2005	1	981	Ampharetidae	Annelida	Polychaeta	Terebellida	Ampharetidae		
2022N2005	1	394153	*Arthritica* sp.	Mollusca	Bivalvia	Galeommatida	Lasaeidae	Arthritica	
2022N2005	16	921	Capitellidae	Annelida	Polychaeta	Scolecida	Capitellidae		
2022N2005	2	953	Goniadidae	Annelida	Polychaeta	Phyllodocida	Goniadidae		
2022N2005	1	489274	*Litogynodiastylis laevis*	Arthropoda	Malacostraca	Cumacea	Gynodiastylidae	Litogynodiastylis	laevis
2022N2005	7	414267	*Heterothyone alba*	Echinodermata	Holothuroidea	Dendrochirotida	Heterothyonidae	Heterothyone	alba
2022N2005	1	967	Lumbrineridae	Annelida	Polychaeta	Eunicida	Lumbrineridae		
2022N2005	2	724054	*Maorimactra ordinaria*	Mollusca	Bivalvia	Venerida	Mactidae	Maorimactra	ordinaria
2022N2005	1	914	Magelonidae	Annelida	Polychaeta	Spionida	Magelonidae		
2022N2005	2	956	Nephtyidae	Annelida	Polychaeta	Phyllodocida	Nephtyidae		
2022N2005	3	506638	*Nucula nitidula*	Mollusca	Bivalvia	Nuculoida	Nuculidae	Nucula	nitidula

Station	Count	AphiaID	Scientific Name	Phylum	Class	Order	Family	Genus	Species
2022N2005	2	174737	Pseudidotheidae	Arthropoda	Malacostraca	Isopoda	Pseudidotheidae		
2022N2005	2	943	Sigalionidae	Annelida	Polychaeta	Phyllodocida	Sigalionidae		
2022N2005	4	913	Spionidae	Annelida	Polychaeta	Spionida	Spionidae		
2022N2005	1	237055	*Torridoharpinia hurleyi*	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	Torridoharpinia	hurleyi
2022N5001	1	981	Ampharetidae	Annelida	Polychaeta	Terebellida	Ampharetidae		
2022N5001	17	921	Capitellidae	Annelida	Polychaeta	Scolecida	Capitellidae		
2022N5001	1	919	Cirratulidae	Annelida	Polychaeta	Terebellida	Cirratulidae		
2022N5001	5	953	Goniadidae	Annelida	Polychaeta	Phyllodocida	Goniadidae		
2022N5001	2	414267	*Heterothyone alba*	Echinodermata	Holothuroidea	Dendrochirotida	Heterothyonidae	Heterothyone	alba
2022N5001	1	967	Lumbrineridae	Annelida	Polychaeta	Eunicida	Lumbrineridae		
2022N5001	1	914	Magelonidae	Annelida	Polychaeta	Spionida	Magelonidae		
2022N5001	1	147031	*Nebalia* sp.	Arthropoda	Malacostraca	Nebaliacea	Nebaliidae	Nebalia	
2022N5001	1	956	Nephtyidae	Annelida	Polychaeta	Phyllodocida	Nephtyidae		
2022N5001	1	913	Spionidae	Annelida	Polychaeta	Spionida	Spionidae		
2022N5001	1	948	Syllidae	Annelida	Polychaeta	Phyllodocida	Syllidae		
2022N5001	1	237055	*Torridoharpinia hurleyi*	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	Torridoharpinia	hurleyi
2022N5001	1	101412	Urothoidae	Arthropoda	Malacostraca	Amphipoda	Urothoidae		
2022N5002	1	981	Ampharetidae	Annelida	Polychaeta	Terebellida	Ampharetidae		
2022N5002	12	921	Capitellidae	Annelida	Polychaeta	Scolecida	Capitellidae		
2022N5002	1	507573	*Dosinia anus*	Mollusca	Bivalvia	Veneroida	Veneridae	Dosinia	anus
2022N5002	1	976	Flabelligeridae	Annelida	Polychaeta	Terebellida	Flabelligeridae		
2022N5002	2	953	Goniadidae	Annelida	Polychaeta	Phyllodocida	Goniadidae		
2022N5002	4	489274	*Litogynodiastylis laevis*	Arthropoda	Malacostraca	Cumacea	Gynodiastylidae	Litogynodiastylis	laevis
2022N5002	2	414267	*Heterothyone alba*	Echinodermata	Holothuroidea	Dendrochirotida	Heterothyonidae	Heterothyone	alba
2022N5002	1	101610	*Hippomedon* sp.	Arthropoda	Malacostraca	Amphipoda	Tryphosidae	Hippomedon	

Station	Count	AphiaID	Scientific Name	Phylum	Class	Order	Family	Genus	Species
2022N5002	1	967	Lumbrineridae	Annelida	Polychaeta	Eunicida	Lumbrineridae		
2022N5002	3	724054	*Maorimactra ordinaria*	Mollusca	Bivalvia	Venerida	Mactidae	Maorimactra	ordinaria
2022N5002	2	506638	*Nucula nitidula*	Mollusca	Bivalvia	Nuculoida	Nuculidae	Nucula	nitidula
2022N5002	1		Unidentified Bivalve 3						
2022N5002	1	943	Sigalionidae	Annelida	Polychaeta	Phyllodocida	Sigalionidae		
2022N5002	5	237055	*Torridoharpinia hurleyi*	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	Torridoharpinia	hurleyi
2022N5002	2	399420	*Xymene plebeius*	Mollusca	Gastropoda	Neogastropoda	Muricidae	Xymene	plebeius
2022N5003	1	394153	*Arthritica* sp.	Mollusca	Bivalvia	Galeommatida	Lasaeidae	Arthritica	
2022N5003	1	878318	*Bartschicoma edgari*	Mollusca	Bivalvia	Cardiida	Bartschioma	edgari	
2022N5003	1	921	Capitellidae	Annelida	Polychaeta	Scolecida	Capitellidae		
2022N5003	1	976	Flabelligeridae	Annelida	Polychaeta	Terebellida	Flabelligeridae		
2022N5003	2	953	Goniadidae	Annelida	Polychaeta	Phyllodocida	Goniadidae		
2022N5003	2	489274	*Litogynodiastylis laevis*	Arthropoda	Malacostraca	Cumacea	Gynodiastylidae	Litogynodiastylis	laevis
2022N5003	1	101610	*Hippomedon* sp.	Arthropoda	Malacostraca	Amphipoda	Tryphosidae	Hippomedon	
2022N5003	1	118454	*Idotea* sp.	Arthropoda	Malacostraca	Isopoda	Idoteidae	Idotea	
2022N5003	1	967	Lumbrineridae	Annelida	Polychaeta	Eunicida	Lumbrineridae		
2022N5003	3	724054	*Maorimactra ordinaria*	Mollusca	Bivalvia	Venerida	Mactidae	Maorimactra	ordinaria
2022N5003	3	506638	*Nucula nitidula*	Mollusca	Bivalvia	Nuculoida	Nuculidae	Nucula	nitidula
2022N5003	2	414281	*Rynkatorpa uncinata*	Echinodermata	Holothuroidea	Apodida	Synaptidae	Rynkatorpa	uncinata
2022N5003	3	182871	*Scleroconcha* sp.	Arthropoda	Ostracoda	Myodocopida	Philomedidae	Scleroconcha	
2022N5003	4	943	Sigalionidae	Annelida	Polychaeta	Phyllodocida	Sigalionidae		
2022N5003	4	913	Spionidae	Annelida	Polychaeta	Spionida	Spionidae		
2022N5003	3	237055	*Torridoharpinia hurleyi*	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	Torridoharpinia	hurleyi
2022N5004	2	981	Ampharetidae	Annelida	Polychaeta	Terebellida	Ampharetidae		
2022N5004	14	921	Capitellidae	Annelida	Polychaeta	Scolecida	Capitellidae		

Station	Count	AphiaID	Scientific Name	Phylum	Class	Order	Family	Genus	Species
2022N5004	3	953	Goniadidae	Annelida	Polychaeta	Phyllodocida	Goniadidae		
2022N5004	4	414267	*Heterothyone alba*	Echinodermata	Holothuroidea	Dendrochirotida	Heterothyonidae	Heterothyone	alba
2022N5004	1	956	Nephtyidae	Annelida	Polychaeta	Phyllodocida	Nephtyidae		
2022N5004	1	225803	*Paracaudina* sp.	Echinodermata	Holothuroidea	Molpadiida	Caudinidae	Paracaudina	
2022N5004	2	913	Spionidae	Annelida	Polychaeta	Spionida	Spionidae		
2022N5004	3	237055	*Torridoharpinia hurleyi*	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	Torridoharpinia	hurleyi
2022N5005	9	921	Capitellidae	Annelida	Polychaeta	Scolecida	Capitellidae		
2022N5005	5	953	Goniadidae	Annelida	Polychaeta	Phyllodocida	Goniadidae		
2022N5005	3	414267	*Heterothyone alba*	Echinodermata	Holothuroidea	Dendrochirotida	Heterothyonidae	Heterothyone	alba
2022N5005	1	967	Lumbrineridae	Annelida	Polychaeta	Eunicida	Lumbrineridae		
2022N5005	2	225803	*Paracaudina* sp.	Echinodermata	Holothuroidea	Molpadiida	Caudinidae	Paracaudina	
2022N5005	1	182871	*Scleroconcha* sp.	Arthropoda	Ostracoda	Myodocopida	Philomedidae	Scleroconcha	
2022N5005	1	943	Sigalionidae	Annelida	Polychaeta	Phyllodocida	Sigalionidae		
2022N5005	4	237055	*Torridoharpinia hurleyi*	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	Torridoharpinia	hurleyi
2022N5005	2	101412	Urothoidae	Arthropoda	Malacostraca	Amphipoda	Urothoidae		
2022NDIFF1	2	981	Ampharetidae	Annelida	Polychaeta	Terebellida	Ampharetidae		
2022NDIFF1	1	137700	*Buccinulum* sp.	Mollusca	Gastropoda	Neogastropoda	Buccinidae	Buccinulum	
2022NDIFF1	30	921	Capitellidae	Annelida	Polychaeta	Scolecida	Capitellidae		
2022NDIFF1	3	451102	*Diasterope grisea*	Arthropoda	Ostracoda	Myodocopida	Cylindroleberididae	Diasterope	grisea
2022NDIFF1	1	953	Goniadidae	Annelida	Polychaeta	Phyllodocida	Goniadidae		
2022NDIFF1	2	489274	*Litogynodiastylis laevis*	Arthropoda	Malacostraca	Cumacea	Gynodiastylidae	Litogynodiastylis	laevis
2022NDIFF1	3	451063	*Leuroleberis zealandica*	Arthropoda	Ostracoda	Myodocopida	Cylindroleberididae	Leuroleberis	zealandica
2022NDIFF1	1	468190	*Limnoporeia* sp.	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	Limnoporeia	
2022NDIFF1	18	724054	*Maorimactra ordinaria*	Mollusca	Bivalvia	Venerida	Mactidae	Maorimactra	ordinaria
2022NDIFF1	2	956	Nephtyidae	Annelida	Polychaeta	Phyllodocida	Nephtyidae		

Station	Count	AphiaID	Scientific Name	Phylum	Class	Order	Family	Genus	Species
2022NDIFF1	9	506638	*Nucula nitidula*	Mollusca	Bivalvia	Nuculoida	Nuculidae	Nucula	nitidula
2022NDIFF1	3	225803	*Paracaudina* sp.	Echinodermata	Holothuroidea	Molpadiida	Caudinidae	Paracaudina	
2022NDIFF1	2	943	Sigalionidae	Annelida	Polychaeta	Phyllodocida	Sigalionidae		
2022NDIFF1	2	913	Spionidae	Annelida	Polychaeta	Spionida	Spionidae		
2022NDIFF1	1	1133	Tanaidacea	Arthropoda	Malacostraca	Tanaidacea			
2022NDIFF2	1	981	Ampharetidae	Annelida	Polychaeta	Terebellida	Ampharetidae		
2022NDIFF2	21	921	Capitellidae	Annelida	Polychaeta	Scolecida	Capitellidae		
2022NDIFF2	1	118273	Cirolanidae	Arthropoda	Malacostraca	Isopoda	Cirolanidae		
2022NDIFF2	1	976	Flabelligeridae	Annelida	Polychaeta	Terebellida	Flabelligeridae		
2022NDIFF2	4	953	Goniadidae	Annelida	Polychaeta	Phyllodocida	Goniadidae		
2022NDIFF2	5	414267	*Heterothyone alba*	Echinodermata	Holothuroidea	Dendrochirotida	Heterothyonidae	Heterothyone	alba
2022NDIFF2	1	101610	*Hippomedon* sp.	Arthropoda	Malacostraca	Amphipoda	Tryphosidae	Hippomedon	
2022NDIFF2	3	975	Oweniidae	Annelida	Polychaeta	Sabellida	Oweniidae		
2022NDIFF2	1	174737	Pseudidotheidae	Arthropoda	Malacostraca	Isopoda	Pseudidotheidae		
2022NDIFF2	1	237055	*Torridoharpinia hurleyi*	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	Torridoharpinia	hurleyi
2022NDIFF2	1		Unidentified Bivalve 1						
2022NDIFF3	1	981	Ampharetidae	Annelida	Polychaeta	Terebellida	Ampharetidae		
2022NDIFF3	1	123613	*Amphiura* sp.	Echinodermata	Ophiuroidea	Ophiurida	Amphiuridae	Amphiura	
2022NDIFF3	1	101368	*Aoridae* sp.	Arthropoda	Malacostraca	Amphipoda	Aoridae		
2022NDIFF3	27	921	Capitellidae	Annelida	Polychaeta	Scolecida	Capitellidae		
2022NDIFF3	1	414226	*Fellaster zelandiae*	Echinodermata	Echinoidea	Clypeasteroida	Arachnoididae	Fellaster	zelandiae
2022NDIFF3	1	976	Flabelligeridae	Annelida	Polychaeta	Terebellida	Flabelligeridae		
2022NDIFF3	7	953	Goniadidae	Annelida	Polychaeta	Phyllodocida	Goniadidae		
2022NDIFF3	1	414267	*Heterothyone alba*	Echinodermata	Holothuroidea	Dendrochirotida	Heterothyonidae	Heterothyone	alba
2022NDIFF3	1	101610	*Hippomedon* sp.	Arthropoda	Malacostraca	Amphipoda	Tryphosidae	Hippomedon	

Station	Count	AphiaID	Scientific Name	Phylum	Class	Order	Family	Genus	Species
2022NDIFF3	1	967	Lumbrineridae	Annelida	Polychaeta	Eunicida	Lumbrineridae		
2022NDIFF3	5	724054	*Maorimactra ordinaria*	Mollusca	Bivalvia	Venerida	Mactidae	Maorimactra	ordinaria
2022NDIFF3	1	956	Nephtyidae	Annelida	Polychaeta	Phyllodocida	Nephtyidae		
2022NDIFF3	2	506638	*Nucula nitidula*	Mollusca	Bivalvia	Nuculoida	Nuculidae	Nucula	nitidula
2022NDIFF3	3	975	Oweniidae	Annelida	Polychaeta	Sabellida	Oweniidae		
2022NDIFF3	1	913	Spionidae	Annelida	Polychaeta	Spionida	Spionidae		
2022NDIFF3	1	237055	*Torridoharpinia hurleyi*	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	Torridoharpinia	hurleyi
2022NDIFF4	1	981	Ampharetidae	Annelida	Polychaeta	Terebellida	Ampharetidae		
2022NDIFF4	2	394153	*Arthritica* sp.	Mollusca	Bivalvia	Galeommatida	Lasaeidae	Arthritica	
2022NDIFF4	17	921	Capitellidae	Annelida	Polychaeta	Scolecida	Capitellidae		
2022NDIFF4	1	118273	Cirolanidae	Arthropoda	Malacostraca	Isopoda	Cirolanidae		
2022NDIFF4	1	451102	*Diasterope grisea*	Arthropoda	Ostracoda	Myodocopida	Cylindroleberididae	Diasterope	grisea
2022NDIFF4	6	953	Goniadidae	Annelida	Polychaeta	Phyllodocida	Goniadidae		
2022NDIFF4	1	414267	*Heterothyone alba*	Echinodermata	Holothuroidea	Dendrochirotida	Heterothyonidae	Heterothyone	alba
2022NDIFF4	2	724054	*Maorimactra ordinaria*	Mollusca	Bivalvia	Venerida	Mactidae	Maorimactra	ordinaria
2022NDIFF4	1	956	Nephtyidae	Annelida	Polychaeta	Phyllodocida	Nephtyidae		
2022NDIFF4	2	506638	*Nucula nitidula*	Mollusca	Bivalvia	Nuculoida	Nuculidae	Nucula	nitidula
2022NDIFF4	2	975	Oweniidae	Annelida	Polychaeta	Sabellida	Oweniidae		
2022NDIFF4	1	225803	*Paracaudina* sp.	Echinodermata	Holothuroidea	Molpadiida	Caudinidae	Paracaudina	
2022NDIFF4	2	913	Spionidae	Annelida	Polychaeta	Spionida	Spionidae		
2022NDIFF4	3	237055	*Torridoharpinia hurleyi*	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	Torridoharpinia	hurleyi
2022NDIFF4	2		Unidentified Bivalve 3						
2022NDIFF4	1		Unidentified Platyhelminthes						
2022NDIFF4	1	549242	*Waitangi chelatus*	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	Waitangi	chelatus

Station	Count	AphiaID	Scientific Name	Phylum	Class	Order	Family	Genus	Species
2022NDIFF5	2	878315	*Ardeamya spenceri*	Mollusca	Bivalvia	Cardiida	Tellinidae	Ardeamya	spenceri
2022NDIFF5	5	394153	*Arthritica* sp.	Mollusca	Bivalvia	Galeommatida	Lasaeidae	Arthritica	
2022NDIFF5	1	394153	*Arthritica* sp.	Mollusca	Bivalvia	Galeommatida	Lasaeidae	Arthritica	
2022NDIFF5	3	921	Capitellidae	Annelida	Polychaeta	Scolecida	Capitellidae		
2022NDIFF5	1	118273	Cirolanidae	Arthropoda	Malacostraca	Isopoda	Cirolanidae		
2022NDIFF5	1	451102	*Diasterope grisea*	Arthropoda	Ostracoda	Myodocopida	Cylindroleberididae	Diasterope	grisea
2022NDIFF5	1	507573	*Dosinia anus*	Mollusca	Bivalvia	Veneroida	Veneridae	Dosinia	anus
2022NDIFF5	2	507556	*Dosinia subrosea*	Mollusca	Bivalvia	Veneroida	Veneridae	Dosinia	subrosea
2022NDIFF5	1	946	Hesionidae	Annelida	Polychaeta	Phyllodocida	Hesionidae		
2022NDIFF5	8	724054	*Maorimactra ordinaria*	Mollusca	Bivalvia	Venerida	Mactidae	Maorimactra	ordinaria
2022NDIFF5	5	724054	*Maorimactra ordinaria*	Mollusca	Bivalvia	Venerida	Mactidae	Maorimactra	ordinaria
2022NDIFF5	1	147031	*Nebalia* sp.	Arthropoda	Malacostraca	Nebaliacea	Nebaliidae	Nebalia	
2022NDIFF5	11	506638	*Nucula nitidula*	Mollusca	Bivalvia	Nuculoida	Nuculidae	Nucula	nitidula
2022NDIFF5	13	506638	*Nucula nitidula*	Mollusca	Bivalvia	Nuculoida	Nuculidae	Nucula	nitidula
2022NDIFF5	1	101400	Oedicerotidae	Arthropoda	Malacostraca	Amphipoda	Oedicerotidae		
2022NDIFF5	1		Ostracod A						
2022NDIFF5	3	414281	*Rynkatorpa uncinata*	Echinodermata	Holothuroidea	Apodida	Synaptidae	Rynkatorpa	uncinata
2022NDIFF5	3	505757	*Scalpomactra scalpellum*	Mollusca	Bivalvia	Veneroida	Mactridae	Scalpomactra	scalpellum
2022NDIFF5	1	943	Sigalionidae	Annelida	Polychaeta	Phyllodocida	Sigalionidae		
2022NDIFF5	4	913	Spionidae	Annelida	Polychaeta	Spionida	Spionidae		
2022NDIFF5	2		Unidentified Bivalve 1						
2022S10001	4	980	Pectinariidae	Annelida	Polychaeta	Terebellida	Pectinariidae		
2022S10001	2	878315	*Ardeamya spenceri*	Mollusca	Bivalvia	Cardiida	Tellinidae	Ardeamya	spenceri
2022S10001	3	394153	*Arthritica* sp.	Mollusca	Bivalvia	Galeommatida	Lasaeidae	Arthritica	

Station	Count	AphiaID	Scientific Name	Phylum	Class	Order	Family	Genus	Species
2022S10001	3	921	Capitellidae	Annelida	Polychaeta	Scolecida	Capitellidae		
2022S10001	1	507159	*Gari stangeri*	Mollusca	Bivalvia	Cardiida	Psammobiidae	Gari	stangeri
2022S10001	2	953	Goniadidae	Annelida	Polychaeta	Phyllodocida	Goniadidae		
2022S10001	1	101610	*Hippomedon* sp.	Arthropoda	Malacostraca	Amphipoda	Tryphosidae	Hippomedon	
2022S10001	1	967	Lumbrineridae	Annelida	Polychaeta	Eunicida	Lumbrineridae		
2022S10001	2	724054	*Maorimactra ordinaria*	Mollusca	Bivalvia	Venerida	Mactidae	Maorimactra	ordinaria
2022S10001	1	965	Onuphidae	Annelida	Polychaeta	Eunicida	Onuphidae		
2022S10001	1	975	Oweniidae	Annelida	Polychaeta	Sabellida	Oweniidae		
2022S10001	1	943	Sigalionidae	Annelida	Polychaeta	Phyllodocida	Sigalionidae		
2022S10001	12	913	Spionidae	Annelida	Polychaeta	Spionida	Spionidae		
2022S10001	1	237055	*Torridoharpinia hurleyi*	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	Torridoharpinia	hurleyi
2022S10002	5	980	Pectinariidae	Annelida	Polychaeta	Terebellida	Pectinariidae		
2022S10002	5	981	Ampharetidae	Annelida	Polychaeta	Terebellida	Ampharetidae		
2022S10002	2	878315	*Ardeamya spenceri*	Mollusca	Bivalvia	Cardiida	Tellinidae	Ardeamya	spenceri
2022S10002	4	921	Capitellidae	Annelida	Polychaeta	Scolecida	Capitellidae		
2022S10002	3	953	Goniadidae	Annelida	Polychaeta	Phyllodocida	Goniadidae		
2022S10002	1	394946	*Halicarcinus* sp.	Arthropoda	Malacostraca	Brachyura	Hymenosomatidae	Halicarcinus	
2022S10002	1	101388	*Isaeidae* sp.	Arthropoda	Malacostraca	Amphipoda	Isaeidae		
2022S10002	1	451063	*Leuroleberis zealandica*	Arthropoda	Ostracoda	Myodocopida	Cylindroleberididae	Leuroleberis	zealandica
2022S10002	1	967	Lumbrineridae	Annelida	Polychaeta	Eunicida	Lumbrineridae		
2022S10002	4	724054	*Maorimactra ordinaria*	Mollusca	Bivalvia	Venerida	Mactidae	Maorimactra	ordinaria
2022S10002	1	914	Magelonidae	Annelida	Polychaeta	Spionida	Magelonidae		
2022S10002	1	956	Nephtyidae	Annelida	Polychaeta	Phyllodocida	Nephtyidae		
2022S10002	3	506638	*Nucula nitidula*	Mollusca	Bivalvia	Nuculoida	Nuculidae	Nucula	nitidula
2022S10002	2	225803	*Paracaudina* sp.	Echinodermata	Holothuroidea	Molpadiida	Caudinidae	Paracaudina	

Station	Count	AphiaID	Scientific Name	Phylum	Class	Order	Family	Genus	Species
2022S10002	1	931	Phyllodocidae	Annelida	Polychaeta	Phyllodocida	Phyllodocidae		
2022S10002	1		Polynoidea						
2022S10002	8	913	Spionidae	Annelida	Polychaeta	Spionida	Spionidae		
2022S10002	3	237055	*Torridoharpinia hurleyi*	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	Torridoharpinia	hurleyi
2022S10002	3		Unidentified Platyhelminthes						
2022S10003	1	980	Pectinariidae	Annelida	Polychaeta	Terebellida	Pectinariidae		
2022S10003	1	981	Ampharetidae	Annelida	Polychaeta	Terebellida	Ampharetidae		
2022S10003	1	123613	*Amphiura* sp.	Echinodermata	Ophiuroidea	Ophiurida	Amphiuridae	Amphiura	
2022S10003	2	394153	*Arthritica* sp.	Mollusca	Bivalvia	Galeommatida	Lasaeidae	Arthritica	
2022S10003	7	921	Capitellidae	Annelida	Polychaeta	Scolecida	Capitellidae		
2022S10003	1	953	Goniadidae	Annelida	Polychaeta	Phyllodocida	Goniadidae		
2022S10003	3	724054	*Maorimactra ordinaria*	Mollusca	Bivalvia	Venerida	Mactidae	Maorimactra	ordinaria
2022S10003	2	943	Sigalionidae	Annelida	Polychaeta	Phyllodocida	Sigalionidae		
2022S10003	1	913	Spionidae	Annelida	Polychaeta	Spionida	Spionidae		
2022S10003	1	237055	*Torridoharpinia hurleyi*	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	Torridoharpinia	hurleyi
2022S10003	1	399420	*Xymene plebeius*	Mollusca	Gastropoda	Neogastropoda	Muricidae	Xymene	plebeius
2022S10004	2	953	Goniadidae	Annelida	Polychaeta	Phyllodocida	Goniadidae		
2022S10004	1	724054	*Maorimactra ordinaria*	Mollusca	Bivalvia	Venerida	Mactidae	Maorimactra	ordinaria
2022S10004	3	506638	*Nucula nitidula*	Mollusca	Bivalvia	Nuculoida	Nuculidae	Nucula	nitidula
2022S10004	1	965	Onuphidae	Annelida	Polychaeta	Eunicida	Onuphidae		
2022S10004	1	225803	*Paracaudina* sp.	Echinodermata	Holothuroidea	Molpadiida	Caudinidae	Paracaudina	
2022S10004	1	913	Spionidae	Annelida	Polychaeta	Spionida	Spionidae		
2022S10004	1		Unidentified Broken						
2022S10005	1	878315	*Ardeamya spenceri*	Mollusca	Bivalvia	Cardiida	Tellinidae	Ardeamya	spenceri

Station	Count	AphiaID	Scientific Name	Phylum	Class	Order	Family	Genus	Species
2022S10005	11	921	Capitellidae	Annelida	Polychaeta	Scolecida	Capitellidae		
2022S10005	1	946	Hesionidae	Annelida	Polychaeta	Phyllodocida	Hesionidae		
2022S10005	1	451063	*Leuroleberis zealandica*	Arthropoda	Ostracoda	Myodocopida	Cylindroleberididae	Leuroleberis	zealandica
2022S10005	1	724054	*Maorimactra ordinaria*	Mollusca	Bivalvia	Venerida	Mactidae	Maorimactra	ordinaria
2022S10005	1	956	Nephtyidae	Annelida	Polychaeta	Phyllodocida	Nephtyidae		
2022S10005	1	506638	*Nucula nitidula*	Mollusca	Bivalvia	Nuculoida	Nuculidae	Nucula	nitidula
2022S10005	1	515386	*Ogyrides delli*	Arthropoda	Malacostraca	Decapoda	Ogyrididae	Ogyrides	delli
2022S10005	1	965	Onuphidae	Annelida	Polychaeta	Eunicida	Onuphidae		
2022S10005	1	225803	*Paracaudina* sp.	Echinodermata	Holothuroidea	Molpadiida	Caudinidae	Paracaudina	
2022S10005	1	182871	*Scleroconcha* sp.	Arthropoda	Ostracoda	Myodocopida	Philomedidae	Scleroconcha	
2022S10005	1	913	Spionidae	Annelida	Polychaeta	Spionida	Spionidae		
2022S10005	1	237055	*Torridoharpinia hurleyi*	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	Torridoharpinia	hurleyi
2022S1001	1	980	Pectinariidae	Annelida	Polychaeta	Terebellida	Pectinariidae		
2022S1001	1	981	Ampharetidae	Annelida	Polychaeta	Terebellida	Ampharetidae		
2022S1001	1	123613	*Amphiura* sp.	Echinodermata	Ophiuroidea	Ophiurida	Amphiuridae	Amphiura	
2022S1001	1	394153	*Arthritica* sp.	Mollusca	Bivalvia	Galeommatida	Lasaeidae	Arthritica	
2022S1001	1	921	Capitellidae	Annelida	Polychaeta	Scolecida	Capitellidae		
2022S1001	2	976	Flabelligeridae	Annelida	Polychaeta	Terebellida	Flabelligeridae		
2022S1001	3	953	Goniadidae	Annelida	Polychaeta	Phyllodocida	Goniadidae		
2022S1001	3	414267	*Heterothyone alba*	Echinodermata	Holothuroidea	Dendrochirotida	Heterothyonidae	Heterothyone	alba
2022S1001	2	451063	*Leuroleberis zealandica*	Arthropoda	Ostracoda	Myodocopida	Cylindroleberididae	Leuroleberis	zealandica
2022S1001	2	724054	*Maorimactra ordinaria*	Mollusca	Bivalvia	Venerida	Mactidae	Maorimactra	ordinaria
2022S1001	2	506638	*Nucula nitidula*	Mollusca	Bivalvia	Nuculoida	Nuculidae	Nucula	nitidula
2022S1001	1	225803	*Paracaudina* sp.	Echinodermata	Holothuroidea	Molpadiida	Caudinidae	Paracaudina	
2022S1001	1	943	Sigalionidae	Annelida	Polychaeta	Phyllodocida	Sigalionidae		

Station	Count	AphiaID	Scientific Name	Phylum	Class	Order	Family	Genus	Species
2022S1001	1	913	Spionidae	Annelida	Polychaeta	Spionida	Spionidae		
2022S1001	3	237055	*Torridoharpinia hurleyi*	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	Torridoharpinia	hurleyi
2022S1001	1	101412	Urothoidae	Arthropoda	Malacostraca	Amphipoda	Urothoidae		
2022S1002	1	980	Pectinariidae	Annelida	Polychaeta	Terebellida	Pectinariidae		
2022S1002	4	394153	*Arthritica* sp.	Mollusca	Bivalvia	Galeommatida	Lasaeidae	Arthritica	
2022S1002	9	921	Capitellidae	Annelida	Polychaeta	Scolecida	Capitellidae		
2022S1002	1	118273	Cirolanidae	Arthropoda	Malacostraca	Isopoda	Cirolanidae		
2022S1002	1	953	Goniadidae	Annelida	Polychaeta	Phyllodocida	Goniadidae		
2022S1002	7	414267	*Heterothyone alba*	Echinodermata	Holothuroidea	Dendrochirotida	Heterothyonidae	Heterothyone	alba
2022S1002	1	967	Lumbrineridae	Annelida	Polychaeta	Eunicida	Lumbrineridae		
2022S1002	4	724054	*Maorimactra ordinaria*	Mollusca	Bivalvia	Venerida	Mactidae	Maorimactra	ordinaria
2022S1002	1	975	Oweniidae	Annelida	Polychaeta	Sabellida	Oweniidae		
2022S1002	2	225803	*Paracaudina*	Echinodermata	Holothuroidea	Molpadiida	Caudinidae	Paracaudina	
2022S1002	2	943	Sigalionidae	Annelida	Polychaeta	Phyllodocida	Sigalionidae		
2022S1002	2	913	Spionidae	Annelida	Polychaeta	Spionida	Spionidae		
2022S1002	5	237055	*Torridoharpinia hurleyi*	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	Torridoharpinia	hurleyi
2022S1002	1	399420	*Xymene plebeius*	Mollusca	Gastropoda	Neogastropoda	Muricidae	Xymene	plebeius
2022S1003	1	123613	*Amphiura* sp.	Echinodermata	Ophiuroidea	Ophiurida	Amphiuridae	Amphiura	
2022S1003	2	878315	*Ardeamya spenceri*	Mollusca	Bivalvia	Cardiida	Tellinidae	Ardeamya	spenceri
2022S1003	3	394153	*Arthritica* sp.	Mollusca	Bivalvia	Galeommatida	Lasaeidae	Arthritica	
2022S1003	8	921	Capitellidae	Annelida	Polychaeta	Scolecida	Capitellidae		
2022S1003	2	451102	*Diasterope grisea*	Arthropoda	Ostracoda	Myodocopida	Cylindroleberididae	Diasterope	grisea
2022S1003	1	976	Flabelligeridae	Annelida	Polychaeta	Terebellida	Flabelligeridae		
2022S1003	2	953	Goniadidae	Annelida	Polychaeta	Phyllodocida	Goniadidae		
2022S1003	9	414267	*Heterothyone alba*	Echinodermata	Holothuroidea	Dendrochirotida	Heterothyonidae	Heterothyone	alba

Station	Count	AphiaID	Scientific Name	Phylum	Class	Order	Family	Genus	Species
2022S1003	2	101610	*Hippomedon* sp.	Arthropoda	Malacostraca	Amphipoda	Tryphosidae	Hippomedon	
2022S1003	3	451063	*Leuroleberis zealandica*	Arthropoda	Ostracoda	Myodocopida	Cylindroleberididae	Leuroleberis	zealandica
2022S1003	1	724054	*Maorimactra ordinaria*	Mollusca	Bivalvia	Venerida	Mactidae	Maorimactra	ordinaria
2022S1003	1	956	Nephtyidae	Annelida	Polychaeta	Phyllodocida	Nephtyidae		
2022S1003	8	506638	*Nucula nitidula*	Mollusca	Bivalvia	Nuculoida	Nuculidae	Nucula	nitidula
2022S1003	2	225803	*Paracaudina* sp.	Echinodermata	Holothuroidea	Molpadiida	Caudinidae	Paracaudina	
2022S1003	1	174737	Pseudidotheidae	Arthropoda	Malacostraca	Isopoda	Pseudidotheidae		
2022S1003	1	414281	*Rynkatorpa uncinata*	Echinodermata	Holothuroidea	Apodida	Synaptidae	Rynkatorpa	uncinata
2022S1003	1	182871	*Scleroconcha* sp.	Arthropoda	Ostracoda	Myodocopida	Philomedidae	Scleroconcha	
2022S1003	6	237055	*Torridoharpinia hurleyi*	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	Torridoharpinia	hurleyi
2022S1003	1	399420	*Xymene plebeius*	Mollusca	Gastropoda	Neogastropoda	Muricidae	Xymene	plebeius
2022S1004	1	980	Pectinariidae	Annelida	Polychaeta	Terebellida	Pectinariidae		
2022S1004	1	101368	Aoridae	Arthropoda	Malacostraca	Amphipoda	Aoridae		
2022S1004	1	878315	*Ardeamya spenceri*	Mollusca	Bivalvia	Cardiida	Tellinidae	Ardeamya	spenceri
2022S1004	12	921	Capitellidae	Annelida	Polychaeta	Scolecida	Capitellidae		
2022S1004	5	953	Goniadidae	Annelida	Polychaeta	Phyllodocida	Goniadidae		
2022S1004	1	489274	*Litogynodiastylis laevis*	Arthropoda	Malacostraca	Cumacea	Gynodiastylidae	Litogynodiastylis	laevis
2022S1004	4	414267	*Heterothyone alba*	Echinodermata	Holothuroidea	Dendrochirotida	Heterothyonidae	Heterothyone	alba
2022S1004	1	967	Lumbrineridae	Annelida	Polychaeta	Eunicida	Lumbrineridae		
2022S1004	1	724054	*Maorimactra ordinaria*	Mollusca	Bivalvia	Venerida	Mactidae	Maorimactra	ordinaria
2022S1004	2	506638	*Nucula nitidula*	Mollusca	Bivalvia	Nuculoida	Nuculidae	Nucula	nitidula
2022S1004	1	975	Oweniidae	Annelida	Polychaeta	Sabellida	Oweniidae		
2022S1004	8	225803	*Paracaudina* sp.	Echinodermata	Holothuroidea	Molpadiida	Caudinidae	Paracaudina	
2022S1004	2	414281	*Rynkatorpa uncinata*	Echinodermata	Holothuroidea	Apodida	Synaptidae	Rynkatorpa	uncinata
2022S1004	4	237055	*Torridoharpinia hurleyi*	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	Torridoharpinia	hurleyi

Station	Count	AphiaID	Scientific Name	Phylum	Class	Order	Family	Genus	Species
2022S1004	1	101412	Urothoidae	Arthropoda	Malacostraca	Amphipoda	Urothoidae		
2022S1005	1	980	Pectinariidae	Annelida	Polychaeta	Terebellida	Pectinariidae		
2022S1005	1	981	Ampharetidae	Annelida	Polychaeta	Terebellida	Ampharetidae		
2022S1005	1	123613	*Amphiura* sp.	Echinodermata	Ophiuroidea	Ophiurida	Amphiuridae	Amphiura	
2022S1005	1	101368	Aoridae	Arthropoda	Malacostraca	Amphipoda	Aoridae		
2022S1005	1	878315	*Ardeamya spenceri*	Mollusca	Bivalvia	Cardiida	Tellinidae	Ardeamya	spenceri
2022S1005	2	394153	*Arthritica* sp.	Mollusca	Bivalvia	Galeommatida	Lasaeidae	Arthritica	
2022S1005	34	921	Capitellidae	Annelida	Polychaeta	Scolecida	Capitellidae		
2022S1005	4	953	Goniadidae	Annelida	Polychaeta	Phyllodocida	Goniadidae		
2022S1005	3	414267	*Heterothyone alba*	Echinodermata	Holothuroidea	Dendrochirotida	Heterothyonidae	Heterothyone	alba
2022S1005	1	138262	*Nucula* sp.	Mollusca	Bivalvia	Nuculoida	Nuculidae	Nucula	
2022S1005	5	225803	*Paracaudina* sp.	Echinodermata	Holothuroidea	Molpadiida	Caudinidae	Paracaudina	
2022S1005	1	182871	*Scleroconcha* sp.	Arthropoda	Ostracoda	Myodocopida	Philomedidae	Scleroconcha	
2022S1005	1	943	Sigalionidae	Annelida	Polychaeta	Phyllodocida	Sigalionidae		
2022S1005	1	913	Spionidae	Annelida	Polychaeta	Spionida	Spionidae		
2022S1005	4	237055	*Torridoharpinia hurleyi*	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	Torridoharpinia	hurleyi
2022S1005	1	101412	Urothoidae	Arthropoda	Malacostraca	Amphipoda	Urothoidae		
2022S2001	13	980	Pectinariidae	Annelida	Polychaeta	Terebellida	Pectinariidae		
2022S2001	1	123613	*Amphiura* sp.	Echinodermata	Ophiuroidea	Ophiurida	Amphiuridae	Amphiura	
2022S2001	1	101368	Aoridae	Arthropoda	Malacostraca	Amphipoda	Aoridae		
2022S2001	1	878315	*Ardeamya spenceri*	Mollusca	Bivalvia	Cardiida	Tellinidae	Ardeamya	spenceri
2022S2001	3	394153	*Arthritica* sp.	Mollusca	Bivalvia	Galeommatida	Lasaeidae	Arthritica	
2022S2001	1	878318	*Bartschicoma edgari*	Mollusca	Bivalvia	Cardiida	Bartschioma	edgari	
2022S2001	57	921	Capitellidae	Annelida	Polychaeta	Scolecida	Capitellidae		
2022S2001	1	182007	*Diastylopsis thileniusi*	Arthropoda	Malacostraca	Cumacea	Diastylidae	Diastylopsis	thileniusi

Station	Count	AphiaID	Scientific Name	Phylum	Class	Order	Family	Genus	Species
2022S2001	1	953	Goniadidae	Annelida	Polychaeta	Phyllodocida	Goniadidae		
2022S2001	3	414267	*Heterothyone alba*	Echinodermata	Holothuroidea	Dendrochirotida	Heterothyonidae	Heterothyone	alba
2022S2001	1	451063	*Leuroleberis zealandica*	Arthropoda	Ostracoda	Myodocopida	Cylindroleberididae	Leuroleberis	zealandica
2022S2001	2	152391	Nemertea	Nemertea					
2022S2001	4	506638	Nucula nitidula	Mollusca	Bivalvia	Nuculoida	Nuculidae	Nucula	nitidula
2022S2001	1	975	Oweniidae	Annelida	Polychaeta	Sabellida	Oweniidae		
2022S2001	2	225803	*Paracaudina* sp.	Echinodermata	Holothuroidea	Molpadiida	Caudinidae	Paracaudina	
2022S2001	1	397169	*Perna canaliculus*	Mollusca	Bivalvia	Mytiloida	Mytilidae	Perna	canaliculus
2022S2001	1	182871	*Scleroconcha* sp.	Arthropoda	Ostracoda	Myodocopida	Philomedidae	Scleroconcha	
2022S2001	1	913	Spionidae	Annelida	Polychaeta	Spionida	Spionidae		
2022S2001	6	237055	*Torridoharpinia hurleyi*	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	Torridoharpinia	hurleyi
2022S2002	2	980	Pectinariidae	Annelida	Polychaeta	Terebellida	Pectinariidae		
2022S2002	1	981	Ampharetidae	Annelida	Polychaeta	Terebellida	Ampharetidae		
2022S2002	1	878315	*Ardeamya spenceri*	Mollusca	Bivalvia	Cardiida	Tellinidae	Ardeamya	spenceri
2022S2002	9	921	Capitellidae	Annelida	Polychaeta	Scolecida	Capitellidae		
2022S2002	1	953	Goniadidae	Annelida	Polychaeta	Phyllodocida	Goniadidae		
2022S2002	2	489274	*Litogynodiastylis laevis*	Arthropoda	Malacostraca	Cumacea	Gynodiastylidae	Litogynodiastylis	laevis
2022S2002	1	414267	*Heterothyone alba*	Echinodermata	Holothuroidea	Dendrochirotida	Heterothyonidae	Heterothyone	alba
2022S2002	1	914	Magelonidae	Annelida	Polychaeta	Spionida	Magelonidae		
2022S2002	10	506638	*Nucula nitidula*	Mollusca	Bivalvia	Nuculoida	Nuculidae	Nucula	nitidula
2022S2002	2	225803	*Paracaudina* sp.	Echinodermata	Holothuroidea	Molpadiida	Caudinidae	Paracaudina	
2022S2002	6	913	Spionidae	Annelida	Polychaeta	Spionida	Spionidae		
2022S2002	1	237055	*Torridoharpinia hurleyi*	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	Torridoharpinia	hurleyi
2022S2003	1	980	Pectinariidae	Annelida	Polychaeta	Terebellida	Pectinariidae		
2022S2003	2	878315	*Ardeamya spenceri*	Mollusca	Bivalvia	Cardiida	Tellinidae	Ardeamya	spenceri

Station	Count	AphiaID	Scientific Name	Phylum	Class	Order	Family	Genus	Species
2022S2003	8	921	Capitellidae	Annelida	Polychaeta	Scolecida	Capitellidae		
2022S2003	1	451102	*Diasterope grisea*	Arthropoda	Ostracoda	Myodocopida	Cylindroleberididae	Diasterope	grisea
2022S2003	1	953	Goniadidae	Annelida	Polychaeta	Phyllodocida	Goniadidae		
2022S2003	1	489274	*Litogynodiastylis laevis*	Arthropoda	Malacostraca	Cumacea	Gynodiastylidae	Litogynodiastylis	laevis
2022S2003	2	414267	*Heterothyone alba*	Echinodermata	Holothuroidea	Dendrochirotida	Heterothyonidae	Heterothyone	alba
2022S2003	3	724054	*Maorimactra ordinaria*	Mollusca	Bivalvia	Venerida	Mactidae	Maorimactra	ordinaria
2022S2003	8	506638	*Nucula nitidula*	Mollusca	Bivalvia	Nuculoida	Nuculidae	Nucula	nitidula
2022S2003	1	225803	*Paracaudina* sp.	Echinodermata	Holothuroidea	Molpadiida	Caudinidae	Paracaudina	
2022S2003	1	943	Sigalionidae	Annelida	Polychaeta	Phyllodocida	Sigalionidae		
2022S2003	1	913	Spionidae	Annelida	Polychaeta	Spionida	Spionidae		
2022S2004	1	980	Pectinariidae	Annelida	Polychaeta	Terebellida	Pectinariidae		
2022S2004	1	878315	*Ardeamya spenceri*	Mollusca	Bivalvia	Cardiida	Tellinidae	Ardeamya	spenceri
2022S2004	8	921	Capitellidae	Annelida	Polychaeta	Scolecida	Capitellidae		
2022S2004	1	953	Goniadidae	Annelida	Polychaeta	Phyllodocida	Goniadidae		
2022S2004	4	489274	*Litogynodiastylis laevis*	Arthropoda	Malacostraca	Cumacea	Gynodiastylidae	Litogynodiastylis	laevis
2022S2004	1	414267	*Heterothyone alba*	Echinodermata	Holothuroidea	Dendrochirotida	Heterothyonidae	Heterothyone	alba
2022S2004	1	967	Lumbrineridae	Annelida	Polychaeta	Eunicida	Lumbrineridae		
2022S2004	1	225803	*Paracaudina* sp.	Echinodermata	Holothuroidea	Molpadiida	Caudinidae	Paracaudina	
2022S2004	3	943	Sigalionidae	Annelida	Polychaeta	Phyllodocida	Sigalionidae		
2022S2004	9	913	Spionidae	Annelida	Polychaeta	Spionida	Spionidae		
2022S2004	8	237055	*Torridoharpinia hurleyi*	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	Torridoharpinia	hurleyi
2022S2004	1		Unidentified Platyhelminthes						
2022S2005	1	101368	Aoridae	Arthropoda	Malacostraca	Amphipoda	Aoridae		
2022S2005	3	921	Capitellidae	Annelida	Polychaeta	Scolecida	Capitellidae		

Station	Count	AphiaID	Scientific Name	Phylum	Class	Order	Family	Genus	Species
2022S2005	1		Decapoda crab juv						
2022S2005	1	414226	*Fellaster zelandiae*	Echinodermata	Echinoidea	Clypeasteroida	Arachnoididae	Fellaster	zelandiae
2022S2005	2	953	Goniadidae	Annelida	Polychaeta	Phyllodocida	Goniadidae		
2022S2005	1	441795	Hymenosoma depressum	Arthropoda	Malacostraca	Decapoda	Hymenosomatidae	Hymenosoma	depressum
2022S2005	1	967	Lumbrineridae	Annelida	Polychaeta	Eunicida	Lumbrineridae		
2022S2005	2	225803	*Paracaudina* sp.	Echinodermata	Holothuroidea	Molpadiida	Caudinidae	Paracaudina	
2022S2005	1	943	Sigalionidae	Annelida	Polychaeta	Phyllodocida	Sigalionidae		
2022S2005	1	913	Spionidae	Annelida	Polychaeta	Spionida	Spionidae		
2022S2005	10	237055	*Torridoharpinia hurleyi*	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	Torridoharpinia	hurleyi
2022S5001	1	123613	*Amphiura* sp.	Echinodermata	Ophiuroidea	Ophiurida	Amphiuridae	Amphiura	
2022S5001	5	921	Capitellidae	Annelida	Polychaeta	Scolecida	Capitellidae		
2022S5001	1	953	Goniadidae	Annelida	Polychaeta	Phyllodocida	Goniadidae		
2022S5001	1	489274	*Litogynodiastylis laevis*	Arthropoda	Malacostraca	Cumacea	Gynodiastylidae	Litogynodiastylis	laevis
2022S5001	1	451063	*Leuroleberis zealandica*	Arthropoda	Ostracoda	Myodocopida	Cylindroleberididae	Leuroleberis	zealandica
2022S5001	1	724054	*Maorimactra ordinaria*	Mollusca	Bivalvia	Venerida	Mactidae	Maorimactra	ordinaria
2022S5001	2	506638	*Nucula nitidula*	Mollusca	Bivalvia	Nuculoida	Nuculidae	Nucula	nitidula
2022S5001	3	414281	*Rynkatorpa uncinata*	Echinodermata	Holothuroidea	Apodida	Synaptidae	Rynkatorpa	uncinata
2022S5001	5	913	Spionidae	Annelida	Polychaeta	Spionida	Spionidae		
2022S5001	3	237055	*Torridoharpinia hurleyi*	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	Torridoharpinia	hurleyi
2022S5001	1		Unidentified Broken						
2022S5001	1		Unidentified Platyhelminthes						
2022S5002	2	981	Ampharetidae	Annelida	Polychaeta	Terebellida	Ampharetidae		
2022S5002	1	394153	*Arthritica* sp.	Mollusca	Bivalvia	Galeommatida	Lasaeidae	Arthritica	
2022S5002	1	878318	*Bartschicoma edgari*	Mollusca	Bivalvia	Cardiida	Bartschioma	edgari	

Station	Count	AphiaID	Scientific Name	Phylum	Class	Order	Family	Genus	Species
2022S5002	22	921	Capitellidae	Annelida	Polychaeta	Scolecida	Capitellidae		
2022S5002	1	101610	*Hippomedon* sp.	Arthropoda	Malacostraca	Amphipoda	Tryphosidae	Hippomedon	
2022S5002	2	914	Magelonidae	Annelida	Polychaeta	Spionida	Magelonidae		
2022S5002	2	506638	*Nucula nitidula*	Mollusca	Bivalvia	Nuculoida	Nuculidae	Nucula	nitidula
2022S5002	1	943	Sigalionidae	Annelida	Polychaeta	Phyllodocida	Sigalionidae		
2022S5002	2	913	Spionidae	Annelida	Polychaeta	Spionida	Spionidae		
2022S5003	2	981	Ampharetidae	Annelida	Polychaeta	Terebellida	Ampharetidae		
2022S5003	1	921	Capitellidae	Annelida	Polychaeta	Scolecida	Capitellidae		
2022S5003	1	953	Goniadidae	Annelida	Polychaeta	Phyllodocida	Goniadidae		
2022S5003	1	118454	*Idotea* sp.	Arthropoda	Malacostraca	Isopoda	Idoteidae	Idotea	
2022S5003	2	451063	*Leuroleberis zealandica*	Arthropoda	Ostracoda	Myodocopida	Cylindroleberididae	Leuroleberis	zealandica
2022S5003	3	506638	*Nucula nitidula*	Mollusca	Bivalvia	Nuculoida	Nuculidae	Nucula	nitidula
2022S5003	1	414281	*Rynkatorpa uncinata*	Echinodermata	Holothuroidea	Apodida	Synaptidae	Rynkatorpa	uncinata
2022S5003	2	913	Spionidae	Annelida	Polychaeta	Spionida	Spionidae		
2022S5003	1	237055	*Torridoharpinia hurleyi*	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	Torridoharpinia	hurleyi
2022S5003	1		Unidentified Broken						
2022S5004	1	980	Pectinariidae	Annelida	Polychaeta	Terebellida	Pectinariidae		
2022S5004	2	123613	*Amphiura* sp.	Echinodermata	Ophiuroidea	Ophiurida	Amphiuridae	Amphiura	
2022S5004	2	394153	*Arthritica* sp.	Mollusca	Bivalvia	Galeommatida	Lasaeidae	Arthritica	
2022S5004	2	878318	*Bartschicoma edgari*	Mollusca	Bivalvia	Cardiida	Bartschioma	edgari	
2022S5004	10	921	Capitellidae	Annelida	Polychaeta	Scolecida	Capitellidae		
2022S5004	2	953	Goniadidae	Annelida	Polychaeta	Phyllodocida	Goniadidae		
2022S5004	1	101610	*Hippomedon* sp.	Arthropoda	Malacostraca	Amphipoda	Tryphosidae	Hippomedon	
2022S5004	2	967	Lumbrineridae	Annelida	Polychaeta	Eunicida	Lumbrineridae		
2022S5004	2	724054	*Maorimactra ordinaria*	Mollusca	Bivalvia	Venerida	Mactidae	Maorimactra	ordinaria

Station	Count	AphiaID	Scientific Name	Phylum	Class	Order	Family	Genus	Species
2022S5004	1	914	Magelonidae	Annelida	Polychaeta	Spionida	Magelonidae		
2022S5004	1	152391	Nemertea	Nemertea					
2022S5004	2	506638	*Nucula nitidula*	Mollusca	Bivalvia	Nuculoida	Nuculidae	Nucula	nitidula
2022S5004	2	225803	*Paracaudina* sp.	Echinodermata	Holothuroidea	Molpadiida	Caudinidae	Paracaudina	
2022S5004	10	913	Spionidae	Annelida	Polychaeta	Spionida	Spionidae		
2022S5004	3	237055	*Torridoharpinia hurleyi*	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	Torridoharpinia	hurleyi
2022S5004	2	399420	*Xymene plebeius*	Mollusca	Gastropoda	Neogastropoda	Muricidae	Xymene	plebeius
2022S5005	1	980	Pectinariidae	Annelida	Polychaeta	Terebellida	Pectinariidae		
2022S5005	2	981	Ampharetidae	Annelida	Polychaeta	Terebellida	Ampharetidae		
2022S5005	3	394153	*Arthritica* sp.	Mollusca	Bivalvia	Galeommatida	Lasaeidae	Arthritica	
2022S5005	12	921	Capitellidae	Annelida	Polychaeta	Scolecida	Capitellidae		
2022S5005	1	451102	*Diasterope grisea*	Arthropoda	Ostracoda	Myodocopida	Cylindroleberididae	Diasterope	grisea
2022S5005	1	489274	*Litogynodiastylis laevis*	Arthropoda	Malacostraca	Cumacea	Gynodiastylidae	Litogynodiastylis	laevis
2022S5005	1	414267	*Heterothyone alba*	Echinodermata	Holothuroidea	Dendrochirotida	Heterothyonidae	Heterothyone	alba
2022S5005	1	967	Lumbrineridae	Annelida	Polychaeta	Eunicida	Lumbrineridae		
2022S5005	1	225803	*Paracaudina* sp.	Echinodermata	Holothuroidea	Molpadiida	Caudinidae	Paracaudina	
2022S5005	2	943	Sigalionidae	Annelida	Polychaeta	Phyllodocida	Sigalionidae		
2022S5005	10	913	Spionidae	Annelida	Polychaeta	Spionida	Spionidae		
2022S5005	4	237055	*Torridoharpinia hurleyi*	Arthropoda	Malacostraca	Amphipoda	Phoxocephalidae	Torridoharpinia	hurleyi
2022S5005	1	399420	*Xymene plebeius*	Mollusca	Gastropoda	Neogastropoda	Muricidae	Xymene	plebeius

Appendix F Epifauna benthic sled tow raw data

Station	1	2	3	4
Direction	N	N	S	S
Distance	1000	100	100	1000
Start Latitude (WGS84)	-43.356648	-43.36389	-43.366529	-43.374002
Start Longitude	172.727576	172.727585	172.727758	172.727737
End Latitude (WGS84)	-43.357938	-43.36305	-43.367703	-43.372464
End Longitude	172.726597	172.726599	172.729161	20/06/1900
Fellaster zelandiae	1	1	1	nil sample
Hymenosoma depressum			2	
Aphrodita sp.			1	
Xymene plebeius			1	

REPORT

Oxford Sewer Scheme – Annual Compliance Monitoring Report 2021 - 2022

Waimakariri District Council

August 2022

Table of Contents

APPENDICES

1. INTRODUCTION

1.1. Background

Waimakariri District Council (WDC) operates a wastewater treatment plant (WWTP) at Oxford, which serves approximately 900 properties. The WWTP is located on the north side of the Eyre River on High Street, while the irrigation disposal field is located on the south side of the Eyre River on Woodstock Road (refer Figure 1).

The WWTP was constructed in 1999 and has undergone a number of upgrades, including the addition of a wet weather flow holding pond in 2014 and modifications to the Modified Ludzack-Ettinger activated sludge process in 2018 to improve the aeration system.

The Oxford scheme is operated under a number of resource consents from Canterbury Regional Council (CRC) also known as Environment Canterbury (ECan), which are listed in Table 1 along with their respective reporting requirements and level of compliance for the 2021/22 monitoring year.

Table 1: Oxford Sewer Scheme Resource Consents

Consent	Activity	Reporting	Compliance
CRC961013	To discharge contaminants to air	Refer to Section 2.0 of this report	Fully compliant
CRC144561	Land use consent for the establishment of a sewage storage basin	Refer to Section 3.0 of this report	Non-compliant
CRC184787	To discharge contaminant into land to water	Refer to Section 4.0 of this report	Non-compliant, due to wind damage to one of the irrigators and issues with the UV disinfection unit

1.2. Report Scope

The scope of this report is to summarise the annual compliance with the three consents that the Oxford sewer scheme is operated under, these include; CRC961013, CRC144561 and CRC184787. These consents do not require an annual monitoring report be submitted to Environment Canterbury, however this report has been prepared as good practice and will be submitted to Ecan for information purposes.

Figure 1 - Oxford Sewer Scheme

0 175 350 525 700
Metres
Scale 1:15000 @ A3

2. CRC961013 – DISCHARGE TO AIR

2.1. Overview

This consent covers the discharge of contaminants into air at or about map references L35:447-655 (i.e.: the irrigation disposal field on Woodstock Road) and L35:458-663 (i.e.: the WWTP on High Street) from a sewage effluent treatment and disposal system.

Consent compliance for the period 1 July 2021 through to 30 June 2022 ('the monitoring period'), has been assessed by WDC.

2.2. Condition 1 – Irrigation of Effluent

Condition 1 states:

"There shall be no spray irrigation of effluent onto land within 15 metres of a property boundary protected by a tree shelter belt, within 150 metres of a property boundary where there is no intervening tree shelter belt and within 150 metres of any dwelling house."

The irrigation fields are located 40m from the closest property boundary to the east (refer Figure 2 below). There is a shelter belt on this eastern boundary therefore compliance with Condition 1 is achieved. The irrigation fields are located more than 150m from the western and southern boundaries. The northern property boundary is within the 150m buffer, however this is publically owned river bed land that is managed and leased out by Environment Canterbury. The closest dwelling is located just over 400m away to the south of the irrigation fields as shown in Figure 2 below.

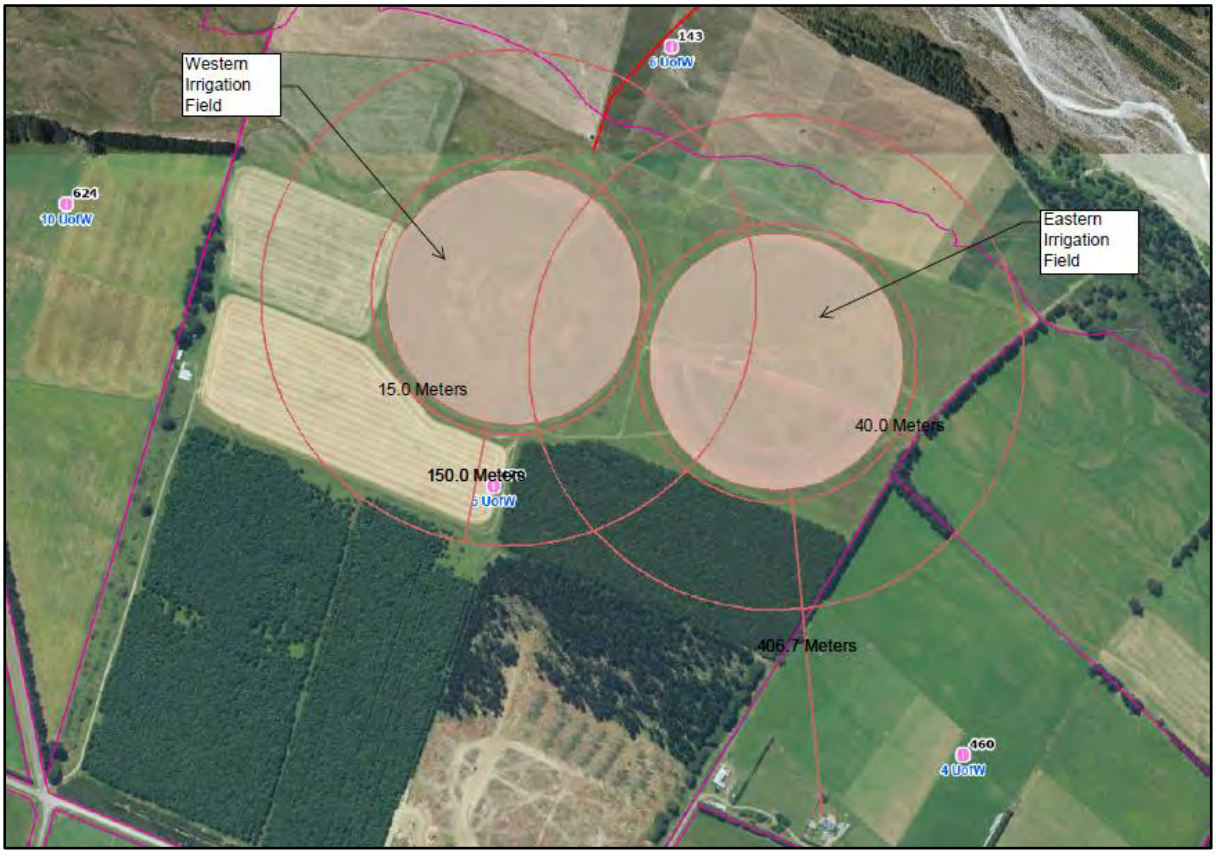


Figure 2. Irrigation disposal fields and required buffers

2.3. Conditions 2 – 5: Odour Management

Condition 2 states the following:

> *"All collection bins containing solids removed from the effluent shall be covered to prevent odorous emissions."*

All bins used for collection of screenings from the WWTP are covered to prevent odour emissions.

Condition 3 states the following:

> *"The sludge holding tank shall be mechanically aerated to minimise odorous emissions."*

The sludge holding tank is mechanically aerated to minimise odour emissions.

Condition 4 states the following:

> *"The discharge shall not cause an odour, which is determined to be objectionable or offensive by an enforcement officer of the Canterbury Regional Council, beyond the property boundary of the consent holder."*

No objectionable or offensive odours were observed during the 2021/22 monitoring period.

Condition 5 states the following:

> *"A record of complaints relating to odour emissions from the site shall be maintained, and shall include:*
>
> *(a) location of where odour detected by complainant;*
> *(b) date and time when odour detected;*
> *(c) a description of wind speed and wind direction when odour detected by complainant;*
> *(d) the most likely cause of odour detected; and*
> *(e) any corrective action undertaken by the consent holder to avoid, remedy or mitigate the odour detected by complainant.*
>
> *This record shall be provided to the Canterbury Regional Council on request."*

No complaints relating to odours were received during the 2021/22 monitoring period.

2.4. Summary of Compliance – CRC961013

A summary of compliance with consent CRC961013 is presented in Table 2 below.

Table 2: Summary of compliance for 2021/22 for consent CRC961013

Consent condition	Description	Compliance
Condition 1	Irrigation of effluent	Fully compliant
Conditions 2-5	Odour management	Fully compliant

3. CRC144561 – HOLDING POND LAND USE

3.1. Overview

This land use consent covers the establishment of a storage basin to store sewage and for associated earthworks.

Consent compliance for the period 1 July 2021 through to 30 June 2022 ('the monitoring period'), has been assessed by WDC.

3.2. Conditions 1-4, 7-9, 10(b), 12(a), 15 and 16 – Holding Pond Construction

Conditions 1, 2, 3, 4, 7, 8, 9, 10(b), 12(a), 15 and 16, relate to the construction of the holding pond.

Condition 1 states:

> *"The use of land shall be only for:*
>
> *(a) excavation associated with the construction of a Wet Weather Holding Pond; and*
> *(b) the collection, storage and treatment of municipal domestic wastewater and stormwater ('wastewater')."*

Excavation works for the holding pond were completed in 2014. The land use at the site is for the collection storage and treatment of municipal domestic wastewater and stormwater.

Condition 2 states:

> *"The Wet Weather Holding Pond shall be located as shown on Plan CRC144561A, which forms part of this consent."*

The wet weather holding pond has previously been validated by Environment Canterbury to be located within the consented area as identified in CRC144561A (refer TRIM 220713119239).

Condition 3 states:

> *"The Wet Weather Holding Pond shall be sealed with a material of low permeability such that any seepage from these structures onto or into land does not exceed an average rate of one millimetre per day."*

The holding pond is lined with a 1.5 mm thick High-Density Polyethylene (HDPE) membrane liner. The construction methodology report (refer TRIM 141121127984[v2]), provided as a requirement of Condition 4, demonstrated that the HDPE pond liner ensures that the average seepage rate from the pond does not exceed 1mm per day.

Condition 4 states:

> *"The consent holder shall provide to the Canterbury Regional Council a report on the method of construction of the Wet Weather Holding Pond that demonstrates compliance with the seepage rate referred to in condition (3). The report shall be supplied to Canterbury Regional Council, Attention RMA Compliance and Enforcement Manager, prior to the first use of the wastewater storage facility."*

The construction methodology report (refer TRIM 141121127984[v2]) demonstrated compliance with the average seepage rate from the pond does not exceed and average rate of 1mm per day.

The report required by this condition was provided to Environment Canterbury on the 25th November 2014, which was prior to the storage pond first being used (refer TRIM 150112003139).

Condition 7 states:

> *"The Wet Weather Holding Pond shall not be located within:*
>
> *(a) 20 metres of any wetland, surface water body or artificial watercourse; or*
> *(b) 50 metres up gradient in relation to groundwater flow and 30 metres in any other direction of a bore."*

The holding pond is not located within 20m of a wetland surface water body or artificial watercourse. The nearest bore (L35 0668) is located more than 70m away. This bore is owned by Waimakariri District Council and is used for observation purposes.

Figure 3. Holding pond location

Condition 8 states:

> *"Construction works authorised by this consent shall:*
>
> *(a) be limited to the area defined on Plan CRC144561A; and*
> *(b) not be carried out on Sundays or public holidays; and*
> *(c) from Monday through to Friday only occur between the hours of 7.30am and 5.30pm inclusive; and*
> *(d) on Saturdays only occur between the hours of 9am and 5pm inclusive.*

The construction works were completed in 2014 and the post-construction compliance monitoring report by Environment Canterbury confirmed compliance with this consent (refer TRIM 150112003139).

Condition 9 states:

> *"Within one month of the installation of the Wet Weather Holding Pond, the consent holder shall provide to the Canterbury Regional Council, Attention: RMA Compliance and Monitoring, a copy of the Odour Management Plan. The Odour Management Plan shall be incorporated into the Oxford Wastewater Treatment Plant's Operations Manual and shall include the specifications detailed in Appendix A.*

The Odour Management Plan was provided to Environment Canterbury on the 19th December 2014 (refer TRIM 141219141903), as an amendment to the existing operations manual for the wastewater treatment plant.

Condition 10(b) states:

> *"The Wet Weather Holding Pond shall:*
>
> *(b) be constructed in accordance with the specifications on Plan CRC144561B."*

The wet weather holding pond has previously been validated by Environment Canterbury to be constructed in accordance with the specifications on Plan CRC144561B (refer TRIM 150112003139).

Condition 12(a) states:

> *"The spillway incorporated into the design for the Wet Weather Holding Pond shall:*
>
> *(a) be constructed in accordance with the design specifications on Plan CRC144561B page 2 of 2;"*

The spillway from the wet weather holding pond has previously been validated by Environment Canterbury to be constructed in accordance with the design specifications on Plan CRC144561B (refer TRIM 220713119239).

Condition 14 states:

> *On the completion of works:*
>
> *(a) All disturbed areas shall be stabilised and/or revegetated; and*
> *(b) All spoil and other waste material from the works shall be removed from site.*

The site was appropriately reinstated following completion of the works back in 2014.

Condition 15 states:

> *In the event of any discovery of archaeological material:*
> *(a) the consent holder shall immediately:*
> *i. Cease earthmoving operations in the affected area and mark off the affected area; and*
> *ii. Advise the Canterbury Regional Council of the disturbance; and*
> *iii. Advise the New Zealand Historic Places Trust of the disturbance.*
> *(b) If the archaeological material is determined to be Koiwi Tangata (human bones) or taonga (treasured artefacts) by the New Zealand Historic Places Trust, the consent holder shall immediately advise the office of the appropriate runanga (office contact information can be obtained from the Canterbury Regional Council) of the discovery.*
> *(c) If the archaeological material is determined to be Koiwi Tangata (human bones) by the New Zealand Historic Places Trust, the consent holder shall immediately advise the New Zealand Police of the disturbance.*

(d) Work may recommence if the New Zealand Historic Places Trust (following consultation with runanga if the site is of Maori origin) provides a statement in writing to the Canterbury Regional Council, Attention: RMA Compliance and Enforcement Manager that appropriate action has been undertaken in relation to the archaeological material discovered. The Canterbury Regional Council shall advise the consent holder on written receipt from the New Zealand Historic Places Trust that work can recommence.

No archaeological material was encountered during the construction works back in 2014.

3.3. Conditions 10(a), 11, 12(b), and 13 – Holding Pond Operation

Conditions 10(a), 11, 12(b), and 13, relate to the operation of the holding pond.

Condition 10(a) states:

"The Wet Weather Holding Pond shall:

(a) be used for storage of excess flows relating to extreme weather events only when wastewater flows to the treatment facility exceed the rate of 16 litres per second;"

The holding pond was used on 18 occasions during the 2021/22 monitoring period. The pond is considered in use when the level is above 250mm.

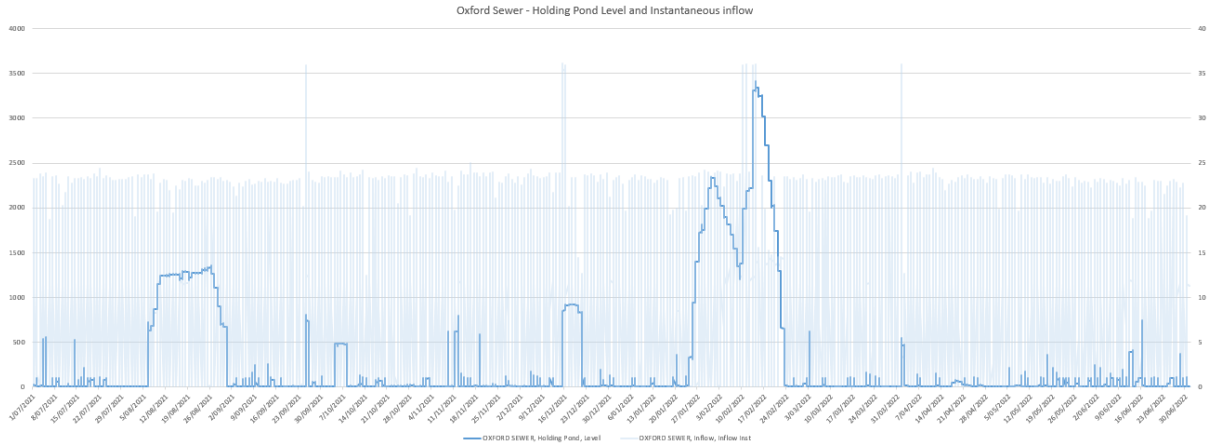


Figure 4(a): Holding Pond Level and Daily Inflow 2021/22

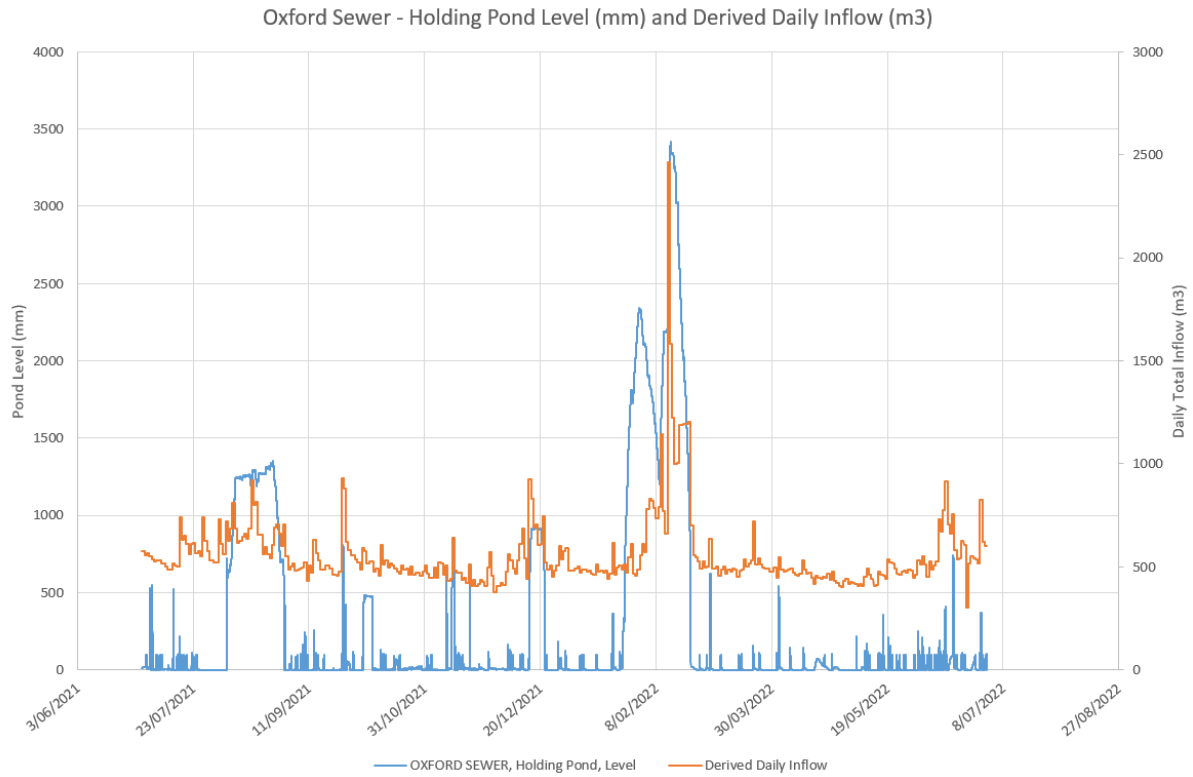


Figure 4(b): Rainfall and Daily Inflow 2021/22

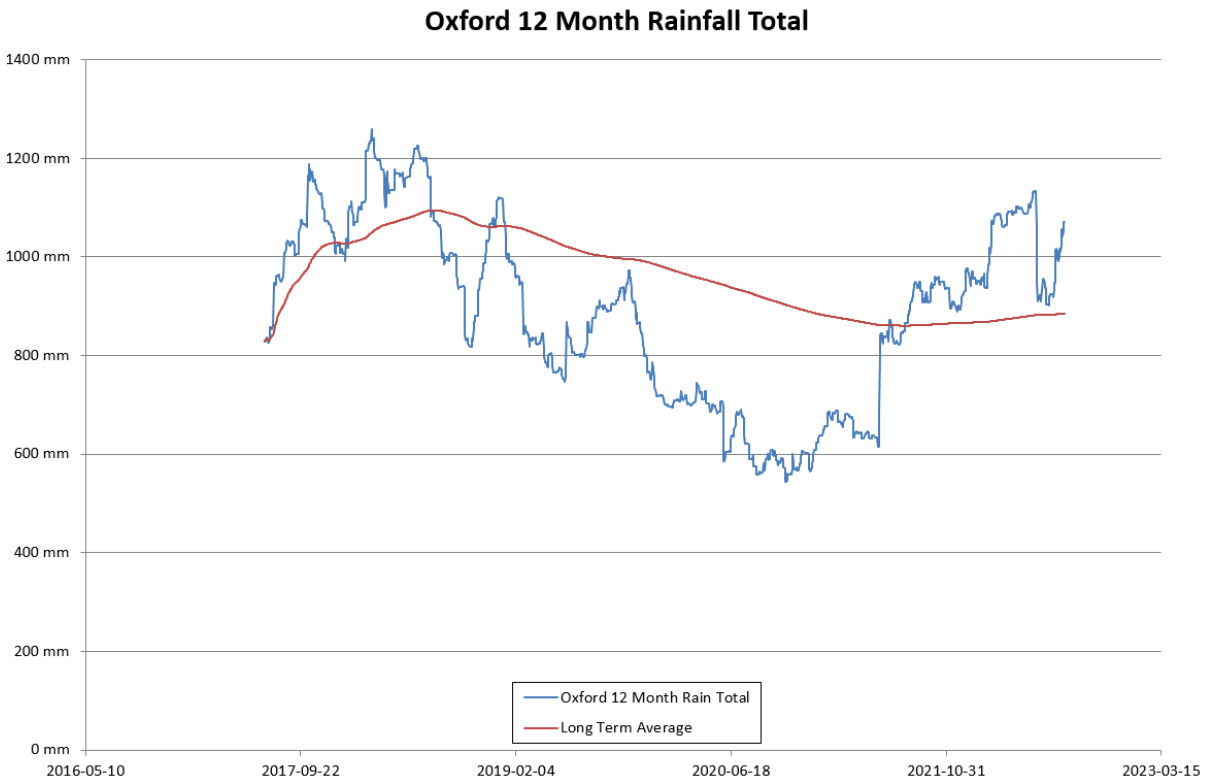


Figure 4(c): 12 month rainfall for Oxford, and long term average

Condition 11 states:

> *"All stored wastewater contained within the Wet Weather Holding Pond labelled on Plan CRC144561A shall be pumped back through the secondary treatment processes at the plant following temporary storage."*

The levels in the holding pond did not exceeded the spillway level once for 2 hours during the 2021/22 monitoring period (refer Figure 5(a) below), all other stored wastewater was pumped back through the plant for treatment following temporary storage.

Condition 12(b) states:

> *"The spillway incorporated into the design for the Wet Weather Holding Pond shall:*
>
> *(b) be used only in the event of a catastrophic 1 in 100 year rainfall event."*

The levels in the holding pond exceeded the spillway level during the 2021/22 monitoring period for 2 hours on one occasion following three rainfall events in close succession (February 2022). Rainfall occurred in the last week of January 2021 filling the pond to 2.3m. From February 1st to 9th the pond slowly emptied. A second rainfall event on February 10th filled the pond again. Lastly a third event on February 13th added another 46mm of rainfall. The peak level in the holding pond was 3,415mm on February 14th and as a result the overflow alarm was triggered and the holding pond spilled between 8:30am and 10:30am on 14 February 2022. None of these individual events were 1 in 100 year rainfall.

Figure 5(a): Holding pond level during 2021/22

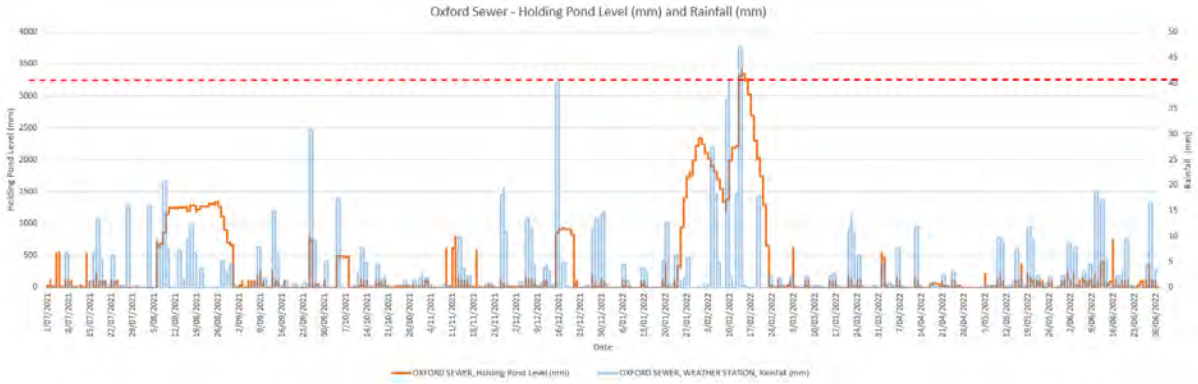


Figure 5(b): Holding pond level and rainfall during 2021/22

Condition 13 states:

> *"The Wet Weather Holding Pond labelled on Plan CRC144561A shall be used for storing diluted municipal wastewater and operated in accordance with the Site Management Plan (Appendix A) including, but not restricted to, the following requirements:*
>
> *(a) Wastewater held within the Wet Weather Holding Pond shall be drained back to the plant for secondary treatment as soon as practicable once influent flows recede to below 16 litres per second to the plant.*
> *(b) The consent holder shall ensure that hydraulic retention times for wastewater stored within the Wet Weather Holding Pond shall not exceed 10 days as far as practicable. (Hydraulic retention times will vary with season, groundwater levels, precipitation events, and plant operational conditions).*
> *(c) The Wet Weather Holding Pond shall be cleaned after each use to remove any accumulated solids.*

The wastewater stored in the holding pond was returned to the plant for treatment as soon as practical. The longest duration of retention within the holding pond was 31 days during the 2021/22 monitoring period, as shown in Table 3 below.

The holding pond fills while it is raining and doesn't start draining immediately after. Discharge only commences when inflow returns to usual levels. In January/February 2022 where the largest spike in storage is shown in Figure 5(b), there were three rainfall events in close succession. Although the pond drained between events it didn't drain fully, meaning that even though the events individually weren't overly significant cumulatively the effect on the holding pond was that it spilled on one occasion. Staff have indicated that temporary aerators can be dispatched to combat odour should this become an issue when 10 days storage is exceeded, however over the last monitoring period this was not required.

Staff consider that going forward, with the effects of climate change, we are more likely to see similar patterns where multiple events occur in close succession and the holding pond does not have time to drain back to 250mm (below 250mm is considered empty) before the next event occurs, leading to more likely occurrences of breaching the 10 day retention period. The pond can't be drained any faster without having negative impacts on the wastewater treatment plant. Faster draining would also increase the risk of discharging contaminants.

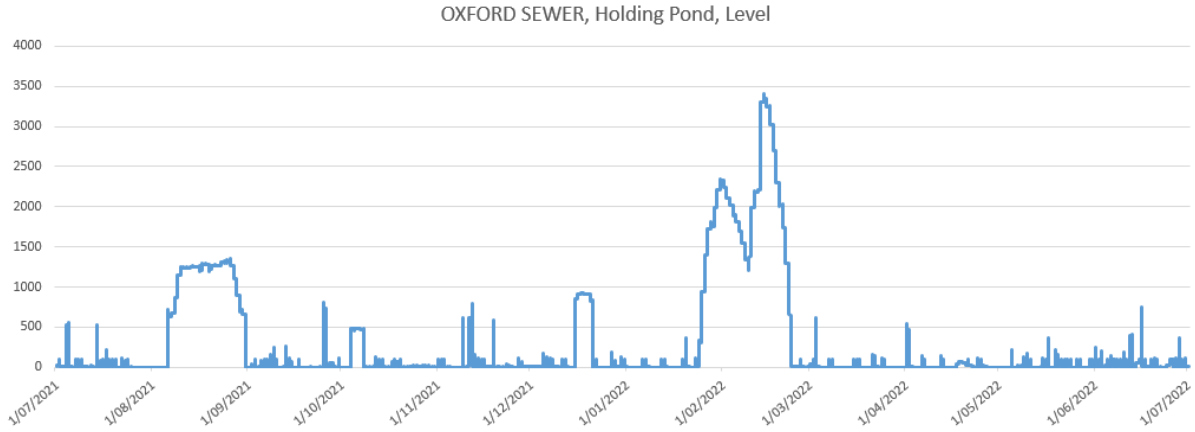


Figure 5(c): Holding Pond Retention, Level (mm)

Table 3: Holding pond retention times during 2021/22

Event Date	Duration of retention (days)
4/7/2021	1
5/7/2021	1
14/7/2021	1
6/8/2021	26
25/09/2021	2
26/09/2021	1
4/10/2021	5
9/11/2021	1
11/11/2021	2
19/11/2021	1
15/12/2021	7
20/01/2022	1
14/01/2022	31
03/03/2022	1
01/04/2022	2
12/06/2022	2
16/06/2022	1
28/06/2022	1

The holding pond was cleaned down after each use in accordance with the site management plan.

3.4. Conditions 5, 6 and 14 – Holding Pond Maintenance and Monitoring

Conditions 5, 6 and 14, relate to the maintenance and monitoring of the holding pond.

Condition 5 states:

> *"At any time as requested by the Canterbury Regional Council, the consent holder shall have the average seepage rate of the Wet Weather Holding Pond tested and certified by a Chartered Professional Engineer (CPEng). The certificate shall be supplied to Canterbury Regional Council, Attention: RMA Compliance and Enforcement Manager, within one month of the completion of the testing."*

Environment Canterbury did not request that the seepage from the holding pond be tested during the 2021/22 monitoring period.

Condition 6 states:

> *"The Wet Weather Holding Pond and all associated tanks, pipes and channels shall be sealed and maintained to prevent the leakage or overflowing of wastewater onto or into land."*

The pond is inspected during wet weather events when the holding pond is in use. No leakage or overflow was observed during the 2021/22 monitoring period.

Condition 14 states:

> *"The Wet Weather Holding pond shall be:*
>
> *(a) inspected at least annually and maintained in sound structural condition;*
> *(b) maintained in accordance with the specifications in the Site Management Plan (Appendix A); and*
> *(c) monitored to ensure compliance with conditions (10) and (11).*

Records of any complaints relating to odour effects shall be logged and submitted to the Canterbury Regional Council, Attention: RMA Compliance and Enforcement Manager, on an annual basis."

The pond is inspected during wet weather events when the holding pond is in use. Annual walkover inspections are undertaken to confirm there are no signs of deterioration of the pond banks or the liner. The holding pond is maintained and cleaned following use as required by the site management plan.

The system is monitored via SCADA to ensure compliance with conditions 10 and 11 (refer Section 3.3 above).

3.5. Summary of Compliance – CRC144561

A summary of compliance with consent CRC144561 is presented in Table 4 below.

Table 4: Summary if compliance for 2021/22 for consent CRC144561

Consent condition	Description	Compliance
Conditions 1, 2, 3, 4, 7, 8, 9, 10(b), 12(a), 15 and 16	Holding Pond Construction	Non-compliant Condition 3: 1, 382m^3/day limit
Conditions 10(a), 11, 12(b), and 13	Holding Pond Operation	Non-compliant Condition 11 & 12(b): Holding pond spilled & Condition 13: 10 day retention exceeded
Conditions 5, 6 and 14	Holding Pond Maintenance and Monitoring	Fully compliant

4. CRC184787 – DISCHARGE TO LAND

4.1. Overview

This consent covers the discharge of contaminants into land at 470 Woodstock Road (i.e.: the irrigation disposal fields).

Consent compliance for the period 1 July 2021 through to 30 June 2022 ('the monitoring period'), has been assessed by WDC.

4.2. Conditions 1-2 and 6-9 – Treatment Process

Conditions 1, 2, 6, 7, 8 and 9, relate to the design and construction of the treatment process at the WWTP.

Condition 1 states:

"The discharge shall be domestic sewage effluent treated in an aerated activated sludge plant and disinfected by ultraviolet light, as described in the Royds Consulting Report entitled "Waimakariri District Council Oxford Sewage Treatment and Disposal System: Assessment of Effects on the Environment and Technical Support Document, September 1995" submitted with the application for this consent."

The discharge consists only of domestic sewage effluent from the Oxford township and is treated in an aerated activated sludge plant and disinfected by ultraviolet light in accordance with the original Assessment of Effects on the Environment and Technical Support Document (refer TRIM 091005030296).

Environment Canterbury have raised concern that the use of chlorine was not explicitly allowed by the consent conditions. However the use of chlorine to control algae has always been used at this plant and was included in the original Operations & Maintenance Manual (dated 2004). WDC have agreed to undertake further analysis work to demonstrate that chlorine dosing is being appropriately managed to ensure there is no residual disinfection in the discharge – effectively that it is being used as an operational control to suppress algae rather than a treatment measure to kill bacteria. It is noted that chlorine is only used during warmer summer months when algae growth occurs.

Condition 2 states:

> *"The treatment plant shall include an effluent storage facility that provides for the storage of wet weather flows as authorised by resource consent CRC144561. Effluent stored in the effluent storage facility shall receive secondary treatment via the aerated activated sludge plant and ultraviolet disinfection described in condition (1) post storage and prior to discharge."*

The holding pond provides storage of wastewater during wet weather events in accordance with CRC144561. After wet weather events, stored wastewater is pumped through to the plant for treatment in accordance with Condition 1 prior to discharge (refer Section 3.3 for further information on the holding pond operation).

Condition 6 states:

> *"The effluent holding pond shall be lined with an impermeable material such that there is no discharge of effluent into land through the base or walls of the pond."*

The holding pond has been constructed with a 1.5 mm thick High-Density Polyethylene (HDPE) membrane liner (refer Section 3.2 for further information on the holding pond construction and seepage rate testing).

Condition 7 states:

> *"Design plans for the sewage effluent treatment and disposal system shall be forwarded to the Canterbury Regional Council, prior to construction of the system. The design shall allow for samples of the effluent to be taken after treatment in the ultra-violet light disinfection unit and before discharge to the irrigation system."*

The design plans were issued to Environment Canterbury prior to 6 August 1998, as confirmed in the historical compliance report received for the original version of this consent (refer TRIM 050830031). The treatment process allows for samples to be taken post UV disinfection and prior to discharge to the irrigation disposal fields, for testing as required by Conditions 4 and 5 (refer Section 4.4).

Condition 8 states:

> *"A certificate signed by a registered civil engineer or environmental engineer to certify that the sewage treatment and disposal system is constructed in accordance with the design plans specified in condition (7) shall be provided to the Canterbury Regional Council within one month of the construction of the treatment and disposal system."*

A letter certify that the treatment plant was constructed in accordance with the design plans, as certified by Alan Hulley of MWH, was issued to Environment Canterbury on 23 May 2005 once the treatment plant has been fully commissioned, as confirmed in the historical compliance report received for the original version of this consent (refer TRIM 050830031).

Condition 9 states:

> *"A management plan for the operation and maintenance of the sewage treatment and disposal system shall be provided to the Canterbury Regional Council prior to commencement of effluent discharge. The management plan shall specifically address the operational requirements for:*
>
> *(a) The aerated treatment plant;*
> *(b) The ultra-violet light disinfection unit;*
> *(c) Screening, storage and disposal of solids removed from the effluent;*
> *(d) Drying and disposal of sludge;*
> *(e). Irrigation of effluent onto land; and*
> *(f) An emergency power source to be used during loss of electricity."*

A copy of the Oxford Treatment Plant – Operations Manual (refer TRIM 150909129046), was issued to Environment Canterbury on 23 May 2005 as confirmed in the historical compliance report received for the original version of this consent (refer TRIM 050830031). An early version of the operations manual was developed during construction (refer TRIM 111110053282), but not issued as the modifications were undertaken to the plant during commissioning.

This manual was updated in 2009 (refer TRIM 090818024656) and also in 2014 to include for the operation of the holding pond (refer TRIM 141219141903). A further update to the Oxford WWTP operations and maintenance manual is currently being undertaken by AECOM and will be forwarded through to Environment Canterbury once finalised.

4.3. Conditions 3 and 10-16 – Plant Operation

Conditions 3, 10, 11, 12, 13, 14, 15 and 16, relate to the plant operation at the WWTP.

Condition 3 states:

> *"The volume of effluent discharged shall not exceed 1,382 cubic metres per day, and a maximum annual volume of 228,125 cubic metres between 1 July and the following 30 June."*

The daily volume discharged from the WWTP to the irrigation disposal field during the 2021/22 monitoring period is shown in Figure 6 below.

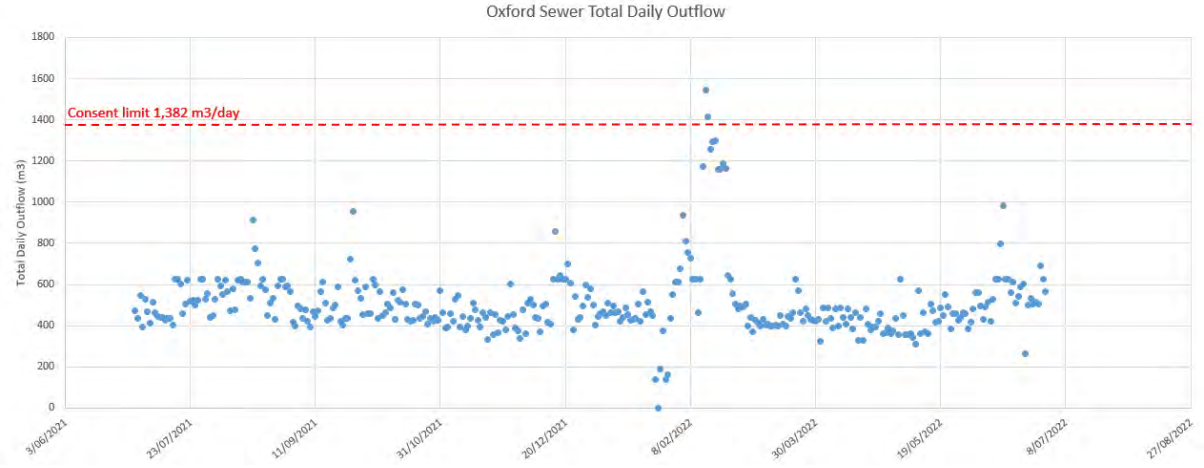


Figure 6: Daily volume discharged to the irrigation disposal field during 2021/22

The daily volume discharged exceeded 1,382 m3/day on two days following the 12th February 2022 rainfall event (14/2/22 & 15/2/22). This event was a 2 year event over a 24 hour period. The annual volume discharged was 185,745.10.

Condition 10 states:

> *"There shall be no discharge of effluent onto land within 20 metres of any surface water."*

There are no surface water bodies within 20meters of the irrigation disposal fields. The Eyre River is the closest surface waterbody which is approximately 215m from the discharge area.

Condition 11 states:

> *"Effluent shall not be spray irrigated directly onto land within the drainage channel depression identified on Plan CRC184787A attached to this consent."*

The drainage channel depression shown on Plan CRC184787A has been redirected to the south of the irrigation disposal fields, such that no treated effluent is discharged onto land within the drainage channel depression.

Condition 12 states:

> *"The rate at which effluent is applied onto land shall not exceed 200 kilograms of nitrogen per hectare per year."*

The average annual nitrogen concentration rate of 13.1 g/m3 measured during the 2021/22 monitoring period, equates to an annual application rate of 148 kg-N/ha assuming that both irrigators were operating. However as the western irrigator was not operational for 9 months of the 2021/22 monitoring period due to wind damaged sustain in September 2021. This has resulted in a higher concentration of nitrogen being applied to the eastern field from last September. The annual application rate has therefore been calculated to be 236 kg-N/ha, which is higher than the consent limit of 200 kg-N/ha.

It is noted that over the previous year the nitrogen concentration rate sampled each month was higher than the consent limit of 14.1 g/m3 in the February 2022 sample; and again in the May 2022, June 2022 and July 2022 samples. This may correlate with high levels of rainfall during these months.

A new irrigator is on order and once operating will enable the nitrogen load to once again be more widely applied across both irrigation fields. The field currently being irrigated (eastern) could be rested later this year, to reduce the nitrogen concentration applied to land, if required. It is anticipated the new irrigator will be online from spring 2022.

The Council acknowledges the very high application rate of nitrogen to the eastern irrigation field, particularly from May 2022. It has deployed a temporary irrigation system using k-lines on the western irrigation fields as an interim measure until the new irrigator is operational.

Condition 13 states:

> *"The depth of effluent application on the primary block identified on Plan CRC184787B, attached to this consent shall not exceed 22 millimetres per day. The depth of effluent irrigation on the secondary and tertiary blocks identified on plan CRC184787B shall not exceed 10 millimetres per day."*

Figure 7 below shows that the daily application rate calculated from the flow and irrigator positioning data. The erroneous data at the beginning of the 2021/22 monitoring period was due to incomplete SCADA data and is not considered to be representative of the actual application rate. Additional flow meters and upgraded irrigator positioning sensors will be installed with the new irrigator to ensure more actual data is collected in the future.

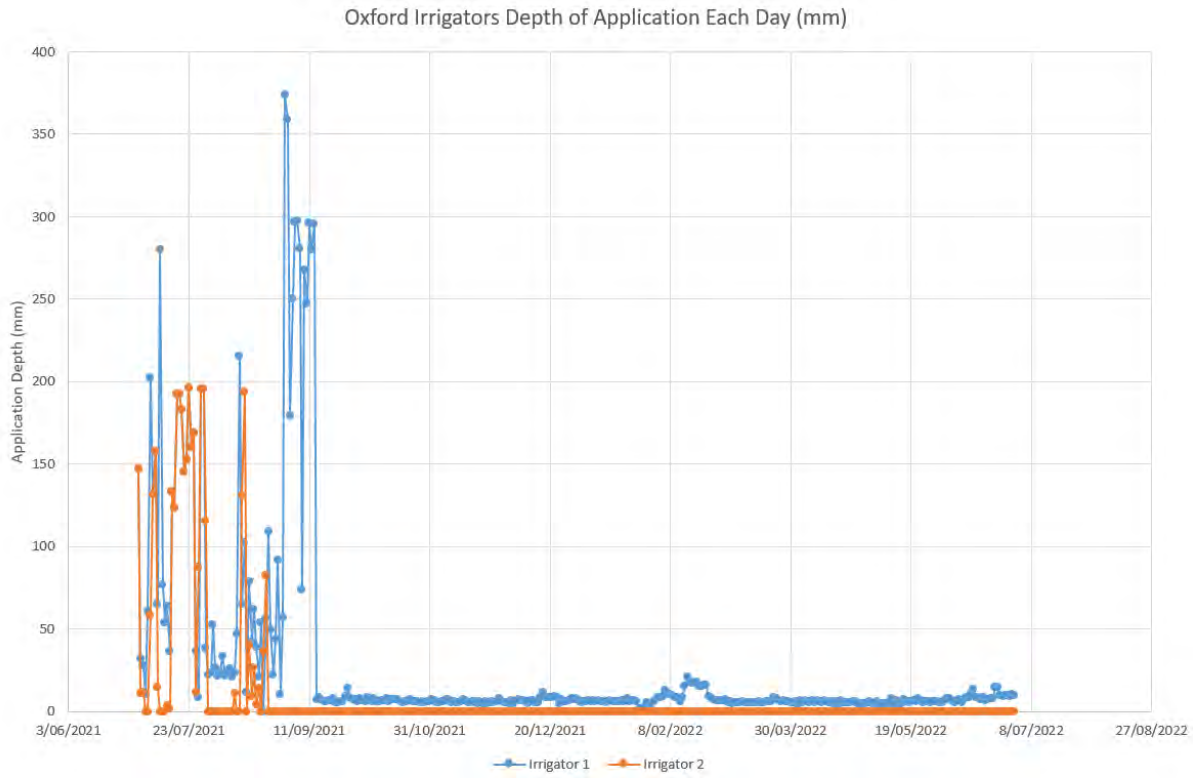


Figure 7: Average daily application rate during 2021/22

A bucket test of the eastern irrigator was conducted in November 2021. This found that the approximate application rate is 17.93mm in any 24 hour period.

Condition 14 states:

> *"There shall be no ponding of effluent."*

Ponding was observed by Environment Canterbury during the site inspection undertaken on the 9 March 2022 as shown in Figure 8 below.

Figure 8. Surface ponding observed on 9 March 2022 by Environment Canterbury

Currently only the eastern irrigator is operational as the western irrigator was damaged during the September 2021 wind event (refer Figure 9 below).

Figure 9. Damage to the western irrigator during the September 2021 wind event

An inspection undertaken by Waimakariri District Council staff on the 17 June 2022, observed some isolated wet areas where there is some pockets of surface ponding as shown in Figure 9 below. This is the lower part of the site as shown by the contours on this plan.

Figure 10. Isolated wet areas where some surface ponding was observed on 26 June 2022 by WDC staff

To reduce the likelihood of surface ponding occurring a temporary K-line irrigation system has been installed on the western irrigation field to enable the eastern irrigation field to recover.

It is currently expected that the new replacement irrigator will be operational by the end of August 2022 or early September 2022.

Condition 15 states:

> *"There shall be no grazing of land by stock within 48 hours of irrigation of that land with effluent."*

The site was not used for grazing at any time during the 2021/22 monitoring period.

Condition 16 states:

> *"The hours and rate (in cubic metres per hour) of effluent discharged and the area of land to which effluent is applied shall be measured to within an accuracy of 10 percent and recorded daily in a log kept for that purpose. These records shall be provided to the Canterbury Regional Council, on request."*

The daily volume of effluent discharged is shown in Figure 8 below and the area of land to which the effluent was applied is tabulated in Appendix A. It is noted that SCADA information was not available on irrigator position and movement for a period of time as the positioning sensor on the irrigator was faulty and had to be replaced.

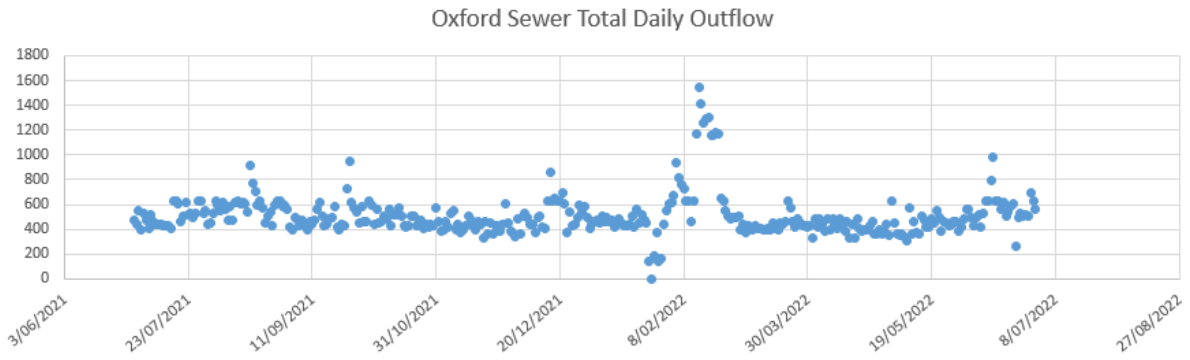


Figure 11: Daily volume of effluent during 2021/22

4.4. Conditions 4 and 5 – Treatment Monitoring

Conditions 4 and 5, relate to the treatment monitoring at the WWTP.

Condition 4 states:

> *"The faecal coliform bacteria concentration in a representative sample of the effluent taken following ultra-violet light disinfection and before discharge to the irrigation system shall not exceed 500 per 100 millilitre sample."*

Condition 5 states:

> *"A representative sample of the discharge shall be taken at the sampling location specified in condition (4) within one month of the commencement of discharge and at least every six months thereafter. Each sample shall be analysed for faecal coliform bacteria (number per 100 millilitres) and total nitrogen concentration (grams per cubic metre). The laboratory carrying out the analyses shall be accredited to ISO Guide 25, for those analyses, either by TELARC or by an organisation with a mutual recognition agreement with TELARC established in accordance with ISO Guide 58. The results shall be provided to the Canterbury Regional Council within five working days of receipt of the results by the consent holder."*

Representative samples are taken from the plant, after UV disinfection and prior to discharge to the irrigation disposal fields, on a monthly basis. The samples are tested by Hill Laboratories who are accredited to ISO Guide 25, results from the daily volume discharge from the WWTP to the irrigation disposal field during the 2021/22 monitoring period is shown in Figure 9 below.

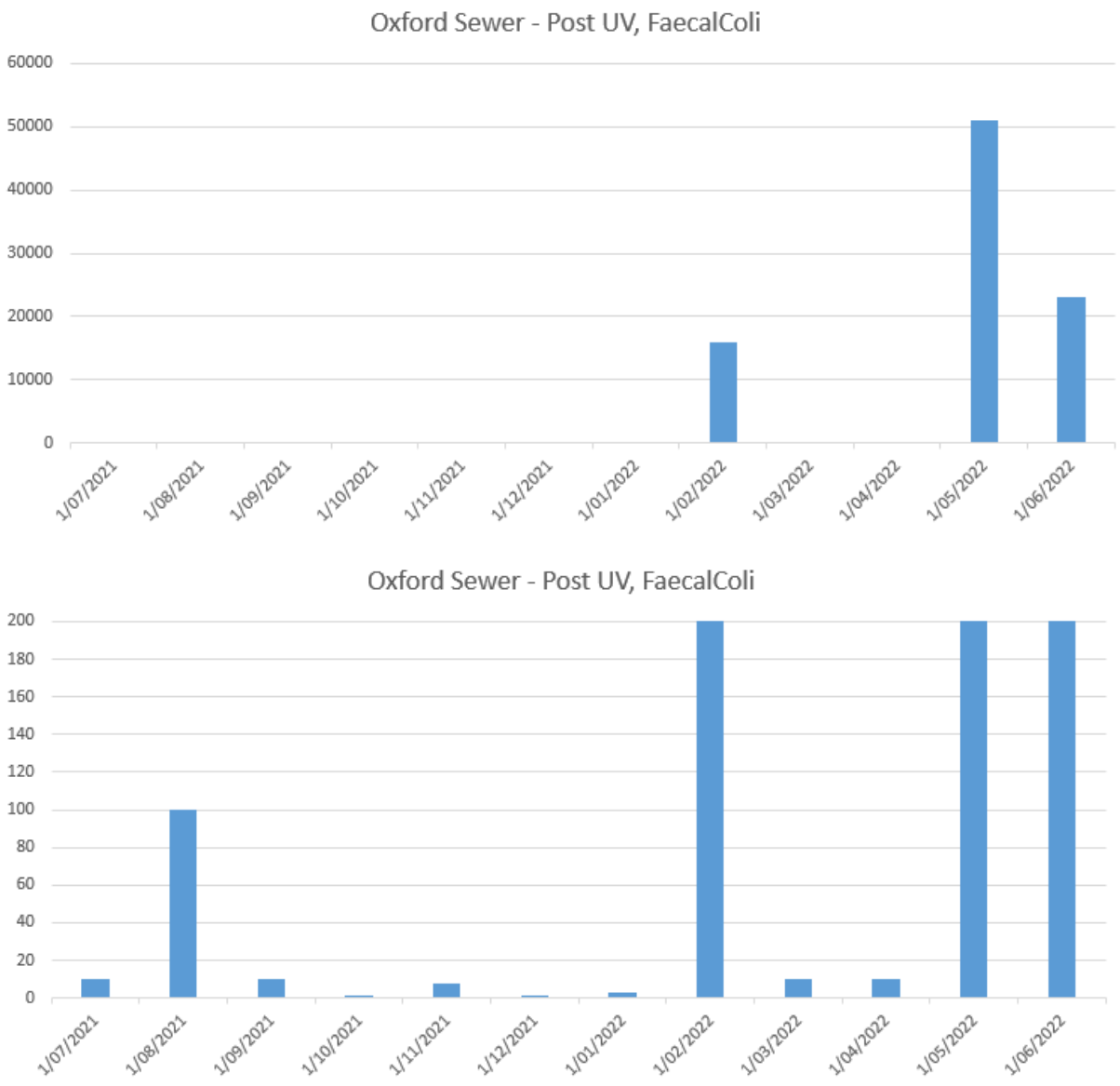


Figure 12: Monthly faecal coliform sample results during 2021/22

The results show that we were not compliant for part of the year. This was during to operational issues with the UV units. Due to the significantly higher readings in February, May and June 2022 the other months are not visible in Figure 12. Measurements for the remaining months ranged from 1 to 100 (Post UV).

Samples has been provided on an annual basis, however Environment Canterbury have requested that these are sent through within 5 working days as per the consent condition. Systems have been put in place to ensure that these results are sent through to Environment Canterbury within 5 working days.

4.5. Summary of Compliance – CRC184787

A summary of compliance with condition CRC184787 is presented in Table 5 below.

Table 5: Summary if compliance for 2021/22 for consent CRC184787.

Consent condition	Description	Compliance
Conditions 1, 2, 6, 7, 8 and 9	Treatment Process	Fully compliant

Conditions 3, 10, 11, 12, 13, 14, 15 and 16	Plant Operation	Non-compliant – The western irrigator was damaged in the September 2021 wind event and as a result surface ponding occurred at the eastern irrigation disposal field.
Condition 4 and 5	Treatment Monitoring	Non-compliant – Issues with the UV disinfection unit resulted in faecal coliform levels above the consent limit in Condition 4.

APPENDIX A

Tabulation of the daily volume of effluent discharged and the area of land to which the effluent was applied

Day	Daily Position Change		Daily Volume		Area Irrigated	
	Irrigator 1	Irrigator 2	Irrigator 1	Irrigator 2	Irrigator 1	Irrigator 2
1/07/2021	-0.4	-0.9	235.6425	235.6425	1600	1600
2/07/2021	33	95.6	220.44	220.44	6875	19916.66667
3/07/2021	56.7	86.7	323.76	209.085	11812.5	18062.5
4/07/2021	193.7	0.5	402.795	0	40354.16667	1600
5/07/2021	42.7	0.8	540.87	0	8895.833333	1600
6/07/2021	3.9	12.7	323.94	153.96	1600	2645.833333
7/07/2021	-0.8	-0.5	210.825	210.825	1600	1600
8/07/2021	0	-0.4	252.15	252.15	1600	1600
9/07/2021	33.9	0.9	456.705	23.595	7062.5	1600
10/07/2021	-0.5	0	448.14	0	1600	1600
11/07/2021	27.7	0	442.59	0	5770.833333	1600
12/07/2021	39.6	-0.4	444.03	0	8250	1600
13/07/2021	27.3	95.5	362.85	65.22	5687.5	19895.83333
14/07/2021	29.2	693.6	220.14	220.14	6083.333333	144500
15/07/2021	-0.4	-0.4	213.135	213.135	1600	1600
16/07/2021	0.4	0.9	197.265	197.265	1600	1600
17/07/2021	0	0	307.86	307.86	1600	1600
18/07/2021	0	-0.4	307.515	307.515	1600	1600
19/07/2021	0.9	0.4	292.98	292.98	1600	1600
20/07/2021	0	0	232.125	232.125	1600	1600
21/07/2021	-0.4	-0.5	244.605	244.605	1600	1600
22/07/2021	-0.4	-1.4	313.575	313.575	1600	1600
23/07/2021	0	0	256.1025	256.1025	1600	1600
24/07/2021	-0.5	0	270.2775	270.2775	1600	1600
25/07/2021	32.1	100.3	244.6725	244.6725	6687.5	20895.83333
26/07/2021	-149.7	14.9	270.8025	270.8025	31187.5	3104.166667
27/07/2021	0	0	312.99	312.99	1600	1600
28/07/2021	-0.4	0	312.645	312.645	1600	1600
29/07/2021	-41.3	3.9	330.975	184.035	8604.166667	1600
30/07/2021	-116.6	0.8	542.295	0	24291.66667	1600
31/07/2021	-92.8	0.9	447.315	0	19333.33333	1600
1/08/2021	-38.5	0	420.825	0	8020.833333	1600
2/08/2021	-99.4	0	542.085	0	20708.33333	1600
3/08/2021	-141.6	0.5	627.45	0	29500	1600
4/08/2021	-117.2	1.4	591.06	0	24416.66667	1600
5/08/2021	-79.2	-1.3	548.94	0	16500	1600
6/08/2021	-139.9	-0.5	631.71	0	29145.83333	1600
7/08/2021	-118.5	0.9	567.72	0	24687.5	1600
8/08/2021	-85.8	0	466.44	0	17875	1600
9/08/2021	-133.3	0	576.15	0	27770.83333	1600
10/08/2021	-61.2	78.9	295.185	176.265	12750	16437.5
11/08/2021	-63.8	0.9	624.54	0	13291.66667	1600
12/08/2021	-13.8	0.5	619.53	0	2875	1600
13/08/2021	-27.3	-8.8	369.435	239.865	5687.5	1833.333333
14/08/2021	-14.5	-0.4	309.495	309.495	3020.833333	1600
15/08/2021	-262.2	0.9	616.71	0	54625	1600
16/08/2021	-24.2	-16.3	397.485	136.575	5041.666667	3395.833333
17/08/2021	-76.3	-125.2	668.4825	231.6525	15895.83333	26083.33333
18/08/2021	-32.5	-65.2	418.0125	362.7975	6770.833333	13583.33333
19/08/2021	-51.1	-354	416.37	286.335	10645.83333	73750
20/08/2021	-84.4	-74.3	369.54	218.19	17583.33333	15479.16667
21/08/2021	-58.3	-0.8	651.42	0	12145.83333	1600
22/08/2021	1.8	-76.1	0	573.09	1600	15854.16667
23/08/2021	-26.4	0	310.2	132.21	5500	1600
24/08/2021	-22.8	-0.9	518.37	0	4750	1600
25/08/2021	-52.8	-0.5	541.89	0	11000	1600

26/08/2021	-98.1	0	445.38	0	20437.5	1600
27/08/2021	-65.5	-0.4	601.26	0	13645.83333	1600
28/08/2021	-32.6	0	624.6	0	6791.666667	1600
29/08/2021	298	0.4	628.32	0	62083.33333	1600
30/08/2021	-49.3	-0.4	587.34	0	10270.83333	1600
31/08/2021	-0.4	-1.4	597.69	0	1600	1600
1/09/2021	0	0	574.35	0	1600	1600
2/09/2021	-11	0	410.34	0	2291.666667	1600
3/09/2021	0.4	-0.5	399.87	0	1600	1600
4/09/2021	0	0.5	474.78	0	1600	1600
5/09/2021	-0.4	0	475.8	0	1600	1600
6/09/2021	0	0	448.53	0	1600	1600
7/09/2021	-29.9	0	459.855	0	6229.166667	1600
8/09/2021	-0.9	0	427.635	0	1600	1600
9/09/2021	0.9	0	395.43	0	1600	1600
10/09/2021	-2.7	10.2	473.79	0	1600	2125
11/09/2021	-0.9	0	447.9	0	1600	1600
12/09/2021	1.3	0	472.62	0	1600	1600
13/09/2021	360	0	557.805	0	75000	1600
14/09/2021	360	0	609.45	0	75000	1600
15/09/2021	360	0	525.375	0	75000	1600
16/09/2021	360	0	424.23	0	75000	1600
17/09/2021	360	0	439.83	0	75000	1600
18/09/2021	360	0	476.52	0	75000	1600
19/09/2021	360	0	485.595	0	75000	1600
20/09/2021	360	0	596.445	0	75000	1600
21/09/2021	360	0	418.65	0	75000	1600
22/09/2021	360	0	400.44	0	75000	1600
23/09/2021	360	0	430.59	0	75000	1600
24/09/2021	360	0	424.35	0	75000	1600
25/09/2021	360	0	697.74	0	75000	1600
26/09/2021	360	0	1054.38	0	75000	1600
27/09/2021	360	0	632.49	0	75000	1600
28/09/2021	360	0	555.735	0	75000	1600
29/09/2021	360	0	551.505	0	75000	1600
30/09/2021	360	0	457.11	0	75000	1600
1/10/2021	360	0	573.24	0	75000	1600
2/10/2021	360	0	476.91	0	75000	1600
3/10/2021	360	0	468.27	0	75000	1600
4/10/2021	360	0	633.51	0	75000	1600
5/10/2021	360	0	600.3	0	75000	1600
6/10/2021	360	0	438.96	0	75000	1600
7/10/2021	360	0	575.82	0	75000	1600
8/10/2021	360	0	449.4	0	75000	1600
9/10/2021	360	0	460.41	0	75000	1600
10/10/2021	360	0	498.45	0	75000	1600
11/10/2021	360	0	478.08	0	75000	1600
12/10/2021	360	0	576.06	0	75000	1600
13/10/2021	360	0	426.57	0	75000	1600
14/10/2021	360	0	518.67	0	75000	1600
15/10/2021	360	0	518.58	0	75000	1600
16/10/2021	360	0	554.085	0	75000	1600
17/10/2021	360	0	517.845	0	75000	1600
18/10/2021	360	0	437.19	0	75000	1600
19/10/2021	360	0	417.48	0	75000	1600
20/10/2021	360	0	421.98	0	75000	1600
21/10/2021	360	0	486.915	0	75000	1600
22/10/2021	360	0	517.125	0	75000	1600

23/10/2021	360	0	428.34	0	75000	1600
24/10/2021	360	0	434.1	0	75000	1600
25/10/2021	360	0	458.76	0	75000	1600
26/10/2021	360	0	402.57	0	75000	1600
27/10/2021	360	0	437.55	0	75000	1600
28/10/2021	360	0	407.1	0	75000	1600
29/10/2021	360	0	444.45	0	75000	1600
30/10/2021	360	0	438.9	0	75000	1600
31/10/2021	360	0	557.22	0	75000	1600
1/11/2021	360	0	476.55	0	75000	1600
2/11/2021	360	0	386.52	0	75000	1600
3/11/2021	360	0	397.35	0	75000	1600
4/11/2021	360	0	442.815	0	75000	1600
5/11/2021	360	0	435.525	0	75000	1600
6/11/2021	360	0	517.77	0	75000	1600
7/11/2021	360	0	546.675	0	75000	1600
8/11/2021	360	0	397.995	0	75000	1600
9/11/2021	360	0	430.155	0	75000	1600
10/11/2021	360	0	390.615	0	75000	1600
11/11/2021	360	0	409.62	0	75000	1600
12/11/2021	360	0	424.035	0	75000	1600
13/11/2021	360	0	519.435	0	75000	1600
14/11/2021	360	0	472.59	0	75000	1600
15/11/2021	360	0	418.08	0	75000	1600
16/11/2021	360	0	406.11	0	75000	1600
17/11/2021	360	0	467.22	0	75000	1600
18/11/2021	360	0	424.89	0	75000	1600
19/11/2021	360	0	348.03	0	75000	1600
20/11/2021	360	0	458.58	0	75000	1600
21/11/2021	360	0	355.47	0	75000	1600
22/11/2021	360	0	453.99	0	75000	1600
23/11/2021	360	0	371.55	0	75000	1600
24/11/2021	360	0	407.175	0	75000	1600
25/11/2021	360	0	427.515	0	75000	1600
26/11/2021	360	0	392.55	0	75000	1600
27/11/2021	360	0	441.06	0	75000	1600
28/11/2021	360	0	602.37	0	75000	1600
29/11/2021	360	0	448.695	0	75000	1600
30/11/2021	360	0	398.715	0	75000	1600
1/12/2021	360	0	377.01	0	75000	1600
2/12/2021	360	0	341.805	0	75000	1600
3/12/2021	360	0	480.915	0	75000	1600
4/12/2021	360	0	368.01	0	75000	1600
5/12/2021	360	0	498.195	0	75000	1600
6/12/2021	360	0	543.045	0	75000	1600
7/12/2021	360	0	510.75	0	75000	1600
8/12/2021	360	0	499.425	0	75000	1600
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WAIMAKARIRI DISTRICT COUNCIL

REPORT FOR DECISION

FILE NO and TRIM NO:	RDG-32-79-08 / 220808134686
REPORT TO:	Utilities and Roading Committee
DATE OF MEETING:	27 September 2022
AUTHOR(S):	Kieran Straw, Civil Project Team Leader Joanne McBride, Roading and Transport Manager
SUBJECT:	Southbrook School Travel Plan
ENDORSED BY: **(for Reports to Council, Committees or Boards)**	General Manager / Acting Chief Executive

1. SUMMARY

1.1 This report seeks approval of the Southbrook School Travel Plan, and authorises staff to meet with the School and explore design options to help achieve the School Travel Plan recommendations.

1.2 It also notes that the approval of the Southbrook Rd Traffic Lights Detailed Design (as per a separate report to the Committee) includes the removal of the existing Pick-Up Drop-Off area for Southbrook Scholl on Torlesse St, and the interim relocation onto Marshall St.

Attachments:

i. Southbrook School Travel Plan (TRIM No. 220817141870)
ii. Southbrook School Travel Survey Results (TRIM No. 220817141874)
iii. Southbrook School Travel Plan Working Group Terms of Reference (Trim No. 220914159775)

2. RECOMMENDATION

THAT the Utilities and Roading Committee recommends:

(a) **Receives** report No. 220808134686.

(b) **Approves** the Southbrook School Travel Plan (attachment i, Trim No. 220817141870).

(c) **Notes** that the current design of the Southbrook Rd traffic lights project (subject to a separate report to this committee) includes the removal of the existing Pick Up Drop Off (PUDO) area on Torlesse St, and the installation of a temporary pick-up drop-off area on Marshall St.

(d) **Authorises** staff to commence discussions with the school, and investigate design options to meet the recommendations from the School Travel Plan Report, which includes a long-term location for the existing pick-up drop-off area.

(e) **Approves** the establishment of a Southbrook School Travel Plan Working Group in accordance with the attached Terms of Reference (attachment iii, Trim No. 220914159775).

(f) **Notes** that elected members will be appointed by the Mayor after the coming election.

(g) **Notes** that additional funding will likely be required through the LTP process, and that the preferred option for the development of the new pick-up drop-off location in Marshall Street will be reported to Utilities and Roading to seek approval prior to implementation.

(h) **Notes** that alternate funding options such as Climate Emission Reduction (CERF) funding are being explored to fund the travel planning works.

(i) **Notes** that the new Setting of Speed Limit Rule 2022 requires Road Controlling Authorities to use reasonable efforts to reduce speed limits around all schools by 31 December 2027, with an interim target of 40 percent of schools by 30 June 2024. Staff are preparing advice on this and will be reporting to Council later in 2022.

(j) **Circulates** this report to the Rangiora Ashley Community Board for their information.

3. BACKGROUND

3.1 The purpose of a School Travel Plan is to promote active travel, and to improve safety around the school by creating an environment which parents and children feel safe and confident to walk, scoot and cycle.

3.2 For students being dropped off and picked up in private motor vehicles, the pick-up and drop-off areas should be designed to promote safe driving behaviours and efficient movement of motor vehicles without endangering pedestrians.

3.3 The project to signalise the intersection of Southbrook Road and Torlesse Street also includes provision to carry out school safety works on Denchs Road, and Marshall Street which will encourage a one-way movement through these streets, exiting on to Torlesse Street.

3.4 The Road Safety Audit (RSA) for this project recommended that a School Travel Plan (STP) was implemented for the Southbrook School. The Road Safety Audit highlighted the need for school travel education for parents and children when Council replace the existing kea crossing point with a new signalised intersection at Torlesse Street.

3.5 The secondary driver for creating a School Travel Plan is to consider the impacts of removing the pickup drop off location that currently exists on Torlesse Street.

3.6 In addition, to promote the use of the Marshall Street one-way facility. The temporary pickup drop off area is to be relocated onto Marshall Street as part of the upcoming contract works.

3.7 The long term location for the pickup drop off area will be worked through in conjunction with the school, as part of the working group.

3.8 In addition, a future Grade 2 cycleway is proposed on Torlesse St. Although design and consultation is yet to be completed on the detail, this facility is likely to be a bidirectional cycleway on the southern side of Torlesse St. Should this facility proceed, there will be insufficient space for the existing buffer zone currently used as an informal pick-up drop-off location and therefore relocation of this pickup drop off location at this stage (construction of the traffic signals) will remove this later issue.

4. ISSUES AND OPTIONS

4.1. Abley Consultants were engaged to facilitate and create the Southbrook School Travel Plan. This involved consultation with the school staff, students and parents in the form of a travel survey.

4.2. A total of 57 people completed the school travel plan survey accounting for 96 Southbrook School students (31% of school roll).

4.3. The survey formed the basis of the School Travel Plan recommendations for Council Staff. Thse are noted in the table below.

Action	Time for completion	Who is involved
Approve the Travel Plan	Term 4, 2022	Council and School Management
Produce information sheets for families on parking areas, changes, suggested behaviours, and active travel	Immediately after completion of the school safety works	Council and School Management
Complete a travel survey 6 months after the completion of the upgrades around the school and revaluate the school travel plan.	6 months after completion of the school safety works	Council and School Management
Create interim pick-up drop-off zone on Marshall Street	In conjunction with the intersection upgrade works	Council
Remove existing pick-up drop-off zone on Torlesse Street	In conjunction with the intersection upgrade works	Council
Create permanent pick-up drop-off zone, with consideration to safe parking, vehicle movement, pedestrian safety and connectivity following discussions with the school.	Following allocation of budget in the LTP	Council
Provide cycle safety training for Year 6 students	Ongoing	School Management
Have pickup drop off wardens (possibly Council parking wardens) to monitor the driving behaviour at the new Marshall St pick-up drop-off zone for the first fortnight	First fortnight immediately after completion of the school safety works	Council and School Management and Local Community

Install a permanent 30kmph speed limit around the School in conjunction with intersection upgrades as part of the Setting of Speed Limits Rule change	As part of roll-out of school speed limit changes	Council
Run a 'Park Smart' programme to encourage a safer and less stressful parking environment with community police. Provide parking education and reinforce safe parking practices over a fortnight.	Immediately after completion of school safety works	Police & School Management

4.4. To progress the recommendations from this report, staff need to explore potential design options for the removal of the existing pick up drop off zone and consider a new location. Establishing a working group to discuss this with school representatives will provide the appropriate forum for these discussions.

4.5. Actions within the time for completion as "after completion of the school safety works" are dependent on future funding being made available to develop the permanent pickup drop off are in Marshall Street.

4.6. It should be noted that while the STP (attachment i) from Abley's states the permanent pickup drop off zone shall be in Marshall Street, staff, along with the Working Group, will investigate all options before making a final recommendation.

Implications for Community Wellbeing

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

4.8. The STP provides education for parents and children on road safety, safe crossing points and ensure these vulnerable children are able to walk/bike/scooter to school safely.

4.9. The STP encourages active modes of travel. This in turn improves wellbeing though physical activity, family cost saving from less driving, and less frustration as a result of less congestion during pick up drop off.

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

5. COMMUNITY VIEWS

5.1. **Mana Whenua**

Te Ngāi Tūāhuriri hapū are likely to be affected by, or have an interest in the subject matter of this report.

Te Ngāi Tūāhuriri have an interest in the area, and they are supportive of road safety improvements particularly in relation to children and schools and regularly provided feedback at the Annual Hui on matters of road safety.

5.2. **Groups and Organisations**

There are groups and organisations likely to be affected by, or to have an interest in the subject matter of this report.

As part of the development of the School Travel Plan, staff and consultants undertook consultation with Southbrook School parents, staff and children in the form of a travel

survey, and the recommendations of this report seek to work with the Southbrook School for the development of this School Travel Plan. However, Rangiora New Life School and Kindercare are likely to be impacted by the School Travel Plan recommendations, and options exploration.

Although staff have been in contact with Rangiora New Life and Kindercare as part of the Southbrook Innovating Streets Project, Southbrook Traffic Signals Project, and the Wider Southbrook Corridor Project, they have not been involved with the Southbrook School Travel Plan.

Once the preferred design options have been agreed with the Southbrook School, staff intend to consult with the other schools, and residents in the area to consider the design option and its implication to the surrounding stakeholders.

5.3. **Wider Community**

The wider community is likely to be affected by, or to have an interest in the subject matter of this report. This will be managed by newspaper, website and social media releases.

6. OTHER IMPLICATIONS AND RISK MANAGEMENT

6.1. **Financial Implications**

There are financial implications of the decisions sought by this report.

The costs associated with the development of the School Travel Plan have been charged to the Southbrook / Torlesse Signals Project to date. This is due to the requirement for the School Travel Plan being triggered by the Road Safety Audit for this project.

It is therefore intended that the professional fees associated with this next phase of work continue to be charged to this project, along with any minor works (in the form of line marking) required to make any short term changes to the pick-up and drop-off locations.

However there is currently no funding available to implement significant physical works to permanently implement the recommendations within the School Travel Plan, and subsequent designs to be agreed with the school.

Once design options have been explored, and an estimate for the works completed, funding will be applied for through the Long Term Plan process. Alternative funding options such as Climate Emission Reduction (CERF) funding are also currently being explored to help deliver this project.

6.2. **Sustainability and Climate Change Impacts**

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

The STP encourages active modes of travel. This in turn encourages the reduction in the vehicle pick up drop offs and therefore reduces vehicle emissions.

6.3 **Risk Management**

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

There are risks that moving the pick-up and drop-off location will meet resistance from parents, and/or that some will continue to use the old area even once it has been removed. This will be managed by including the schools in this process, and ensuring good education processes.

Health and Safety

Health and safety risks that currently exist with the school travel will be reduced with the implementation of the recommendations in this report.

7. CONTEXT

7.1. Consistency with Policy

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

7.2. Authorising Legislation

Land Transport Act 1998

7.3 Consistency with Community Outcomes

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

- Core utility services are sustainable, low emissions, resilient, affordable; and provided in a timely manner
- There is a healthy and sustainable environment for all
- There is a safe environment for all
- Transport is accessible, convenient, reliable and sustainable
- People have wide ranging opportunities for learning and being informed

7.4 Authorising Delegations

Utilities and Roading Committee have delegations to approve the School Travel Plan and approve for staff to proceed with investigation of design options to meet the School Travel Plan recommendations.

School Travel Plan – Southbrook School

BOT Draft - 20 June 2022

Southbrook School
Mātauranga, Āhuatanga, Whanaungatanga

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Appendix A. Travel Survey Template

School Travel Plan – Southbrook Primary School

Quality Assurance Information

Prepared for	Waimakariri District Council
Job Number	WMKDC-J111
Prepared by	Daisy-Bea Scrase, Graduate Transportation Planner
Reviewed by	Penny Gray, Principal Transportation Engineer

Date issued	Status	Approved by
3 June 2022	Draft	Penny Gray, Principal Transportation Engineer
22 June 2022	Draft BOT	Penny Gray

1. Introduction

1.1 Why develop a school travel plan?

Travel plans encourage safe, healthy, and sustainable travel options. By reducing car travel, travel plans can improve health and wellbeing, free up car parking spaces, reduce congestion on the roads, and make a positive contribution to the community and the environment.

Southbrook Primary School have engaged with Waimakariri District Council and Ableyto create a travel plan which will help the students use more active modes and reduce congestion around the school.

There are a number of roading works planned for the roads around Southbrook School that will significantly change how people access the school site. It is proposed that Torlesse Street / Southbrook Road will become a signalised intersection. This will create new signalised crossing points across Southbrook Road which will allow better crossing opportunities. It will also be easier for drivers to turn right out of Torlesse Street. As part of this upgrade, Denchs Road and Marshall Street will become one-way streets. This will change the circulation of vehicles around Southbrook School.

1.2 The Southbrook Road / Torlesse Street Intersection Project

Southbrook Road is the busiest road in Rangiora and the Waimakariri District Council are focused on improving safety for all road users along this corridor. The projects focus is on improving the safety for children and cyclists, managing traffic flow and improving access onto side streets.

To improve safety in the area the Southbrook Road, Torlesse and Coronation Street intersection, which is heavily used by school traffic, will change to a signalised intersection. The signalised intersection will allow traffic from Torlesse and Coronation Street to safely turn left and right onto Southbrook Road.

As part of this project Denchs Road and Marshall Street will become one way. This will change the flow of traffic around the school and allow more on-street parking. A new drop off and pick up (PUDO) area can be installed on Marshall Street on the school side. It is hoped that this zone will become an attractive drop off zone to use and the use of the Torlesse Street PUDO zone will decrease. A raised courtesy crossing will be installed across Marshall Street and Torlesse Street to help children safely cross the roads to school.

Key changes for Southbrook School include;

- Denchs Road and Marshall Street becoming one way.
- Removal of kea crossing on Southbrook Road. The signalised pedestrian crossings at the Torlesse St/Southbrook Road intersection will provide students with a safe place to cross.
- Raised courtesy crossing on Marshall Street near Torlesse Street intersection
- New PUDO created on Marshall St

1.3 Our School

Site Location

As shown in Figure 1-1, the school site is located in Southbrook, on the south side of Rangiora. The site is located south of South Belt; east of Southbrook Road; north of Torlesse Street and west of the railway line.

Figure 1-1 Site Context

1.4 Number of staff and students

Southbrook Primary has approximately 310 students from new entrants to year 8 and 29 staff on site. Figure 1-2 shows that the catchment area for the school, although out of zone enrolments are considered on an application basis. Due to the catchment area extending into the semi-rural areas it is expected that some students will travel along roads with limited pedestrian or cycle infrastructure.

Staff generally come from the wider Canterbury area.

Figure 1-2 School Catchment Area

2. Travel Choices

Walking / Cycling / Scooting to School

Walking, cycling and scooting to school are the healthiest and cheapest ways for children and accompanying adults to travel to school. Walking, scooting and cycling to school will be promoted through the travel plan. Due to the location of the school a number of children walking/cycling/scooting to school will need to cross busy roads with high traffic volumes. It is important that parents, caregivers and school staff educate children to have safe crossing practices.

The roads surrounding Southbrook School have mainly good footpaths for walking and scooting. The key roads are Southbrook Road, Denchs Road, Marshall Street and Torlesse Street as shown in Figure 2-1. There are marked cycle lanes on Southbrook Road but there are no other cycling facilities in the surrounding area. The cycle lanes on Southbrook Road would only be suitable for confident cyclists to use, given the high traffic volumes, parked cars and turning movements from the side roads. Additional cycle infrastructure for the interested but concerned cyclists would be better suited for encouraging primary school children to cycle to school.

Figure 2-1 Local pedestrian facilities

Southbrook School has four pedestrian access points as shown in Figure 2-2. The entrances off Marshall Street and Torlesse Street are the main entrances to the school. The entrance off Gefkins Road is mainly used by new entrants.

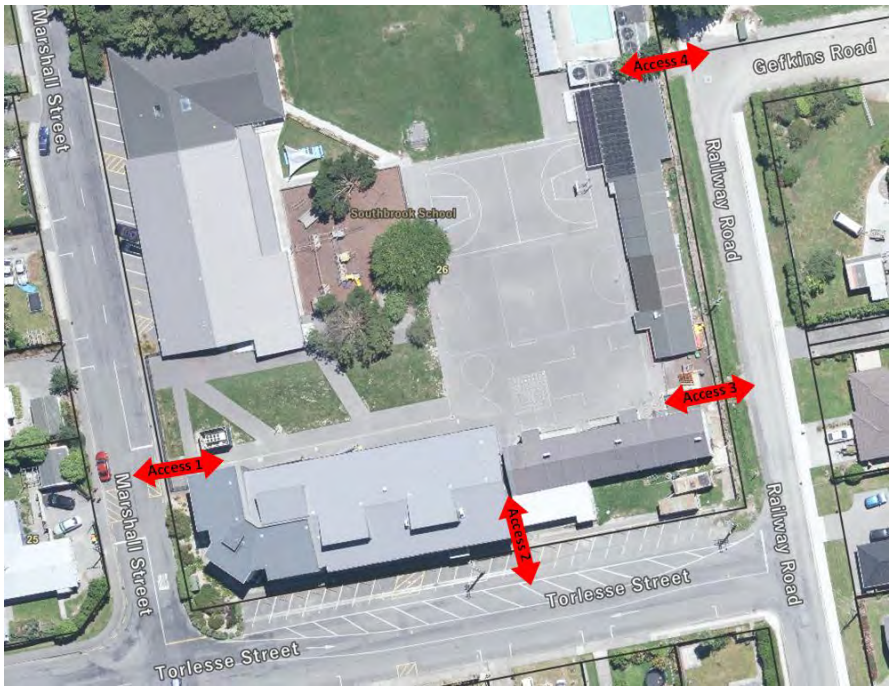


Figure 2-2 School Access for Pedestrians/Bicycles/Scooters

Cycle and Scooter Parking

Presently there is sufficient cycle and scooter parking at the school. In the future this may need to be reviewed if cycle and scooting significantly increases.

Car Parking/Vehicle Drop-off Provision

There is a dedicated PUDO zone on Torlesse Street that allows for informal drop off behind staff car parking, as shown in Figure 2-3. Marshall Street and the rest of Torlesse Street have on street parking with no time restriction and are used for school pick up and drop off.

Figure 2-3 Torlesse Street PUDO

With the changes to the surrounding road network a new PUDO can be created on Marshall Street. It is hoped that this new PUDO area will decrease the use of the Torlesse Street PUDO.

Buses

There is no school bus service to Southbrook School but there is one public bus, Route 1 which runs from Rangiora, down Southbrook Road to Christchurch (Figure 2-4). There is a bus stop on Southbrook Road approximately 300m from the school. However, school buses use this area as New Life School has school buses.

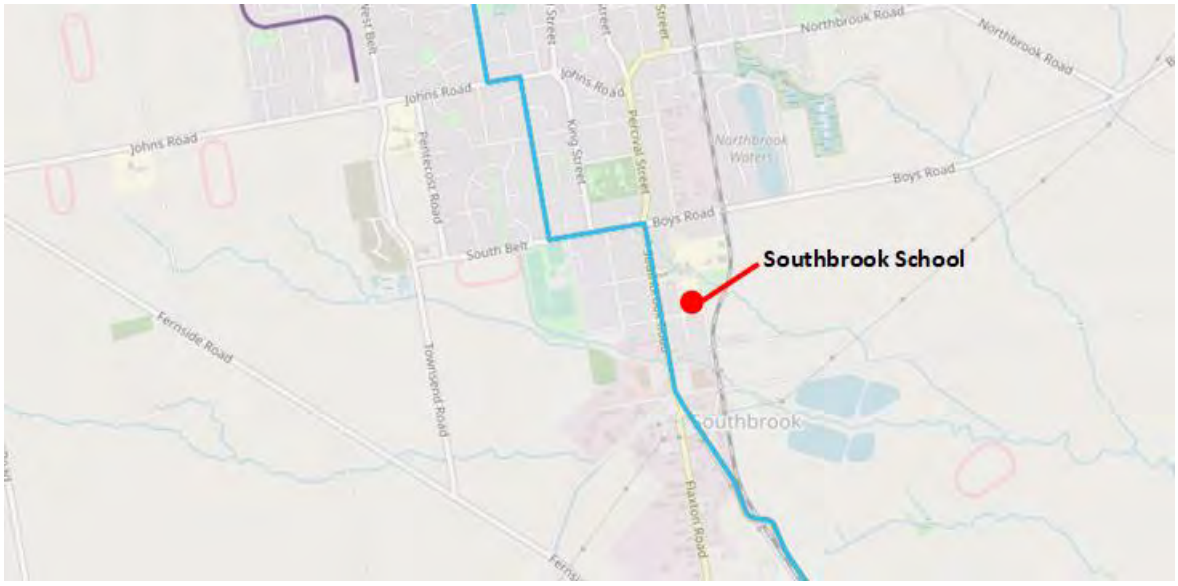


Figure 2-4 Bus routes near Southbrook School

Park and Walk

Creating a safe environment outside of the school entrance is paramount to encouraging more walking, scootering and cycling to the school. If children arrive by car, parents and caregivers should be encouraged to park further away from the school entrance and complete the journey on foot with their children walking, cycling or scooting. This has the benefits of avoiding driving and stopping around the school gates at the busiest times of the day while introducing physical activity in everyone's routine.

3. Travel Survey

3.1 How do we currently travel?

In May 2022 parents and caregivers were asked to partake in an online travel survey. A total of 57 people completed the survey accounting for 96 Southbrook School students (31% of school roll). Of the survey respondents there was relatively equal representation across the school year groups. All survey respondents were asked to indicate which area they live within. As seen in Figure 3-1 many students live in area 6 and out of zone to the north. This shows that many students have to cross South Belt or Southbrook Road on their way to and from school.

Figure 3-1 Where Southbrook School students live

3.2 Getting to and from school

Throughout the school week the mode of transport generally is the same for students at Southbrook, as shown in Figure 3-2.

The predominant transport mode to school is the car. The results show an average of 64% students get dropped to school by car each day. The results showed a good uptake in walking with an average of 17% of students walking each day. Public transport use is low which is to be expected for this size of town with limited public transport and the school age group.

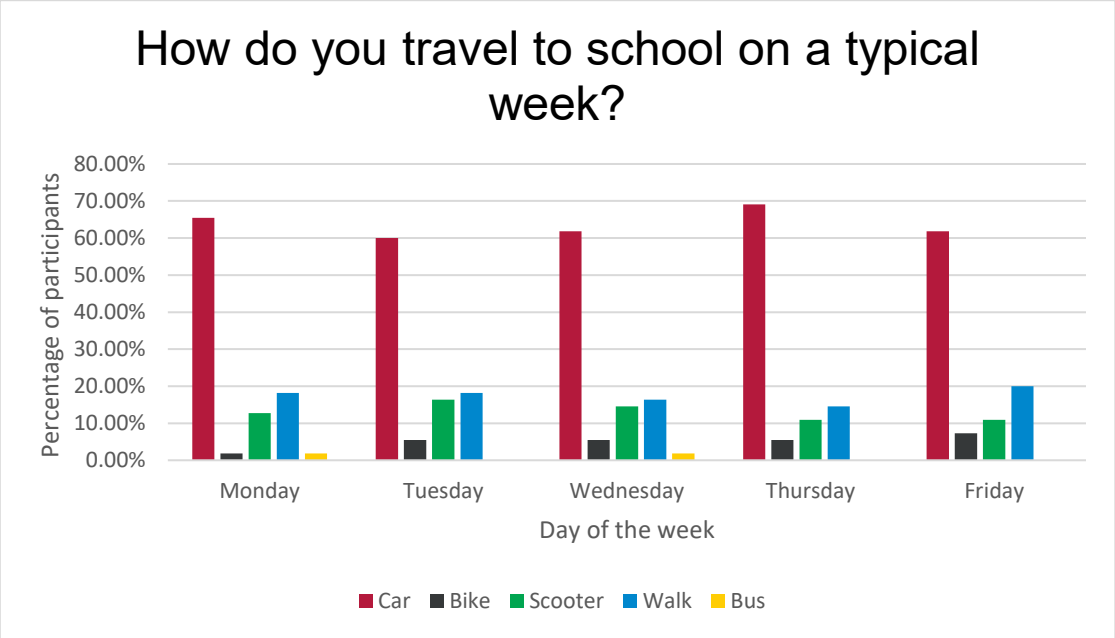


Figure 3-2 How Southbrook School students travel to school

From the survey results the mode split for the school can be estimated. Table 3-1 shows current mode split and the desired mode split. Increasing the number of students travelling to school by cycling, scooting, walking and public transport will meet the goals of the travel plan.

Walking school buses are often used by schools to increase the number of children walking to school. Walking school buses rely on an enthusiastic parent cohort to run the scheme. When asked in the survey if the parents and caregivers of Southbrook School children would use a walking school bus service 52% said no, 22% said yes and 26% were unsure. Therefore, it is not considered that a walking school bus is a viable option for Southbrook School at present.

Table 3-1 Comparison of current and desired mode splits

	Car	Bike	Scooter	Walk	Bus
Actual mode split	64% (199 students)	5% (15 students)	13% (40 students)	17% (53 students)	1% (3 students)
Desired mode split	50% (155 students)	8% (25 students)	15% (47 students)	26% (80 students)	1% (3 students)
Number of students to change mode	-44 students	+10 students	+7 students	+27 students	same

When asked why parents and caregivers drive their children to school there were multiple reasons, including:

- multiple drop offs needed/trip to work,
- the age of children makes driving the easiest and most convenient mode,
- poor weather making people use their car and
- safety issues of crossing main roads.

3.3 Pick up and drop off around the school

Most parents and caregivers use the Torlesse St pick up/drop off (PUDO) zone to drop their children at school (see Figure 3-3). Marshall Street and Railway Road were the next two most popular PUDO areas. Other locations used for PUDO were found to be the south end of Marshall Street (cul-de-sac end), Southbrook Road and Coronation Street. One respondent commented on the dangerous driving behaviour at school drop off and pick up time with drivers not giving way at the Torlesse Street and Railway Road intersection.

Approximately 96% of respondents felt that congestion outside of Southbrook School is an issue at pick up and drop off times.

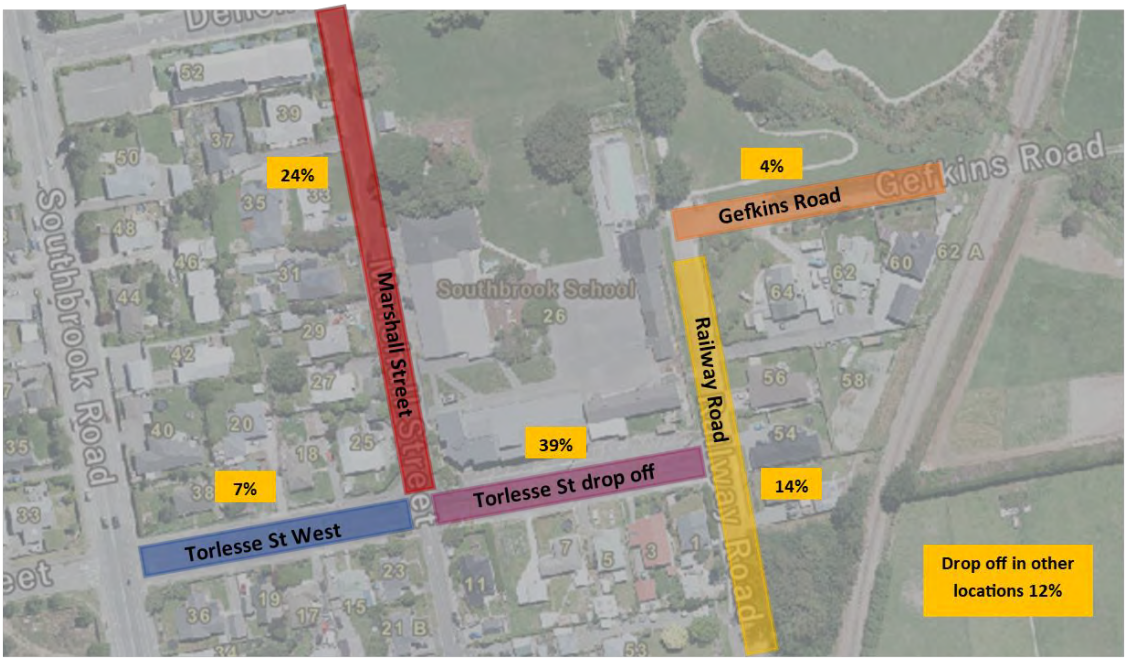


Figure 3-3 Drop off locations around Southbrook School.

3.4 Crossings around the school

The most highly used crossing is the Southbrook Road/Southbelt signals with an average of 22% of children using the signalised crossing to and from school. Other crossings around the school had a relatively equal split of use. Results show that the Marshall Street kea crossing is well used in the afternoons.

3.5 School accesses

To understand how parents, caregivers and children access the school grounds respondents were asked which entrances they regularly used.

A total of 47% respondents indicated that they use the Torlesse Street (access 2) entrance which coincides the high usage of the Torlesse Street PUDO area.

A total of 37% respondents indicated that they used access 1 on Marshall Street which lines up with the kea crossing which runs in the afternoons.

The other accesses have a lower percentage of children using them which is consistent with their location.

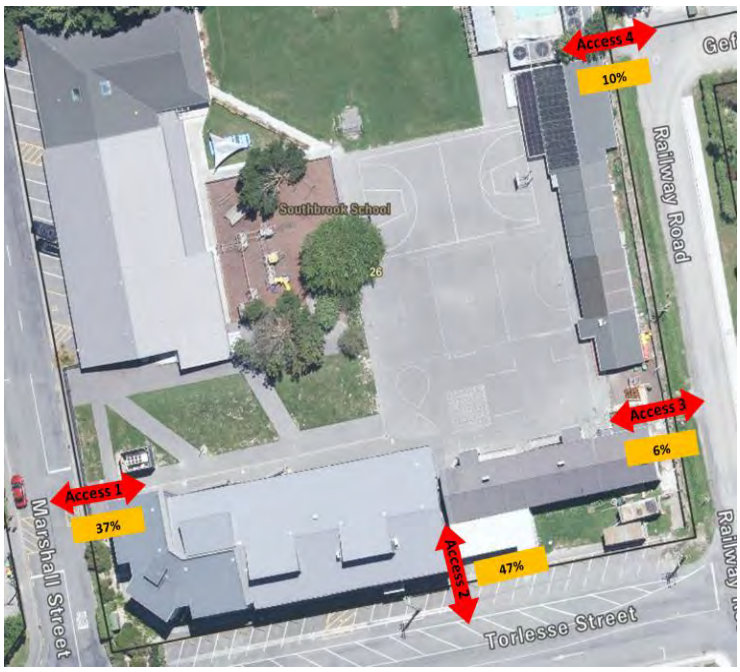


Figure 3-4 School access points.

3.6 School trip safety

When asked to rate their child's safety on their way to school a third of respondents rated the journey as safe. As shown in Table 3-2 many respondents were neutral about the safety on the way to school or felt it was unsafe.

Table 3-2 School trip safety

	Very unsafe	Unsafe	Neutral	Safe	Very safe
Safety rating	9.26%	22.22%	29.63%	33.33%	5.56%

Considering children's safety, respondents were asked what improvements could be made to improve safety on their trips to and from school. The main changes which could be made to make travel to school safer would be:

- installing a signalised crossing on Southbrook Road.
- lowering speeds around the school with a reduced speed zone or speed bumps
- creating a one-way system around the school.
- providing more parking and better drop off zones
- providing a cut through road which take people back to Rangiora avoiding Southbrook Road.

3.7 Awareness of upgrades and changes around the school

This travel plan can assist the school with the road upgrades occurring around the school in the next year. These changes include a signalised intersection being installed at the Torlesse Street/Southbrook Road intersection. With this intersection upgrade Denchs Road and Marshall Street will become one way, changing the way traffic flows around the school.

Only 46% of respondents were aware of this planned upgrade. The change to one way traffic flow and the signalised intersection means that the new PUDO on Marshall Street will become more attractive as parents and caregivers will be able to turn right out of Torlesse Street. The survey showed that 42% said they would use the new drop off zone on Marshall Street, 33% said they would not and 25% said that they were unsure.

4. What are we trying to achieve?

4.1 Aims and objectives

The aim of this travel plan is to change how students are travelling to and from school and encourage them to use more active modes. As shown above in Table 3-1 to achieve our desired mode split approximately 44 students need to switch from using a car to using an active mode to get to school.

The following table identifies our aims and objectives split into four categories; active, social, safe and sustainable, as well as the associated potential benefits. Importantly, barriers to reaching each aim and objective are identified and give an idea of areas where improvements are needed.

Table 4-1 Aims and Objectives

Aims and objectives	Expected benefits including who will benefit and how e.g. health and wellbeing	What barriers are there to our objectives?
Active Encourage physical fitness and healthy living of Southbrook School children. Children and parents choose to use active transport and walk or cycle to school	Health and wellbeing benefits: active children - resulting in maximised health and learning outcomes Minimised traffic congestion Less need for car transport	Many out of zone residential homes still a reasonable distance from the school. Many car users dropping children off to school on their way to work or elsewhere makes the car most convenient. Long term habits of car use.
Social Children and parents join with others as they walk or cycle to school. Engage the community in the ownership of the school travel plan	Health and wellbeing benefits: connected citizens Children interact with other children and adults as they journey to school Older children take on mentor roles Safety in numbers	Parents availability to support walking and cycling school buses Many residential homes still a reasonable distance from the school making active modes less desirable
Safe Reduce congestion and chaos at and near the school gates. Improve safety for the children on the roads surrounding the school. Children and parents feel safe walking or cycling to school. Children are aware of their surroundings and cross streets safely. Children and parents who walk or cycle to school do so confidently and safety.	Health and wellbeing benefits: nurturing sound road behaviour - for children, and adults. Older children take on safety patrol leadership roles.	Due to Southbrook Road being the main access road in Rangiora it has large volumes of traffic. Multiple schools in the area resulting in high numbers of cars and pedestrians navigating the road network.
Sustainable Promote active modes of transport. Increase the number of children and parents walking, scooting, or cycling to school	Health and wellbeing benefits: active connected, and safe children - resulting in maximised health and learning outcomes Environmental benefits: traffic is minimised	Not having the necessary infrastructure in place to encourage all active modes (limited cycle lanes and limited public transport connection)

5. The Travel Plan

5.1 What we plan to do

What are we already doing?

Southbrook School already complete a number of activities that encourage active travel to the school. These include:

- Cycle Safety Training.
- Walk or wheel to school day/week
- SOUTHBROOK TO FILL IN OTHER INITIATIVES

Action Plan

Targets are necessary to drive actions. Considering the benefits of alternatives to car use but also of student's preferences, targets need to reflect an ambition to increase active travel and reduce car use.

Table 5-1 outlines the proposed travel plan actions for Southbrook Primary School, Waimakariri District Council and the wider stakeholders.

Table 5-1 Travel Plan actions

Action	Timescales for completion	Who is involved/responsible
Create and implement travel plan		
Approve the travel plan	Term 4 2022	School management & Waimakariri District Council
Nominate a staff member or member of the community to take on the role of travel plan coordinator	End of Term 4 2022	School management
Publish survey results and travel plan to parents and students. Have a feature in the school newsletter.	Start of Term 4 2022	School management
Create a school travel page on school website for all initiatives and communication.	End of school year 2022	School management
Produce information sheets for families on parking areas, changes, suggested behaviours, and active travel	Immediately after upgrade completion	Waimakariri District Council & School management
Complete a travel survey 6 months after the completion of the upgrades around the school and revaluate the school travel plan.	6 months post upgrade completion	School management & Waimakariri District Council
For the school		
Prepare consistent and culturally considerate road safety and active transport messages to the community. Plan curriculum initiatives to promote road safety and active travel awareness in detail (which activities, on which days, in which classes etc). This can include:	Start of school 2023 - Ongoing	School management

▪ Pedestrian/Cycling/Scooting safety training – community Police ▪ Health and Physical Education classes centred on active travel		
Create an interim PUDO zone on Marshall Street	In conjunction with intersection upgrade works	Waimakariri District Council
Create permanent PUDO zone on Marshall Street with consideration to safe parking vehicle movement, pedestrian safety and connectivity following discussions with the school	Following allocation of budget in the LTP	Waimakariri District Council
Remove existing Torlesse Street PUDO zone	In conjunction with intersection upgrade works	Waimakariri District Council
Participate in a walk or wheel to school week/day annually	Start of school 2023 - ongoing	School Management & student leaders
Promote active modes at school and create a recognition system for students.	Ongoing	School Management & student leaders
Provide cycle safety training for Year 6 students	Ongoing	Waimakariri District Council & School Management
Engage with community Police to facilitate school road saftey programmes	Ongoing	School Management & local community Police
Have PUDO wardens (possibly Council parking wardens) to monitor the driving behaviour at the new Marshall St PUDO for the first fortnight	First fortnight immediately after upgrade completion	Waimakariri District Council, local community Police & School Management
Operate Marshall Street kea crossing in mornings and afternoons	Immediately after upgrade completion – ongoing	School Management
Include regular information in the school newsletter on active, sustainable travel. For examples, profiling different families using sustainable and active modes to get to school.	Ongoing	School Management
Provide new families with information about travel options to school and the schools travel plan	Ongoing	School Management
For the community		
Install a permenant 30kmph speed limit around the School in conjunction with intersection upgrades as part of the Setting of Speed Limits Rule change	In conjunction with surrounding upgrades, as soon as practicable	Waimakariri District Council
Run a ‘Park Smart’ programme to encourage a safer and less stressful parking environment with community police. Provide parking education and reinforce safe parking practices over a fortnight.	Immediately after completion of school safety work	Waimakariri District Council, Police & School Management
Identify and promote suitable locations for parking and walking to school to promote active travel to the school and reduce congestion at the school gate.	Term 1 2023	School Management

Further options for encouraging walking and wheeling to school

- Build a bike and scooter shelter
- Walk/bike/bus to school maps
- Classroom challenges
- Frequent walker scheme
- Cycle or bus miles
- Buddy programme
- Set walking day
- Feet first
- Active travel tree
- Active transport breakfast, smoothie station or walk to support activity

Resources which can be used in school

NZTA's Road Safety teacher resources: https://education.nzta.govt.nz/teacher-resources/school-policy-and-practices/

Bike Ready: https://www.bikeready.govt.nz/schools/

Bike On (bikes in schools programme): https://bikeon.org.nz/

NZ Police School Portal: https://www.police.govt.nz/advice/personal-and-community-advice/school-portal

6. Monitoring and Review

It is important that the school travel plan is regularly reviewed. Each update should include a review of the objectives and action plan. To track progress, an annual travel survey should be completed. However, it is recommended that another travel survey is completed after the roading changes are implemented around Southbrook School.

A copy of the template travel survey is supplied in Appendix A. The survey may be adapted to include location specific questions as required.

In order to ensure the Travel Plan is implemented and reviewed, the school should have an appointed Travel Plan Coordinator at all times. This can be any member of staff wishing to champion the approach.

The current Travel Plan Coordinator is:

On an annual basis, the Travel Plan Coordinator will manage the Travel Plan Monitoring by following these steps:

1) The Travel Survey Questionnaire will be distributed to parents/caregivers for them to fill out (survey monkey is a free survey service).

2) The School will analyse survey results against previous results and against targets.

3) The School will review progress in implementing the actions set out in the Action Plan.

4) The School will update the Action Plan with new or different actions in order to meet targets.

The first survey, carried out in May 2022 is the baseline survey. These results will be used to set targets. Once the baseline is established, this Travel Plan will be updated with the survey results but also with clear targets for:

- the proportion of students driven to/from school in single family cars, aiming for a decrease from the baseline.

Travel Survey Methodology:

- The parents/caregivers survey questionnaire developed by Abley is to be used every year to allow comparing results year on year.
- In-classroom desired mode surveys can consist of either hands-up counts or of asking every student individually about their preferred travel mode. Only one answer per student.
- Together, these surveys will generate data to be summarised by the School in the following outputs:
    - Graph of how people travel to and from school
    - Parking / drop off location for staff and parents
    - Reason for current travel mode
    - Other modes interested in and/or how students would prefer to travel
    - Main reason why they don’t travel by an active mode.

Appendix A. Travel Survey Template

Q1 I am a parent/caregiver of a child at Southbrook Primary and by completing this survey I agree that the answers I provide can used to create the school travel plan.

Yes

No

Q2 How many children do you have attending Southbrook Primary?

1

2

3

4

5

6+

Q3 What year is/are your child(ren) in at school?

Year 0

Year 1

Year 2

Year 3

Year 4

Year 5

Year 6

Year 7

Year 8

Q4 Looking at the image below, please indicate which are you live within?

Area 1

Area 2

Area 3

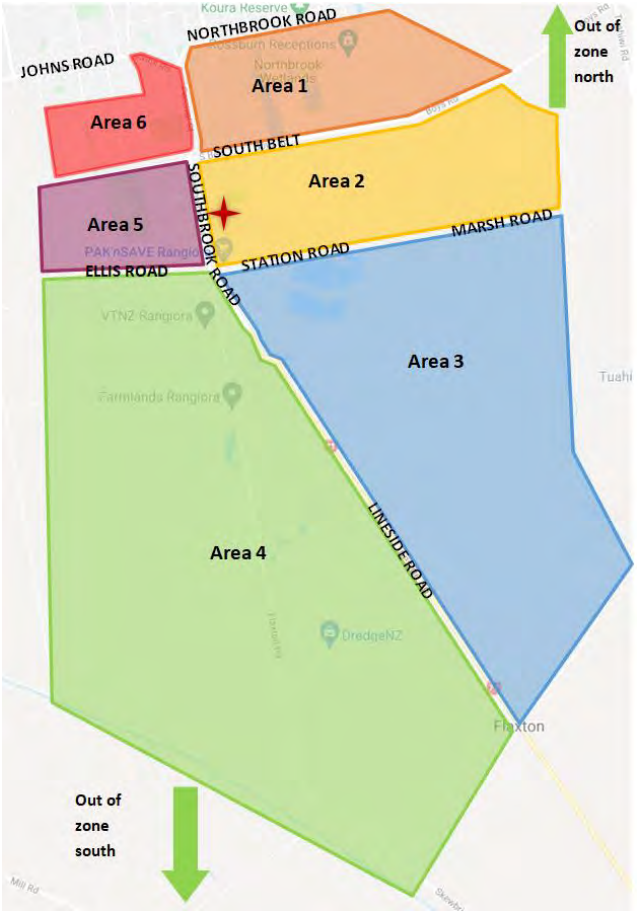
Area 4

Area 5

Area 6

Out of zone (North)

Out of zone (South)



Q5 On a typical week how do you travel to school?

	Car	Bike	Scoter	Walk	Bus	Total
Monday						
Tuesday						
Wednesday						
Thursday						
Friday						

Q6 If you drive, why do you drive your child(ren) to school? Select all that apply

Convenience

Age of children means driving is easier

Multiple drop offs needed/trip to work

There isn't a safe route to cycle or walk to school

The distance to school is too great walk or cycle

Other (please specify)

Q7 If you drive, where do you pick up/drop off? Select all locations which you use (see image below).

Torlesse St drop off zone

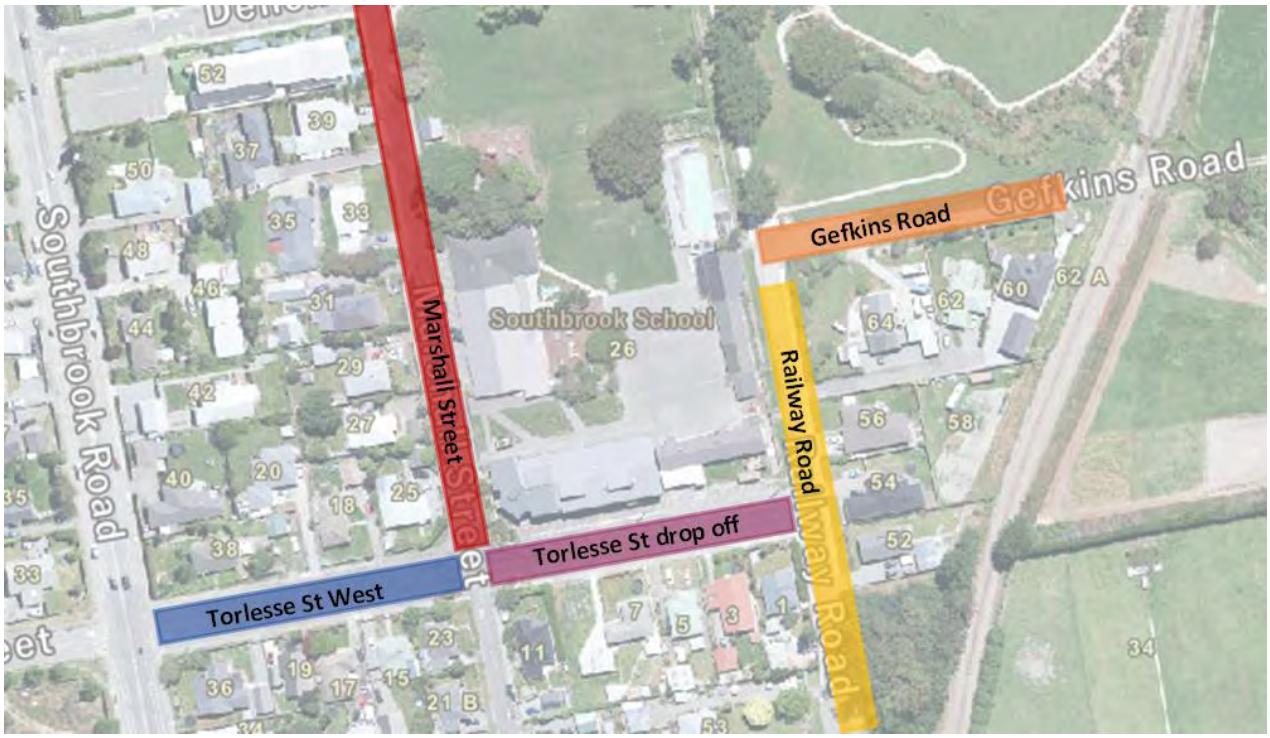
Torlesse St west

Marshall St

Railway Road

Gefkins Road

Other (please specify)



Q8 Which crossings do you use when travelling to school? (see image below)

Southbrook/Southbelt signals

Southbrook kea crossing

Denchs Road planter box crossing

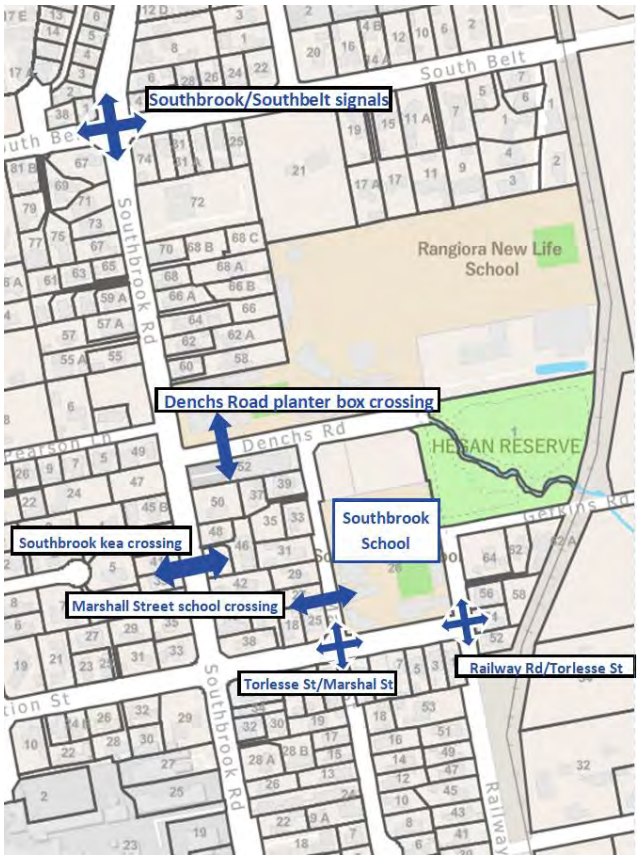
Marshall Street school crossing

Torlesse St/Marshall St intersection

Railway Rd/Torlesse St intersection

I don't use a crossing

Other (please specify)



Q9 Looking at the image below, which entrance to the school do you currently use? (see image below)

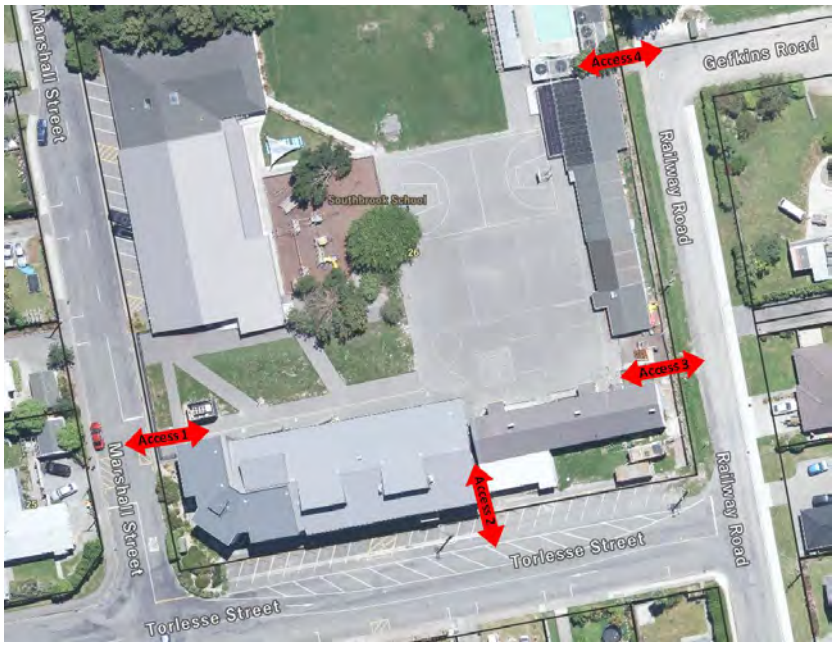
Access 1

Access 2

Access 3

Access 4

Other (please specify)



Q10 How safe would you consider your childs route to school?

Very unsafe

Unsafe

Neutral

Safe

Very Safe

Q11 Do you believe that congestion at the school pick up/drop off times is an issue?

Yes - all the the time

Yes - but only in the morning drop off

Yes - but only in the afternoon pick up

No - congestion is not an issue

Q12 What would make your child(ren)s trip to school safer?

Supervised crossings (Kea crossings)

Cycleways connecting the school

More footpaths around the school

Signalised crossing on Southbrook Road

No changes are needed

Other (please specify)

Q13 Would you use a walking school bus service? A walking school bus involves students with adult supervisors walking in a group to school. Each 'bus' walks along a set route with at least one adult 'driver' picking up children at designated 'bus stops' and walking them to and from school. Walking school buses are organised by the parent community.

Yes

No

Unsure

Q14 A new signalised intersection will be installed at Southbrook Road and Torlesse Street. This will allow traffic to turn right onto Southbrook Road and create signalised pedestrian crossings. With the upgrade Denchs Road and Marshall Street will become one way, changing the way traffic will flow around the school. Are you aware of this planned upgrade?

Yes

No

Q15 The changes to one way roads will allow us to install a drop off zone on Marshall Street (see image below). Would you use this new zone instead of the current Torlesse Street drop off area?

Yes

No

Unsure

Auckland
Level 1/70 Shortland Street
PO Box 613, Shortland Street
Auckland 1140
Aotearoa New Zealand

Wellington
Level 1/119-123 Featherston Street
Wellington 6011
Aotearoa New Zealand

Christchurch
Level 1/137 Victoria Street
PO Box 36446, Merivale
Christchurch 8146
Aotearoa New Zealand

hello@abley.com
+64 3 377 4703
abley.com

Southbrook Travel Survey Results

Summary for the school

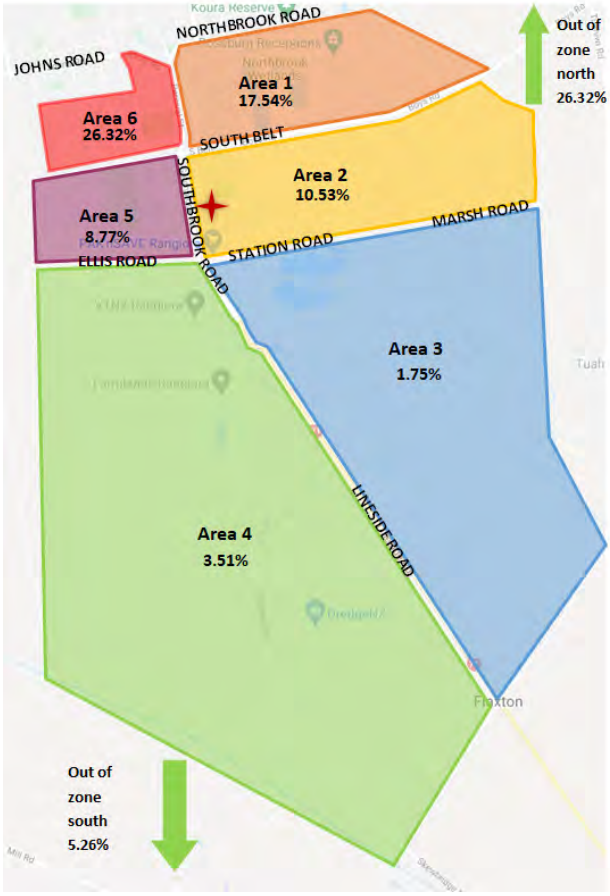
Prepared for	Southbrook School and Waimakariri District Council
Job Number	WMKDC-J111
Issue Date	21 June 2022
Prepared by	Daisy-Bea Scrase, Graduate Transportation Planner
Reviewed by	Penny Gray, Principal Transportation Engineer

Summary of travel survey results

- 64% of students travel to school by car, 17% walk, 13% scooter, 5% cycle and 1% bus.
- The main reason for travelling to school by car was due to multiple drop offs needed, being enroute to work, poor weather and safety concerns with crossing main roads.
- Torlesse Street pick up and drop off zone is the most highly used drop off zone (39%) followed by Marshall Street (24%).
- 96% of respondents felt that congestion around the school at drop off and pick up times is an issue.
- Respondents' perception of children's school trip safety had a near equal split of unsafe, neutral and safe.
- 46% of respondents were aware of the planned upgrades around Southbrook School and at Southbrook Road whereas 54% were unaware.

Who answered the survey?

In May 2022 parents and caregivers were asked to partake in an online travel survey. A total of 57 people completed the survey accounting for 96 Southbrook School students (31% of school roll). Of the survey respondents there was relatively equal representation across the school year groups. All survey respondents were asked to indicate which area they live within. As seen in the diagram many students live in area 6 and out of zone to the north. This shows that many students have to cross South Belt or Southbrook Road on their way to and from school.



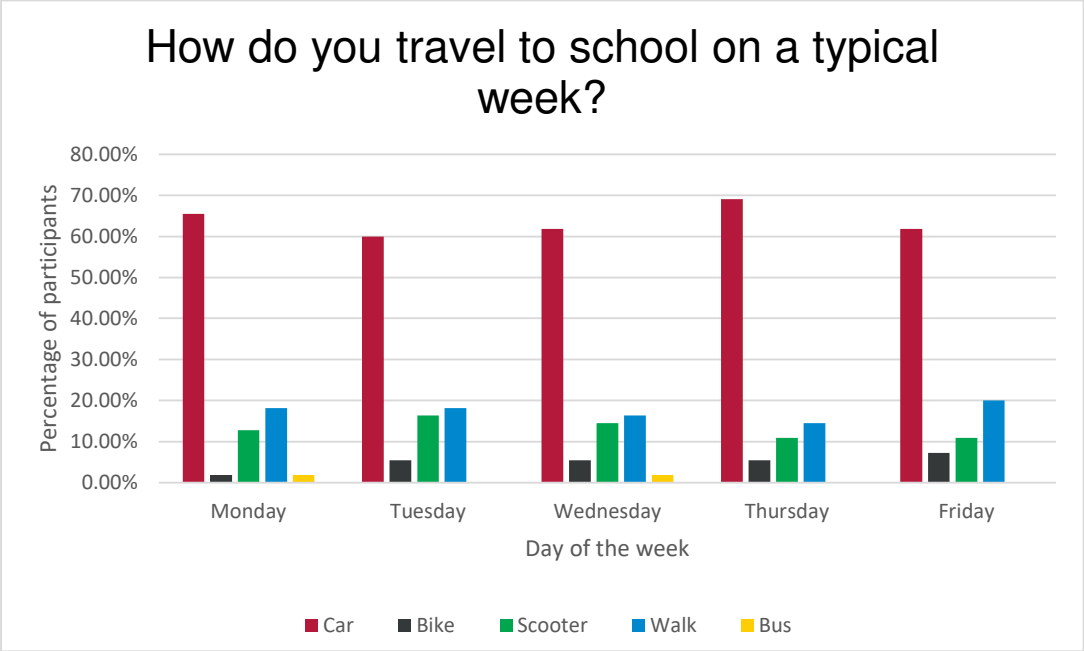
Getting to and from school

The predominant transport mode to school is the car, see the graph below. The results show an average of 64% students get dropped to school by car each day. The results showed a good uptake in walking with an average of 17% of students walking each day.

When asked in the survey if the parents and caregivers of Southbrook School children would use a walking school bus service 52% said no, 22% said yes and 26% were unsure. Therefore, it is not considered that a walking school bus is not a viable option for Southbrook School at present.

When asked why parents and caregivers drive their children to school there were multiple reasons, including:

- multiple drop offs needed/trip to work,
- the age of children makes driving the easiest and most convenient mode,
- poor weather making people use their car and
- safety issues of crossing main roads.



Pick up and drop off around the school

Most parents and caregivers use the Torlesse St pick up/drop off (PUDO) zone to drop their children at school, see diagram below. Marshall Street and Railway Road were the next two most popular drop off/pick up areas. Other locations used for PUDO were found to be the south end of Marshall Street, Southbrook Road and Coronation Street.

Approximately 96% of respondents felt that congestion outside of Southbrook School is an issue at pick up and drop off times.

Pedestrian crossings around the school

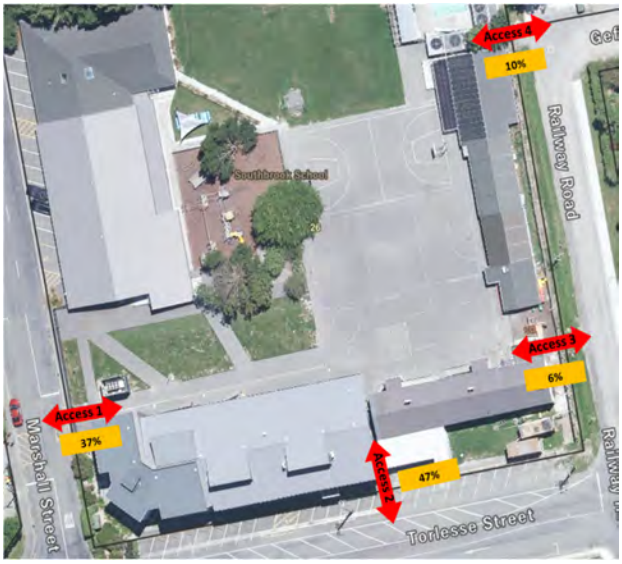
The most highly used crossing around the school is the Southbrook Road/Southbelt signals with an average of 22% of children using the signalised crossing to and from school. Other crossings around the school had a relatively equal split of use. Results show that the Marshall Street kea crossing is well used in the afternoons.

School accesses

Results showed that 47% of children use the Torlesse Street access which coincides the high usage of the Torlesse Street PUDO area, see diagram.

37% of respondents indicated that they use entrance off Marshall Street (access 1) which lines up with the kea crossing in the afternoons.

The other accesses have a lower percentage of children using them which is consistent with their location.



School trip safety

When asked to rate their child's safety on their way to school a third of respondents rated the journey as safe. As shown in Table 1.1 almost a third of respondents were neutral about the level of safety on the way to school whereas 22% felt it was unsafe.

Table 1.1 School trip safety

	Very unsafe	Unsafe	Neutral	Safe	Very safe
Safety rating	9.26%	22.22%	29.63%	33.33%	5.56%

Considering children's safety, respondents were asked what improvements could be made to improve safety on their trips to and from school. The main changes which could be made to make travel to school safer would be:

- installing a signalised crossing on Southbrook Road.
- lowering speeds around the school with a reduced speed zone or speed bumps
- creating a one-way system around the school.
- providing more parking and better drop off zones
- providing a cut through road which take people back to Rangiora avoiding Southbrook Road.

Awareness of upgrades and changes to the roads around the school

Only 46% of respondents were aware of the planned upgrade of the intersection of Torlesse Street and Southbrook Road to a signalised intersection. The change to one way traffic flow and the signalised intersection means that Marshall Street will be more attractive as a drop off zone as parents and caregivers will be able to do a loop. The survey showed that 42% said they would use the new drop off zone on Marshall Street, 33% said they would not and 25% said that they were unsure.

TERMS OF REFERENCE

SOUTHBROOK SCHOOL STP WORKING GROUP

1. Purpose

To provide:

a. Southbrook School input to the required actions to implement the School Travel Plan (220817141870) as recommended by Abley Transportation Consultants.

b. An opportunity for both the Southbrook School, and Council Staff to provide updates on progress relating to identified actions within the School Travel Plan

This Working Group feedback will be considered by the Utilities and Roading Committee along with any technical advice, the outcome of any wider community consultation, and the view of the Rangiora Ashley Community Board.

2. Membership

- Elected Member TBC
- Elected Member TBC
- Southbrook School Representative TBC
- Southbrook School Representative TBC
- Peter Daly, Road Safety Co-Ordinator
- Don Young, Senior Engineering Advisor
- Kieran Straw, Civil Project Team Leader (as required)
- Shane Binder, Safety Engineer (as required)

Note that the elected member representation will be confirmed following the 2022 Local Elections, in October 2022.

3. Administrative Support

- Communications assistance – Karen Lindsay-Lees
- Meetings and Minutes assistance – Utilities and Roading administrative staff

4. Quorum

Any 5 members, including at least 1 elected representatives, and 1 Southbrook School representative.

5. Objectives

5.1 To implement the School Travel Plan, with particular emphasis on:

5.2 Development of a permanent PUDO zone, either in Marshall Street, or Railway Road.

SOUTHBROOK SCHOOL STP WORKING GROUP

6. Outcomes

6.1 The first outcome for the Southbrook School Travel Plan Working Group is to complete all identified actions within the School Travel Plan that do not require physical works.

6.2 The second outcome for the Southbrook School Travel Plan Working Group is to provide the following plans, including cost estimates, to the Utilities and Roading Committee (and Council if required) to assist in its decision making

6.2.1 Plan of works required to establish safe walking and cycling connections to the Southbrook School

6.2.2 Plan of works required to establish a permanent PUDO zone for Southbrook School

7. Delegation

7.1 The Southbrook School Travel Plan Working Group does not have any delegated authority.

8. Decision Making

8.1 Decision making will be by consensus. Where this is not achieved, a vote will be taken with equal weighting between members, except the Chair will have the casting vote. Any counter views will be recorded if requested.

8.2 In order to achieve free and frank discussions, the meetings will not be open to the general public.

9. Financial Management

9.1 The Southbrook School Travel Plan Working Group will not be responsible for expenditure of Council funds.

9.2 Council staff will seek funding for the physical works required through the LTP process.

9.3 Council staff will seek the approval of the Utilities and Roading Committee prior to committing to any physical works contract.

10. Legal Responsibilities

The Southbrook School Travel Plan Working Group are required to comply with all relevant legislation and regulations.

These include, but are not limited to:

- Health and Safety at Work Act
- Local Government Act
- Resource Management Act
- Land Transport Act

11. Administration

The agenda and minutes for the Southbrook School Travel Plan Working Group meeting will be prepared by the Administrative Support. The agenda and minutes will be filed in TRIM and distributed to all members.

The outline agenda for the meeting shall generally be as follows:

1. Apologies
2. Previous Minutes
3. Matters Arising
4. Southbrook School Progress Report
5. Council Staff Progress Report
6. Risks, Issues or Concerns
7. Community Engagement and Media
8. Reports to Council, Committee or Community Board
9. General Business

12. Meeting Frequency

The Southbrook School Travel Plan Working Group shall meet bi-monthly.

13. Duration

The Southbrook School Travel Plan Working Group is intended to function until either:

a. All action points within the School Travel Plan are completed; or

b. All action points within the School Travel Plan that can be completed are completed, and the Utilities and Roading Committee have approved plans as per Section 6.2 of this Terms of Reference.

For the purposes of planning a draft timeline is proposed below:

- Confirmation of Working Group Members - Mid November 2022
- Working Group Meeting - February 2023
- Working Group Meeting - April 2023
- Working Group Meeting - June 2023
- Utilities & Roading Committee Meeting - June 2023
- Final Working Group Meeting - August 2023

WAIMAKARIRI DISTRICT COUNCIL

REPORT FOR DECISION

FILE NO and TRIM NO:	RDG-32-79-08 / 220830149672
REPORT TO:	UTILITIES AND ROADING COMMITTEE
DATE OF MEETING:	27 September 2022
AUTHOR(S):	Kieran Straw, Civil Project Team Leader Don Young, Senior Engineering Advisor Joanne McBride, Roading and Transport Manager
SUBJECT:	Approval of Detailed Design – Southbrook / Torlesse Street Traffic Signals
ENDORSED BY: **(for Reports to Council, Committees or Boards)**	General Manager / Acting Chief Executive

1. SUMMARY

1.1 This report seeks the approval of the Southbrook Road / Torlesse Street Signalisation Detailed Design

Attachments:

i. Detailed Design drawings (Trim No.220913158764)
ii. Draft No-Stopping Schedule to update the parking bylaw (Trim No. 220913158774)
iii. Extract from Road Safety Audit regarding vehicle speeds through the intersection (Trim No. 220907155228)

2. RECOMMENDATION

THAT the Utilities and Roading Committee:

(a) **Receives** report No. 220830149672.

(b) **Approves** the Southbrook Road Traffic Signals Detailed Design including works on Denchs Rd, Marshall St, Torlesse St, Coronation St, Buckleys Rd and Southbrook Rd as detailed in the Detailed Design Drawings (220913158764), and authorises staff to proceed with design and procurement.

(c) **Approves** the conversion of Denchs Road (Southbrook to Marshall) to one-way eastbound and Marshall St (Denchs to Torlesse St) to one-way southward.

(d) **Approves** the installation of “No stopping” at all locations noted within attachment ii, which includes both proposed new no-stopping lines, and existing no-stopping lines that are not currently included within the Parking Schedule

(e) **Notes** that net effect of the design is an overall decrease in 32 number of on-street parking spaces (across Torlesse Street, Coronation Street, and Southbrook Road).

(f) **Authorises** staff to provide a Project Update notice to all affected residents and stakeholders.

(g) **Notes** that the current Project Estimate for the works is $1,896,824, and there is sufficient budget to proceed with this design, and subsequent tender.

(h) **Notes** that a workshop was held to brief the RACB on the detailed design on 14th September 2022, and that the RACB are supportive of the design. More detail in regards to feedback the board provided is included in section 5.3 of this report.

(i) **Notes** that some of the planned works in Marshall Street, and Torlesse Street are considered an "interim" only and will be revisited during the process to adopt the School Travel Plan, and develop the detailed design of the proposed cycleway in Torlesse Street., Physical works and priority controls are not considered "interim", and "Interim works" relates to planned line marking layouts only.

(j) **Notes** that alternate funding sources are being explored for funding of works associated with the School Travel Plan as per report 220808134686, including the raised crossing points. Until such time funding is secured, the current temporary features from the innovating street project (such as planter boxes) will be retained.

(k) **Notes** that both of the roundabouts installed on Marshall Street (at Denchs Rd and Torlesse St) as part of the "Innovating Streets" trial will be removed, and the "Stop" controls at the Marshall Street / Torlesse Street intersection and the "Give Way" controls at Denchs Rd (East) / Marshall St will be reinstated.

(l) **Notes** that minor changes to the detailed design may continue as the design develops, and as a result of recommendations from the Design Phase Road Safety Audit. These are expected to be minor in nature and therefore it is not expected that these will be reported back to the Utilities and Roading Committee. Should any significant issues be identified then these would be reported.

(m) **Circulates** this report to the Rangiora-Ashley Committee Board for their information.

3. BACKGROUND

3.1 Two previous reports have been presented on this issue:

3.1.1. Report (210315043232) in May 2021 sought to adopt the Concept Design at this intersection, and establish a working group in relation to the wider Southbrook Road corridor issues.

3.1.2. Report (211124187890) in December 2021 sought to adopt the Scheme Design and authorise staff to proceed to Detailed Design.

3.2 Since December 2021 staff have developed the Scheme Design and have also further investigated and confirmed road layout options.

3.3 In addition to the reports regarding the signalisation of the Southbrook Rd / Torlesse St intersection, a report (211108179157) was also prepared. This report provided an update on the Innovating Streets project which was implemented on Denchs Road, Marshall Street, and Torlesse Street around the nearby schools. Some aspects of the recommendations of this report will be made permanent, as part of the upcoming project at Southbrook Rd / Torlesse St.

3.4 A further report has been presented to this Committee meeting, (220808134686) seeking adoption of the School Travel Plan for Southbrook School. The School Travel Plan was developed following a recommendation from the Scheme Design Road Safety Audit for the Southbrook Rd / Torlesse St intersection. Southbrook School has been provided a copy of the proposed School Travel Plan, and to date, have not provided feedback.

4. ISSUES AND OPTIONS

4.1. The Detailed Design is finalising all aspects of the design. Particular design elements of note are as follows:

4.2. Denchs Road:

The works in Denchs Road are intended to be a permanent design which builds on the "Innovative Streets" trial last year. The physical works associated with Denchs Road include the following:

I. Conversion to a one-way east-bound between Southbrook Rd, and Marshall Street

II. Installation of a kerb build-out on the north-east quadrant at the Southbrook Road intersection

III. Installation of a raised courtesy crossing mid-block between Southbrook Road, and Marshall Street.

IV. Installation of a new kerb build out on the south-west quadrant at the Denchs Road / Marshall Street intersection, and a splitter island on Denchs Rd immediately east of Marshall St intersection. These feature reinforce the one-way nature of the design, and ensure traffic from the eastern end of Denchs Road turns into Marshall St to exit.

V. Removal of the roundabout installed at the Marshall Street intersection as part of the Innovative Street project and reinstatement of a Give Way control on the Denchs Rd (East) traffic.

VI. Installation of a 1.0m painted buffer between car parking spaces, and the east bound traffic lane

VII. Increase in the available length of parking space by 20m. Staff have approached Rangiora New Life School to determine if this is best utilised as a bus stop, or to provide for on-street car parking.

4.3. Marshall Street:

The proposed works in Marshall Street builds on the "Innovative Streets" trial previously undertaken. Alternative funding sources such as the CERF funding are currently being explored to allow the proposed works included within the recommendations of the School Travel Plan to proceed. There is unlikely to be sufficient to fund all of the recommended improvements, however the existing innovating streets infrastructure including planter boxes will be utilised in the interim to provide the necessary calming until the works can be made permanent.

The physical works associated with Marshall Street in conjunction with this project are as follows:

I. Conversion to a one-way south-bound between Denchs Road, and Torlesse Street.

II. Construction of kerb build-outs at the Torlesse Street intersection, including raised courtesy crossing set back approximately 6m from the limit line. This crossing facility will operate as a Kea Crossing during School Pick-up and Drop-off times

I. Removal of the “roundabout” that was installed at the Torlesse Street intersection. This option is not desirable for the one-way leg of Marshall Street.

III. Reinstatement of “STOP” control at the Torlesse Street intersection (currently a Give-Way associated with the temporary roundabout)

IV. Installation of a painted median behind the existing angle parking. This is to serve as a Pick-up / Drop-Off zone, and will measure approximately 40m in length (enough for 7 vehicles). Note this is intended to be an interim measure until the permanent location of the school drop-off pick-up location is confirmed as part of the School Travel Plan implementation.

4.4. Torlesse Street:

The works in Torlesse Street is intended to build on the “Innovative Streets” trial last year, however some features are considered “interim”, while others may follow once funding and time to complete the recommendations of the School Travel Plan become available.

In addition to this, the planned Torlesse Street Cycleway will require additional infrastructure to be installed to give effect to it. Where possible, the design of the current works to give effect to the traffic lights makes allowance for the future cycle way – however there is a risk that some elements may need to change.

The physical works associated with Torlesse Street in conjunction with this project are as follows:

II. Removal of the existing Pick-up / Drop-off zone east of Marshall Street

III. Installation of a raised courtesy crossing immediately north of the Marshall Street intersection (note the timing of installation of this feature is dependent on funding)

IV. Installation of a raised intersection at Railway Road (note the timing of installation of this feature is dependent on funding)

V. Installation of a kerb build-out on the southern side of the Southbrook Road intersection. This build out is to serve as provision for the connection of the future cycle way to the signalised intersection. Inclusion of this build out will ensure there is no re-work required at the Southbrook Road intersection to accommodate a cycleway.

VI. The works associated with this project will result in the relocation of the existing Pick-up / Drop-off area from its current location on Torlesse St into Marshall Street, and the removal of on-street parking for 40m east of the intersection (northern side only). The removal of these spaces is required to ensure adequate space for the proposed road layout and lanes at this intersection. To help offset this loss, an additional parking space has been created immediately west of the Marshall Street intersection. In Torlesse Street, the total number of parking spaces is being reduced by five.

4.5. Coronation Street:

The works in Coronation Street is limited to the entrance to the street from the intersection, and to install traffic calming features to help reduce the attractiveness of Coronation Street as a “rat-run” for drivers to avoid using South Belt. The physical works associated with Coronation Street in conjunction with this project is as follows:

I. Relocation of the kerb alignment to the north outside No. 33 Coronation Street. This is to provide sufficient space for queued vehicles and right turning vehicles up to and including a large rigid truck.

II. Relocation of the kerb alignment to the north outside Rangiora Motor Group (RMG). This is to provide adequate space for the proposed shared-use footpath along this frontage. Note that RMG have provided a contribution towards the development of this path as required by their Consent Conditions.

III. The works associated with this project will result in the removal of on-street parking for 40m west of the intersection (on both sides of Coronation Street) This is required to ensure adequate space for the proposed road layout and lanes at this intersection. In Coronation Street, the total number of parking spaces is being reduced by ten.

IV. Removal of the existing speed hump upon entry to Coronation Street from Southbrook Road.

V. No traffic calming is proposed to be installed within Coronation Street at this time. Staff will need to monitor traffic movements through this area and if rat-running does occur then traffic calming features may be required in the future to help discourage this behaviour.

4.6. Buckleys Road:

The works in Buckleys Road includes a proposal to install traffic calming features to help reduce the attractiveness of Buckleys Road as a short cut for drivers to avoid using South Belt intersection. The physical works associated with Buckleys Road in conjunction with this project is as follows:

I. Flush / painted crossing to be located at the South Belt intersection

II. Watts profile speed hump to be installed at No. 55 Buckleys Rd

III. Watts profile speed hump to be installed at No. 41 Buckleys Rd

IV. Watts profile speed hump to be installed at No.27 Buckleys Rd

V. Watts profile speed hump to be installed at No. 11 Buckleys Rd

VI. There is no planned changes to the parking restrictions in Buckleys Road.

4.7. Southbrook Road:

Southbrook Road is where the majority of the physical work is required. The works required is as follows:

I. Installation of traffic signals at the intersection of Torlesse Street

II. Installation of a right turn lane into Denchs Road

III. Removal of the existing Kea Crossing outside No's 41 & 44 Southbrook Rd (resulting in up to 7 additional on-street car parking spaces)

IV. Kerb & Channel Renewal on the eastern side between Torlesse Street and No. 44 Southbrook Rd which includes provision to realign kerb to provide adequate footpath width for a bus shelter outside No 42 Southbrook Rd. Note – this work

has already been approved as part of the Kerb & Channel Renewal Programme and is being combined for efficiencies).

V. Installation of a bus shelter outside No. 42 Southbrook Road, and relocation of the existing bus stop from No. 47 Southbrook Rd to No. 37 Southbrook Road

VI. Realignment of the kerb and channel outside Rangiora Motor Group to allow for the traffic lanes to correctly align, and provide adequate manoeuvring space on the opposite side of the road, outside No. 34 Southbrook Road. This is important to ensure that the resident of No. 34 Southbrook Rd can enter, and exit their property without obstructing traffic lanes.

VII. Street lighting upgrades and alterations as required to comply with NZS 1158.

VIII. Staff will investigate the opportunity of extending the existing flush median to the south of the Torlesse St intersection, but note that this will need to stop before the right turn bay to ensure vehicles do not turn across the tail of the Right Turn Bay.

IX. The road layout changes require on-street car parking to be removed at the following locations:

- Opposite Denchs Road, to accommodate the proposed right turn lane
- An extension of the existing no-stopping on each side of the Denchs Road intersection (eastern side) to accommodate the proposed right turn lane.
- Retention of the existing 5m length of no stopping between No. 42 and 44 Southbrook Road that is too short to accommodate a parked car
- No. 35 & 33 Southbrook Road, including a bus stop outside No. 35 Southbrook Road (approximately 40m north of the Coronation Street intersection)
- No. 38, 40 and 42 Southbrook Road, including a bus stop (existing) outside No. 42 Southbrook Road. (Approximately 40m north of the Torlesse Street intersection).
- No 34 and 36 Southbrook Road (Approximately 30m south of the Torlesse Street intersection).
- Outside Rangiora Motor Group the removal of these parks is required as a result of the Consent conditions for RMG, and is required to accommodate the proposed road layout.
- A discussion is yet to be had with Rangiroa Mazda, and the impacts of the proposed design on the two parking spaces in front of Rangiora Mazda. These spaces are to be removed as consent condition for the RMG, however there may be options available to retain these parks if required.

4.7.1. Pavement Design

As part of the detailed design, consultants were engaged to review the existing pavement, and provide a seal design specific to the intersection, its traffic volumes, and turning movements. This design was completed using the pavement design software Circly, in accordance with the Austroads Design guide and produced a total asphalt surface layer depth of 220mm.

The costs of this design are substantial, however the issue if constructability also needs to be considered. To construct a 220mm pavement, the existing road structure will need to be removed which would cause significant disruption to traffic.

As such an alternate pavement design has been agreed to reduce construction costs and improve buildability. This will include:

- Remove the top 60mm of the existing surfacing where surfacing is currently chip sealed
- Paver lay 60mm AC14 in the locations above
- Paver lay 75mm AC14 over the 60mm AC14 layers.

This will result in a pavement design which is very similar to the nearby intersections of Southbrook / South Belt and Pak'nSave / Mitre 10, which have 130mm of asphalt surface, and have performed well.

While there is risk with this approach, staff believe this is an acceptable risk given the long term performance of the intersection to date, the good performance of neighbouring intersections with similar design, and the significant extra disruption that would be caused by a much deeper pavement reconstruction.

4.7.2. Signal Phasing

The signal phasing will include the following features:

- Filtered right turns only (i.e. no dedicated right turn phase)
- Partial pedestrian protection (i.e. red arrows to delay turning vehicles until pedestrians have entered the intersection)
- Phasing to co-ordinate with existing signalised sites along Southbrook Road to minimise congestion created by the additional signalised intersection.

The modelling of this intersection shows a significant improvement to side road traffic, and an acceptable effect of through traffic levels of service.

4.7.3. Design Vehicles

The design vehicles at the signalised intersection allow for the following movements:

- Coronation St, inbound: Large Rigid Truck
- Coronation St, outbound: Semi-Trailer Truck
- Torlesse Street, inbound: Medium Rigid Truck
- Torlesse Street, outbound: Tour Coach / Bus
- Denchs Rd, inbound: Tour Coach
- Marshall St, inbound: Tour Coach

These vehicles have been based on the needs of adjacent schools, and businesses as well as the nature of the street and the types of movements which are appropriate for the environment.

4.7.4. Raised Speed Table

A Road Safety Audit was conducted on the Scheme Design, and recommended that speed management treatments are implemented as part of the detailed design phase. The treatment discussed is the inclusion of the raised intersection, designed for a speed of 30-40km/hr.

A raised intersection would comply with a Safe Systems Approach, and Standard safety intervention toolkit which is utilised when implementing Road to Zero projects, to improve safety for all road users. A raised table achieves the following:

- Reduces the vehicle speeds through the intersection

- Reduces the impact speed in the event a right turning vehicle collides with through traffic
- Reduces the impact speed of vehicle of a car vs pedestrian.

Current mean vehicle speed at school start / finish times is less than the posted speed limit, therefore it is considered that the main safety benefits of a raised ramp would be seen predominantly during off-peak times.

The primary risk associated with the inclusion of the raised ramp relates to noise, and vibration. Southbrook Rd carries around 26,000vpd in this location with just over 5% being heavy vehicles. This equates to around 1300 truck movements per day through the intersection.

It is also noted that the new Setting of Speed Limit Rule 2022 requires Road Controlling Authorities to use reasonable efforts to reduce speed limits around all schools by 31 December 2027, with an interim target of 40 percent of schools by 30 June 2024. Staff are preparing advice on this and will be reporting to Council later in 2022 however it is likely that this site will require a 30km/hr variable speed limit in the future due, to the proximity of the two schools, and the governments Road to Zero programme.

Given consideration of all of these factors it is recommend that a raised speed table is not installed at this time, however the site will need to be monitored to ensure low speeds are achieved at the intersection, particularly during school start and finish times. If speeds are above those recommended in the Setting of Speed Limit Rule, then the need to install a raised platform or intersection would need to be reconsidered in the future.

4.8. The Utilities and Roading Committee have the following options available to them:

4.8.1. Option One – Approve the recommendations of this report, authorising staff to proceed with the detailed design described in Section 4.2 to 4.7 of this report.

This is the recommended option as this provides the basis for a complete, co-ordinated project that balances risk vs constructability.

4.8.2. Option Two - Decline the recommendations of this report, and instead authorise staff to proceed with the detailed design noting changes to Items 4.2 to 4.7 as the Utilities and Roading Committee directs.

This is not the recommended option as staff consider the recommendations to be a package, and would not recommend changes to a particular element.

Implications for Community Wellbeing

4.9. There are implications on community wellbeing by the issues and options that are the subject matter of this report. The intersection improvements will have a significant effect on the safety of pedestrians and cyclists in the area, and on the wait times of side road traffic.

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

5. COMMUNITY VIEWS

5.1. **Mana Whenua**

Te Ngāi Tūāhuriri hapū are likely to be affected by, or have an interest in the subject matter of this report.

Te Ngāi Tūāhuriri have regularly provided feedback at the Annual Hui on matters of road safety.

5.2. **Groups and Organisations**

The Southbrook Road Reference Group has been briefed on the detailed design as part of the Reference Group meeting held on 24th August. This was provided as an update to the group and was not seeking feedback on the design.

5.3. **Wider Community**

The wider community is likely to be affected by, or to have an interest in the subject matter of this report.

The community has previously been consulted on the scheme design, including the design of the adjacent streets such as Denchs Rd, Marshall St, and Buckleys Rd. Feedback from the previous consultation has been taken into account during the development of the detailed design.

A briefing was held on September 14th with the RACB to provide the board with an update on the design, and an opportunity for feedback to be presented, and incorporated into the design ahead of the Utilities and Roading Committee meeting. A summary of their comments as follows:

- The board was supportive of the proposed design, however there was a strong message that the Eastern Link Road should be brought forward to ease congestion issues in Southbrook Road, which the proposed signals will not address.
- There should be an emphasis on the education of public that this project is focusing on addressing safety concerns at the intersection rather than focusing on efficiency and congestion.
- To help encourage use of the existing western routes, more investment in the Rangiora West Route should be investigated, including an expansion to include River Road and West Belt.
- Feedback suggested that the speed limit reductions on Rangiora Woodend Road, and the West Rangiora Route have discouraged motorists from using alternative routes, and requested a traffic volume comparison from before the speed limit changes were made. Note that staff would be hesitant to draw a conclusion from this alone.
- Southbrook Road has a current ADT of 26,000 vehicles / day. It was questioned exactly how many vehicles need to be removed to resolve congestion, however this was not modelled. Modelling these figures is unlikely to have any impact on the proposed intersection design.
- The lack of traffic calming in Coronation Street was questioned. The Board had concerns that earlier feedback had not been taken into consideration.
- Although accepting that there is a need to remove car-parking to achieve the recommended design, several board members expressed concern at the number of car-parks to be removed, noting that this has increased from earlier estimates. Board members also noted a likely increase in need for on-street parking spaces in the future as development intensifies.
- Concern was raised over the removal of the existing Kea Crossing, however staff have discussed this with the schools, and the schools are supportive of its removal.

- Board member received complaints have been received regarding the current temporary roundabouts installed as part of the Innovating Streets trial. The board reported that they are happy to see that these will be removed.
- The proposed additional bus stop parking in Denchs Rd was suggested to be converted to a part time bus stop. Staff will discuss bus parking requirements with the school before finalising this parking area.

Residents to be impacted by the design will be contacted prior to the Utilities and Roading Committee meeting on the 27th September, and their feedback will be summarised and presented to the Committee, however it should be noted that little can be done to reduce the impacts of on-street parking.

Upon acceptance of this report, staff will proceed with a planned Project Update notice, providing an update to all stakeholders on the design, and timing of the project. Also, a newsletter will be sent to all residents in the neighbouring streets. In addition, a concerted communication strategy including website, social media and print media will be initiated. Advance Warning VMS boards will be used to inform the travelling public well before the works begin on site.

6. OTHER IMPLICATIONS AND RISK MANAGEMENT

6.1. Financial Implications

There are financial implications of the decisions sought by this report.

The budget for this project is made up as follows:

Budget Name	Project Budget / Allowance	Current Project Estimate
Southbrook Upgrade	$1,760,760.00	$1,500,000.00
K&C Renewals (Southbrook Rd)	$37,000.00	$37,000.00
Footpath Renewals (Southbrook Rd)	$24,000.00	$24,000.00
Footpath Renewals (Torlesse St)	$12,000.00	$12,000.00
Development Contributions (RMG – Coronation St Frontage)	$14,358.00	Included in estimate above
Passenger Transport Infrastructure	$20,000.00	$14,000.00
Water Main Renewals	TBC*	$50,000.00
Resurfacing - Asphalt	$91,636.00	$180,000.00
TOTAL	$1,959,754.00*	$1,817,000.00

* The budget for the water main renewal is yet to be confirmed, and budget will be sought in conjunction with the tender approval report to Council.

6.2. Sustainability and Climate Change Impacts

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

The installation of traffic signals at this location is intended to improve outcomes for active modes to and from the schools in the vicinity, as well as improving pedestrian safety and connectivity across Southbrook Road.

6.3 **Risk Management**

There are risks arising from the adoption/implementation of the recommendations in this report, in particular the risk to reputation given the publics expectation that Council will complete works to resolve congestion in the Southbrook Road Corridor.

This project is intended to improve safety for pedestrians crossing Southbrook Rd and improve safety for drivers using the intersection rather than resolving congestion.

The Southbrook Futures Reference Group has been formed to consider the longer term needs and opportunities around the corridor. The Reference Group will consider alternative projects to help benefit all users in the future.

Health and Safety

The project has gone through a Scheme Design Road Safety audit, and will also go through a Detailed Deign Road Safety Audit prior to construction.

Staff are also required to hold a Safety in Design workshop to identify safe ways of carrying out the contract works. The physical works contractor will be required to be SiteWise Registered, and provide a Site Specific Safety Plan, and Traffic Management Plan ahead of commencing work on site.

7. CONTEXT

7.1. **Consistency with Policy**

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

7.2. **Authorising Legislation**

Land Transport Act 1998

7.3 **Consistency with Community Outcomes**

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

- Core utility services are sustainable, low emissions, resilient, affordable; and provided in a timely manner
- There is a healthy and sustainable environment for all
- There is a safe environment for all
- Transport is accessible, convenient, reliable and sustainable
- People have wide ranging opportunities for learning and being informed

7.4 **Authorising Delegations**

Utilities and Roading Committee have delegations to approve the School Travel Plan and approve for staff to proceed with investigation of design options to meet the School Travel Plan recommendations.

Attachment i. Detailed Drawings

The following drawings are for the purposes of detailing the detailed design of the Southbrook Road / Torlesse Street traffic signal project, and nearby streets.

Sheet 1: Denchs Rd Overview Plan

Sheet 2: Marshall St Overview Plan

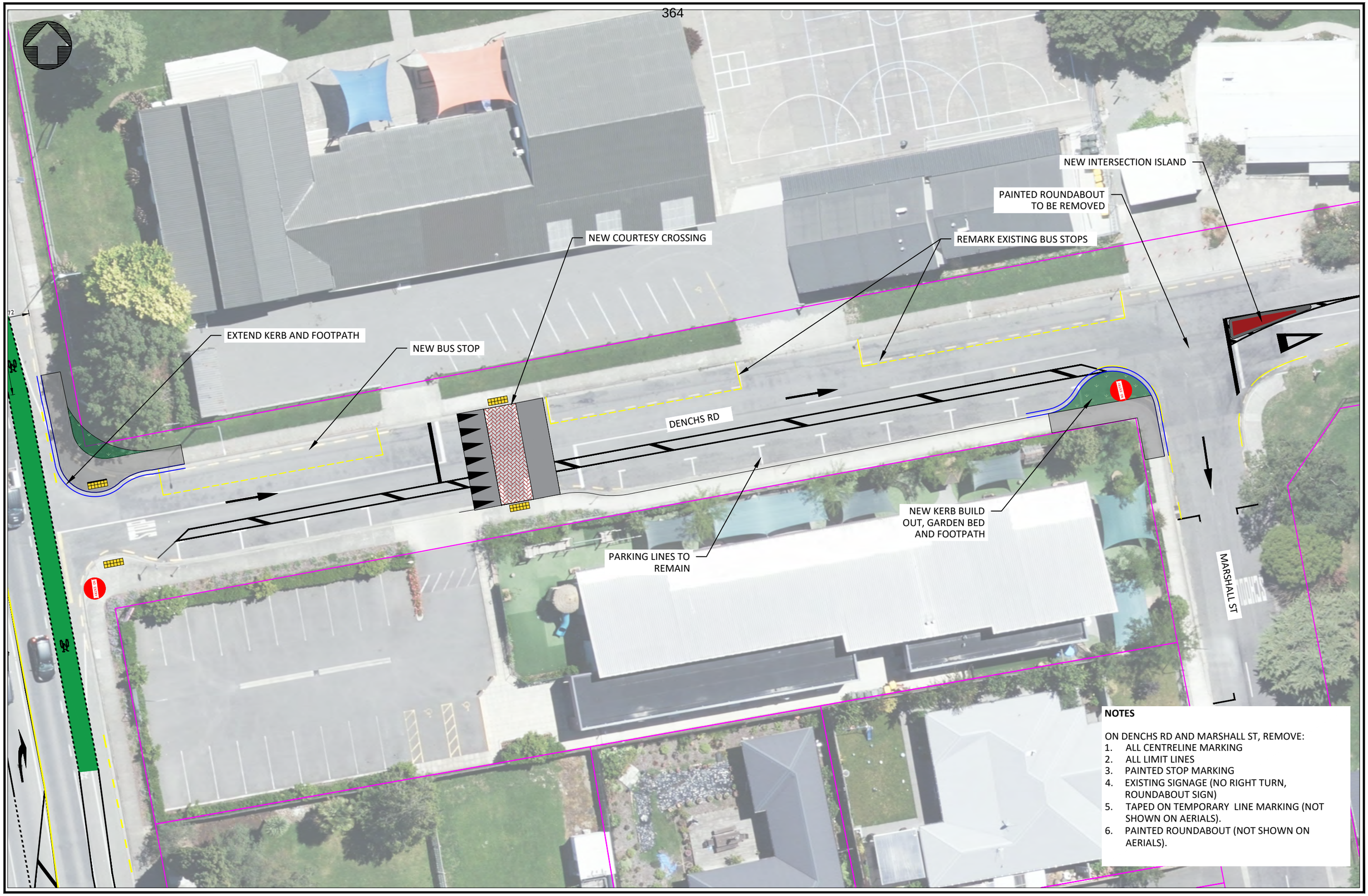
Sheet 3: Torlesse St Overview Plan

Sheet 4: Coronation St Overview Plan

Sheet 5: Buckleys Rd Overview Plan

Sheet 6: Southbrook Rd – North of Torlesse St

Sheet 7: Southbrook Rd – Intersection of Torlesse St



NOTES

ON DENCHS RD AND MARSHALL ST, REMOVE:

1. ALL CENTRELINE MARKING
2. ALL LIMIT LINES
3. PAINTED STOP MARKING
4. EXISTING SIGNAGE (NO RIGHT TURN, ROUNDABOUT SIGN)
5. TAPED ON TEMPORARY LINE MARKING (NOT SHOWN ON AERIALS).
6. PAINTED ROUNDABOUT (NOT SHOWN ON AERIALS).

REV	REVISION DETAILS	DRN	CHK	APP	DATE
A	FOR INFORMATION	AK	---	---	13/09/2022

SURVEYED	---	---	PROJECT No	PD001691
DRAWN	AK	13/09/2022	CON No	CON2022--
DRAWING CHKD	---	---	SCALE (A3)	NTS
DESIGNED	---	---	DATUM ORIGIN	
DESIGNED CHKD	---	---	HORIZONTAL	NZTM GD2000
APPROVED	---	---	VERTICAL	

WAIMAKARIRI DISTRICT COUNCIL

PROJECT

SOUTHBROOK ROAD TRAFFIC SIGNALS

SHEET TITLE

DENCHS ROAD

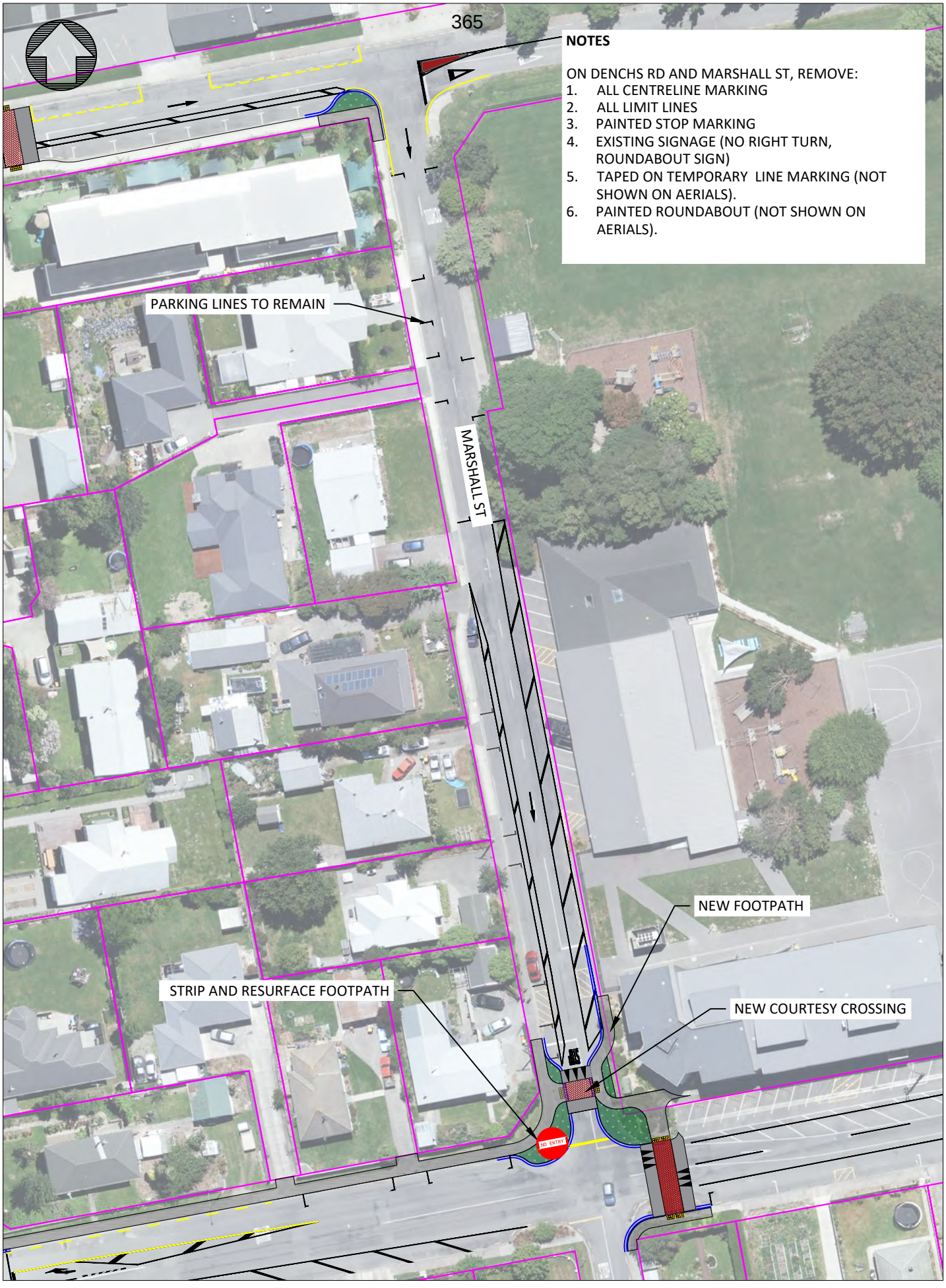
FOR INFORMATION
NOT FOR CONSTRUCTION

DRAWING 4280

SHEET 1

REVISION A

PLOT DATE: 14/09/2022 FILE: S:\PDU\PDU JOBS\PD001600-1699\PD001691 - SOUTHBROOK ROAD IMPROVEMENTS\4 - DESIGN\DETAILED DESIGN\DRAWING\SOUTHBROOK DETAILED DESIGN - PAPERSPACE LAYOUTS - REPORT EDITION.DWG



WAIMAKARIRI DISTRICT COUNCIL

SOUTHBROOK ROAD
TRAFFIC SIGNALS

MARSHALL STREET

SCALE (A4)	DATE
NTS	13/09/2022
DRAWING	4280
SHEET	REVISION
2	A

PLOT DATE: 14/09/2022 FILE: S:\PDU\PDU JOBS\PD001600-1699\PD001691 - SOUTHBROOK ROAD IMPROVEMENTS\4 - DESIGN\DETAILED DESIGN\DRAWING\SOUTHBROOK DETAILED DESIGN - PAPERSPACE LAYOUTS - REPORT EDITION.DWG

REV	REVISION DETAILS	DRN	CHK	APP	DATE
A	FOR INFORMATION	AK	---	---	13/09/2022

SURVEYED	---	---	PROJECT No	PD001691
DRAWN	AK	13/09/2022	CON No	CON2022--
DRAWING CHKD	---	---	SCALE (A3)	NTS
DESIGNED	---	---	DATUM ORIGIN	
DESIGNED CHKD	---	---	HORIZONTAL	NZTM GD2000
APPROVED	---	---	VERTICAL	

WAIMAKARIRI DISTRICT COUNCIL

PROJECT

SOUTHBROOK ROAD TRAFFIC SIGNALS

SHEET TITLE

TORLESSE STREET

FOR INFORMATION
NOT FOR CONSTRUCTION

DRAWING 4280

SHEET 3 | REVISION A

PLOT DATE: 14/09/2022 FILE: S:\PDU\PDU JOBS\PD001600-1699\PD001691 - SOUTHBROOK ROAD IMPROVEMENTS\4 - DESIGN\DETAILED DESIGN\DRAWING\SOUTHBROOK DETAILED DESIGN - PAPERSPACE LAYOUTS - REPORT EDITION.DWG

LAYOUT PLAN

SCALE 1:500

REV	REVISION DETAILS	DRN	CHK	APP	DATE
A	FOR INFORMATION	AK	---	---	13/09/2022

SURVEYED	---	---	PROJECT No	PD001691
DRAWN	AK	13/09/2022	CON No	CON2022--
DRAWING CHKD	---	---	SCALE (A3)	1:500
DESIGNED	---	---	DATUM ORIGIN	
DESIGNED CHKD	---	---	HORIZONTAL	NZTM GD2000
APPROVED	---	---	VERTICAL	

WAIMAKARIRI DISTRICT COUNCIL

PROJECT

SOUTHBROOK ROAD TRAFFIC SIGNALS

SHEET TITLE

CORONATION STREET

FOR INFORMATION
NOT FOR CONSTRUCTION

DRAWING	
4280	
SHEET	REVISION
4	A

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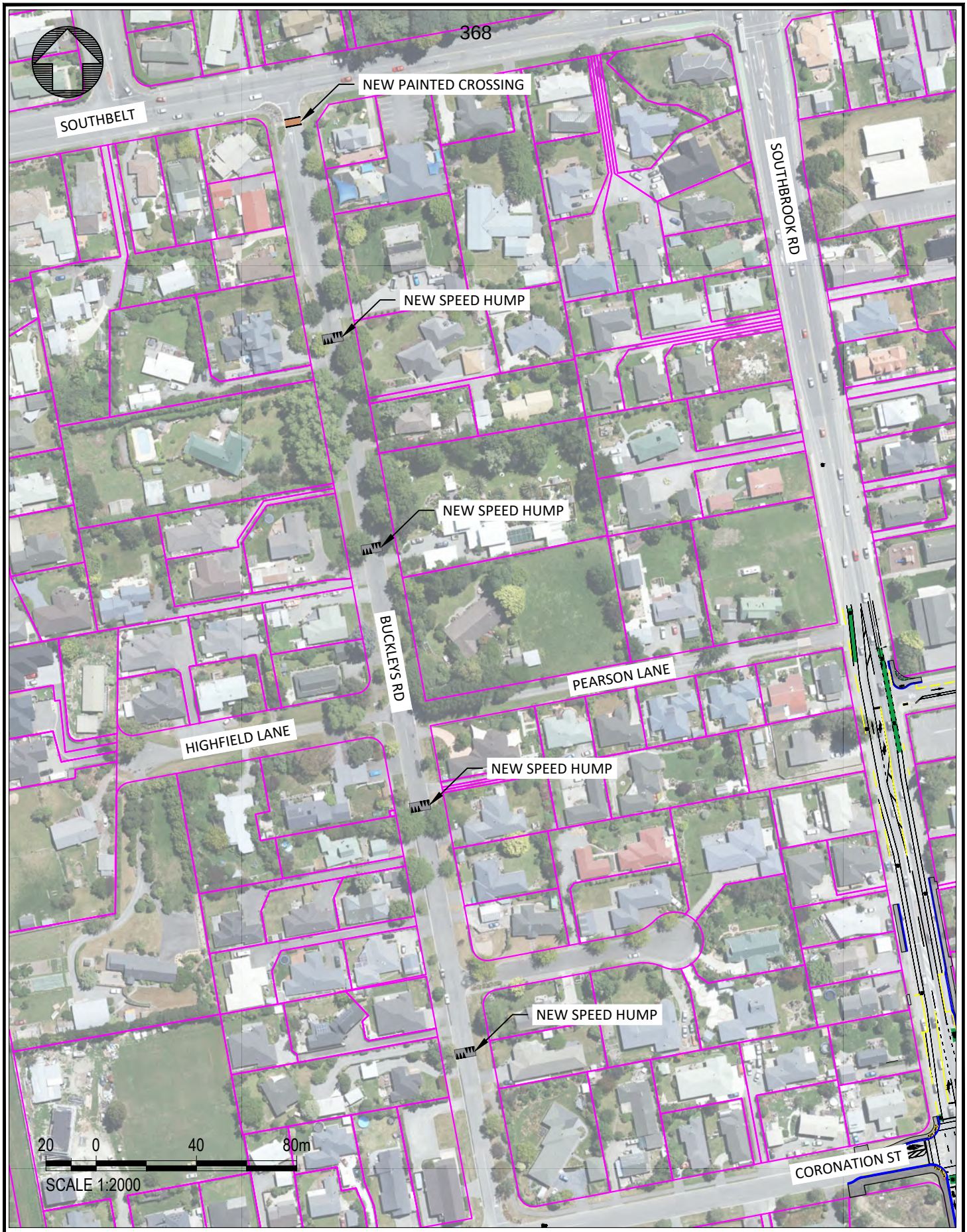

LAYOUT PLAN

SCALE 1:2000

WAIMAKARIRI DISTRICT COUNCIL

SOUTHBROOK ROAD
TRAFFIC SIGNALS

BUCKLEYS ROAD

SCALE (A4)	DATE
1:2000	13/09/2022
DRAWING	4280
SHEET	REVISION
5	A

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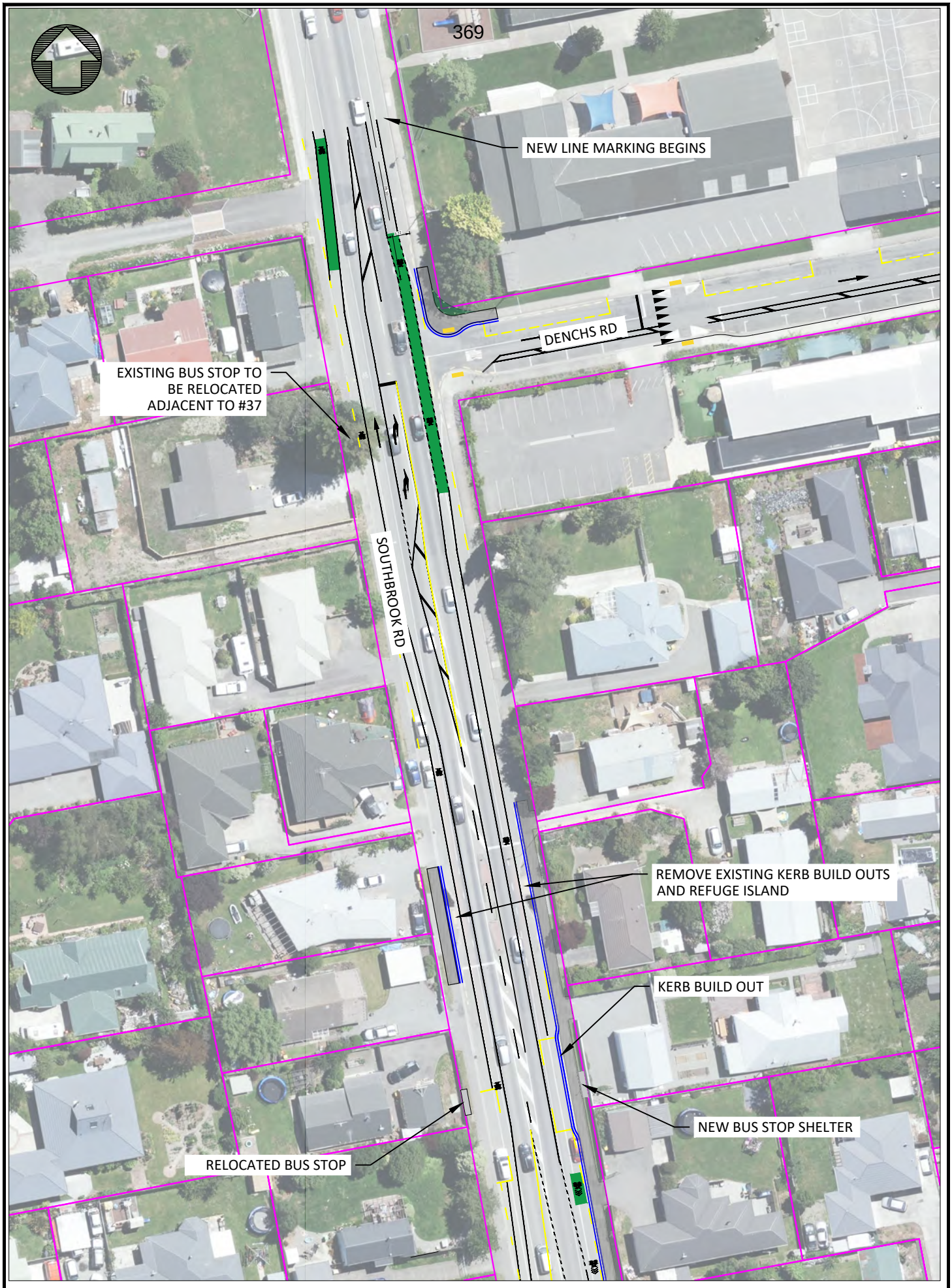

WAIMAKARIRI DISTRICT COUNCIL

SOUTHBROOK ROAD TRAFFIC SIGNALS

SOUTHBROOK ROAD NORTH

SCALE (A4)	DATE
NTS	13/09/2022
DRAWING	4280
SHEET	REVISION
6	A

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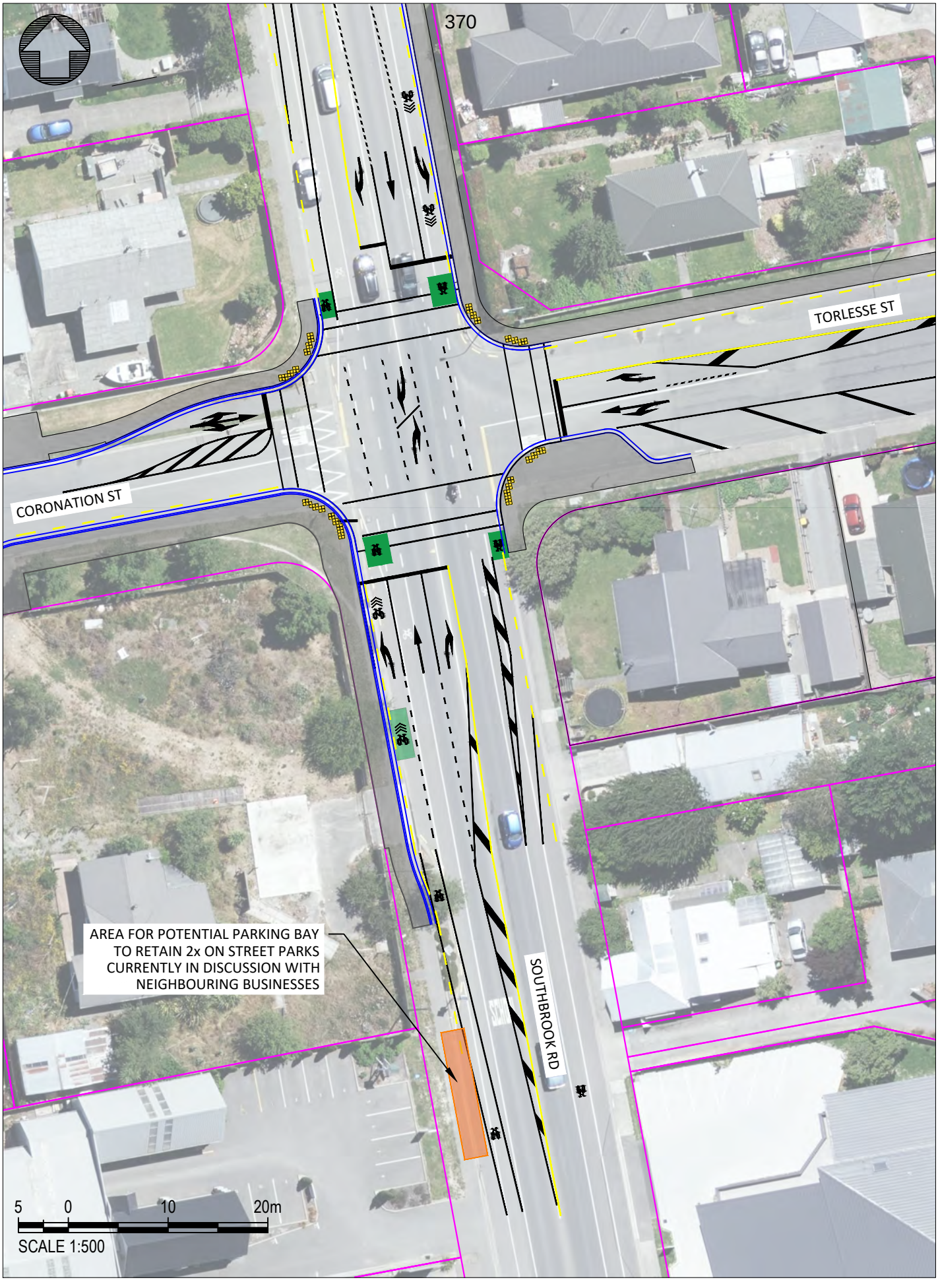

WAIMAKARIRI DISTRICT COUNCIL

SOUTHBROOK ROAD
TRAFFIC SIGNALS

SOUTHBROOK / TORLESSE
INTERSECTION

SCALE (A4)	DATE
1:500	13/09/2022
DRAWING	4280
SHEET	REVISION
7	A

PLOT DATE: 14/09/2022 FILE: S:\PDU\PDU JOBS\PD001600-1699\PD001691 - SOUTHBROOK ROAD IMPROVEMENTS\4 - DESIGN\DETAILED DESIGN\DRAWING\SOUTHBROOK DETAILED DESIGN - PAPERSPACE LAYOUTS - REPORT EDITION.DWG

Waimakariri District Council: No-Stopping Restriction Schedule associated with Southbrook Road / Torlesse Street Signalisation Project

Item	Locality	Street	Side of Street	Location	Distance [m]	No. of spaces impacted	Notes
	Rangiora	Denchs Rd	South	Southbrook Rd to Marshall st	6	0	Existing no-stopping lines, not currently included within the Parking Schedule
	Rangiora	Denchs Rd	North	Southbrook Rd to Marshall st	6	0	Existing no-stopping lines, not currently included within the Parking Schedule
	Rangiora	Denchs Rd	South	Marshall St East	70	0	Existing no-stopping lines, not currently included within the Parking Schedule
	Rangiora	Denchs Rd	North	Marshall St East	90	0	Existing no-stopping lines, not currently included within the Parking Schedule
	Rangiora	Marshall St	West	South of Denchs Rd	10	0	Existing no-stopping lines, not currently included within the Parking Schedule
	Rangiora	Marshall St	East	South of Denchs Rd	10	0	Existing no-stopping lines, not currently included within the Parking Schedule
	Rangiora	Marshall St	West	South of Torlesse St	36	0	Existing no-stopping lines, not currently included within the Parking Schedule
	Rangiora	Marshall St	East	South of Torlesse St	36	0	Existing no-stopping lines, not currently included within the Parking Schedule
	Rangiora	Marshall St	West	North of Torlesse St, outside No. 25	20	0	Existing no-stopping lines, not currently included within the Parking Schedule
	Rangiora	Marshall St	East	North of Torlesse St, outside school	35	0	Existing no-stopping lines, not currently included within the Parking Schedule
	Rangiora	Torlesse St	North	Outside No. 38 Southbrook Rd	40	-6	Required as part of the signalisation project
	Rangiora	Torlesse St	South	Outside No. 36 Southbrook Rd	15	0	Required as part of the signalisation project / Existing no-stopping lines not currently included
	~~Rangiora~~	~~Torlesse St~~	~~North~~	~~west of Marshall Street~~	~~5~~	~~1~~	~~Existing no-stopping lines to be removed~~
	Rangiora	Coronation St	North	Outside 1	32	0	Existing no-stopping lines, not currently included within the Parking Schedule
	Rangiora	Coronation St	North	West of Buckleys Rd intersection	10	0	Existing no-stopping lines, not currently included within the Parking Schedule
	Rangiora	Coronation St	North	East of Buckleys Rd intersection	10	0	Existing no-stopping lines, not currently included within the Parking Schedule
	Rangiora	Coronation St	North	Outside No. 33	40	-6	Required as part of the signalisation project
	Rangiora	Coronation St	South	Outside No. 29 Southbrook Rd	28	-4	Required as part of the signalisation project
	Rangiora	Buckleys Rd	East	south of Intersection outside 91	15	0	Existing no-stopping lines, not currently included within the Parking Schedule
	Rangiora	Buckleys Rd	west	south of Intersection outside 93	16	0	Existing no-stopping lines, not currently included within the Parking Schedule
	Rangiora	Buckleys Rd	East	North of Coronation St	25	0	Existing no-stopping lines, not currently included within the Parking Schedule
	Rangiora	Southbrook Rd	West	Opposite Denches Rd, Pearson Lane to No. 43	100	-6	Required due to right turn lane. Parking impact accounts for existing bus stop
	Rangiora	Southbrook Rd	East	North of Denchs Rd intersection	20	0	Existing no-stopping lines, not currently included within the Parking Schedule
	Rangiora	Southbrook Rd	East	South of Denchs Rd intersection	50	-6	Extension of existing no stopping lines, required due to right turn lane
	Rangiora	Southbrook Rd	East	Between No. 42 & No. 44	5	0	Existing no-stopping lines, not currently included within the Parking Schedule
	Rangiora	Southbrook Rd	East	North of Torlesse St, to No. 42	40	-5	Required as part of the signalisation project
	Rangiora	Southbrook Rd	West	North of Torlesse St, to No. 35	35	-4	Required as part of the signalisation project
	Rangiora	Southbrook Rd	East	South of Torlesse St	30	-3	Required as part of the signalisation project
	Rangiora	Southbrook Rd	West	South of Torlesse St outside RMG & Mazda	TBC		Required as part of the signalisation project, and as part of consent conditions for RMG
	Rangiora	Southbrook Rd	West	From Mitre 10 to Rangiora Mazda (No. 27)	160	0	Existing no-stopping lines, not currently included within the Parking Schedule
	Rangiora	Southbrook Rd	East	From Pack N Save to No 24	135	0	Existing no-stopping lines, not currently included within the Parking Schedule
	Rangiora	Southbrook Rd	East	South of South Belt to No. 64	150	0	Existing no-stopping lines, not currently included within the Parking Schedule
	Rangiora	Southbrook Rd	West	South of South Belt to No. 57a	160	0	Existing no-stopping lines, not currently included within the Parking Schedule
	Rangiora	Southbrook Rd	East	Removal of Kea Crossing	N/A	3	
	Rangiora	Southbrook Rd	West	Removal of Kea Crossing	N/A	4	
						-32	

Attachment iii

EXTRACT FROM SCHEME DESIGN ROAD SAFETY AUDIT

Vehicle Speeds on Southbrook Road - Minor

Free flow vehicle speeds traveling on Southbrook Road were observed to be high and do not align with the recommended safe system speeds for vulnerable road users who may be travelling through the project area in the future. These high speeds coupled with reduced lane widths and high pedestrian volumes, may introduce safety risks to all road users.

It is recommended that speed management treatments (i.e. raised platforms, etc) are investigated to be implemented into the project during the detailed design of the project.

Recommendation:

- Investigate speed management treatments for vehicles travelling on Southbrook Road during the detailed design of the project.

Frequency Rating:	***Severity Rating:***
Crashes are likely to be **Infrequent**	*Death or serious injury is* **Unlikely**
Designer Response: *Agree. The installation of a raised intersection can help with side on crashes at intersections. However the due to the congestion, speeds at peak times, and school traffic times are low. There is also a need to consider the reduction in traffic through the intersection with the raised platform potentially reducing the speeds. This may increase congestion and cause other unwanted safety concerns.*	
Safety Engineer: ***Disagree with the Designer's response. Waka Kotahi has confirmed that raised platforms are preferred but not a funding requirement. Speed data from three weeks of counts in 2021 show mean speeds of 42 kph and 85th percentile speeds of 51 kph, which are a little higher than a preferred speed of 30 kph; however, these speeds should be perused further to understand what speeds are during daylight hours when traffic volumes and pedestrian usage are both expected to be greatest. Consideration of a raised platform will be based on more detailed analysis of traffic speeds on Southbrook.***	
Client Decision: *The need to slow traffic and provide a raised platform should be considered as part of detailed design stage. Speeds through this area at peak times is low.*	
Action Taken: *Speeds checked in current design. Detailed detail stage will require a meeting to discuss ways to create a low speed environment and minimise the impact to traffic congestion.*	

WAIMAKARIRI DISTRICT COUNCIL

REPORT FOR DECISION

FILE NO and TRIM NO:	CON202241-01 / 220816140512
REPORT TO:	Management Team
DATE OF MEETING:	22 August 2022
FROM:	Claudia Button, Project Engineer Colin Roxburgh, Water Asset Manager
SUBJECT:	Backflow Preventer Installations 2022/23– Request to Engage Water Unit
SIGNED BY: **(for Reports to Council, Committees or Boards)**	General Manager Acting Chief Executive

1. SUMMARY

1.1 This report is to seek Management Team approval to engage the Water Unit for the civil works for Contract 22/41 Backflow Preventer Installations in the 2022/23 financial year. This involves all separable portions, with the intent that all medium hazard sites in the district have the appropriate backflow prevention in place at the conclusion of this contract.

1.2 The prices received for Separable Portions A to C have been assessed to represent good value.

Attachments:

i. Evaluated price assessment (TRIM 220815139633)

2. RECOMMENDATION

THAT the Management Team:

(a) **Receives** report No.220816140512.

(b) **Notes** that prices have been received from the Waimakariri District Council Water Unit for three separable portions of the district wide backflow preventer installation works and that Separable Portion A requires an overspend on the budget, whereas Separable Portion B and C can be accommodated within the current financial year's budgets.

(c) **Authorises** Council staff to engage the Waimakariri District Council Water Unit to undertake Separable Portions A to C of the Backflow Preventer Installations to the value of $184,166.07 (excluding GST).

(d) **Notes** that the price received for Separable Portions A to C was assessed to represent good value for undertaking this work.

(e) **Notes** that the reason for not externally tendering this work is because of the additional costs anticipated by tendering externally and the expectation that Council are unlikely to gain a better combination of price and quality through an alternative method for Separable Portions A to C.

(f) **Notes** that the planned 2022/23 work for Separable Portion A is funded from the Backflow Prevention implementation budget for Rangiora, Separable Portion B is funded by the Kaiapoi pipeline renewals budget, and Separable Portion C is funded by the capital additions AMIS budget.

(g) **Notes** that the surveys for properties requiring backflow preventer installations were ongoing at the time the budget was set for Rangiora, so the total number of double check installations remaining on the scheme was unknown. There are still some remaining surveys being undertaken which may increase the overspend on the budget, however the forecast overspend is in the low tens of thousands of dollars, and can be accommodated in the overall scheme budgets.

(h) **Circulates** this report to the Utilities and Roading Committee for their information.

3. BACKGROUND

3.1. The proposed works for the Backflow Preventer Installations are due to be constructed over the 2022/23 financial year. The works are anticipated to commence in September 2022.

3.2. The project has been tendered with three Separable Portions which will include works in:

- Rangiora – Backflow Installations (Separable Portion A)
- Kaiapoi – Backflow Installations (Separable Portion B)
- Woodend/Pegasus – Backflow Installations (Separable Portion C)

3.3. The backflow preventer surveys and installations (Separable Portions A to C) will provide protection to the Council's water supply networks by aligning with the intentions set out in the Council's Backflow Prevention Policy S-CP 5605. The works will result in installations of backflow prevention devices at the boundary for various commercial and industrial properties that have been identified to represent a medium risk of contamination to the public water supply. This is generally done by upgrading the type of manifold within the toby box at a given property to be a testable double check device, rather than a non-testable dual check device.

3.4. Backflow flow prevention is a key element of protection from contamination on the reticulation for schemes without chlorine residual disinfection. The Rangiora, Kaiapoi and Woodend drinking-water schemes are all applying to be exempt from chlorine disinfection and having backflow preventers installed on all medium hazard properties is an essential part of the application process.

3.5. Through the surveys that have taken place, the majority of sites have a defined scope and price. There was however some uncertainty regarding some properties' lateral connection locations and sizes. To account for this uncertainty, the tender incorporated items for providing confirmation of lateral location and size in advance of backflow preventer installation. The intent is that once the lateral size is confirmed the quantity and size of installations at these remaining sites will be confirmed, and therefore final costs.

4. ISSUES AND OPTIONS

4.1. Pipework and fitting installation, backfilling and reinstatement will be completed by the Council's Water Unit. This type of work is typical of work undertaken by the Water Unit.

4.2. At the time of tendering there were two suppliers nominated by the Water Unit who are the only suppliers able to supply the stock required – Hynds and Humes. Prices are based on a full stock price request the Water Unit conducted with each supplier. This approach has been discussed with the General Manager of Utilities and Roading.

4.3. Options:

The Management Team have two options:

1) Management Team approve staff to engage the Water Unit to construct this project in the 2022/23 financial year. This is the recommended option.

2) Management Team reject the Water Unit price and competitively tender all portions of the contract. This is not recommended, as this would significantly delay the project and add cost to the project.

Implications for Community Wellbeing

There are implications on community wellbeing by the issues and options that are the subject matter of this report. The provision of safe drinking-water (achieved in part by having adequate backflow prevention in place) is a fundamental requirement for the health and wellbeing of the community.

5. COMMUNITY VIEWS

5.1. Mana whenua

Te Ngāi Tūāhuriri hapū may be affected by, or have an interest in the subject matter of this report. The protection of water supplies against the risk of backflow is part of giving effect to Te Mana o te Wai, in that the mauri of the water is protected, by addressing the risk of contamination by backflow.

5.2. Groups and Organisations

No community group views have been sought specifically on this project.

5.3. Wider Community

The Water Unit will prepare and deliver letters to business owners, and any affected neighbouring properties, in advance of construction to advise of short periods of reduced level of service.

The majority of the community members on these schemes prefer their scheme to remain chlorine free and support Council applying for chlorine exemptions, with the protection against backflow being a key criteria chlorine exemption applications are assessed against.

6. IMPLICATIONS AND RISK MANAGEMENT

6.1. Financial Implications

The Water Unit has provided a schedule of rates for a range of potential backflow device types, sizes, and reinstatement methods. This list of rates provides sufficient flexibility to allow pricing for any reasonably foreseeable type of installation.

A schedule of properties that may require medium hazard devices (and therefore Council funding) has been generated. This list has been generated from properties where backflow surveys have been completed, and the type of device was identified and confirmed as a Council funded device.

In some cases estimates of the lateral size and location needs further confirmation as it could not be confirmed as part of the survey. The final number of backflow devices installed will increase as these sizes and locations are confirmed as part of the contract.

Simultaneously there are some surveys being completed which may indicate more medium hazard properties that require backflow prevention devices be installed.

There is sufficient budget available to complete Separable Portions B and C within the Kaiapoi, and Woodend/Pegasus budgets over the 2022/23 financial year.

A summary of total budget available for the 2022/23 financial years versus projected expenditure is given in Table 1 below.

Table 1: Cost Summary for 2022/23 financial year

Funding Source	Separable Portion	Expenditure to Date	Recommended Tender Price	Predicted Commitments	Total Projected Expenditure	Total Budget
101373.000.5103 (Rangiora Backflows)	A	$0	$161,152.65	$51,134.75[1]	$212,287.40	$143,000
100032.000.5104 (Kaiapoi pipeline renewals)	B	$0	$16,820.14	$10,226.95[1]	$27,047.09	$30,000[2]
10.302.747.5302 (Capital additions AMIS)	C	$0	$6,193.28	$12,272.34[1]	$18,395.62	$20,000[2]
Totals		$0	$184,166.07	$73,634.04	$239,666.07	$193,000

[1] Predicted Commitments is for the known additional number of installations based on the number requiring their lateral be located/size confirmed, and installations recommended from surveys to date following the tender being submitted to the Water Unit. It was assumed the connections were DN20 and asphalt reinstatement would be necessary.

[2] This figure represents typical expenditure against this item, as this budget code covers unplanned works undertaken via the AMIS system.

As is identified above, the works recommended will result in an overspend of budget by approximately 24% overall. The reason for this forecast overspend is that the number of installations required had not been confirmed at the time the budget was set, which has only more recently been confirmed as final backflow surveys were completed. It is recommended to proceed with the award of this contract to ensure works can be completed by the end of October (as currently forecast) such that all sites have their backflow risk adequately addressed prior to the deadline of 15 November where chlorine is required on all water supplies unless an exemption is gained. The overspend against these budgets will be reported to Council through the normal capital reporting channels, and can be accommodated within these overall scheme budgets.

The quotation received from the Water Unit has been assessed and Separable Portions A to C are deemed to represent good value, and are mostly similar to the available budget. The Water Unit's Tender exceeded the available budget for Separable Portion A (Rangiora) due to the number of properties requiring backflow prevention being unknown at the time the budget was set, and further properties requiring backflows to be installed following the lateral location and size being confirmed under the contract.

6.2. Community Implications

The need for this project is to provide protection to the Council's water supply network by aligning with the intentions set out in the Council's Backflow Prevention Policy S-CP 5605. The works will include installations of backflow prevention devices at the boundary for various commercial and industrial properties that have been identified to represent a medium risk of contamination to the public water supply.

6.3. Sustainability and Climate Change Impacts

The recommendations in this report do not have sustainability and/or climate change impacts.

6.4. **Risk Management**

The normal construction risks apply to this contract. There are no extraordinary risks over and above these normal risks.

6.5. **Health and Safety**

Health and Safety will be managed for this contract as per the Council's Health and Safety System.

7. CONTEXT

7.1. **Consistency with Policy**

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

7.2. **Authorising Legislation**

The Water Services Act 2021 and Local Government Act are relevant in this matter.

7.3. **Consistency with Community Outcomes**

The following community outcomes are relevant in this matter:

- Core utility services are sustainable, resilient, affordable; and provided in a timely manner.
- There is a healthy and sustainable environment for all

7.4. **Authorising Delegations**

The Management Team has the delegated authority to award this contract.

ATTACHMENT A

Tender Assessment

NO	SCHEDULE ITEM	QUANTITY	UNIT	RATE	AMOUNT	Number Check		Engineers Estimate		Award Amounts	
A1	**LOCATE & CONFIRM LATERAL SIZE**										
A1.1	Locate lateral service connection, connectivity & confirm size with PDU Project Manager prior to installation of device	22	Ea	$ 198.40	$ 4,364.80	$ 198.40	$ 4,364.80	$ 1,736.46	$ 38,202.12	$ 198.40	$ 4,364.80
A1.2	Confirm pipe size, connectivity and inform PDU Project Manager prior to installation of device	1	Ea	$ 289.00	$ 289.00	$ 289.00	$ 289.00	$ 289.00	$ 289.00	$ 289.00	$ 289.00
A2	**SITE SPECIFIC INSTALLATION**										
A2.1	**Supply & Install Backflow Device**										
A2.1.1	DN50 Double Check Valve	3	Ea	$ 4,121.25	$ 12,363.75	$ 4,121.25	$ 12,363.75	$ 4,121.25	$ 12,363.75	$ 4,121.25	$ 12,363.75
A2.1.2	DN40 Double Check Valve **(Provisional Item)**	1	Ea	$ 3,903.82	$ 3,903.82	$ 3,903.82	$ 3,903.82	$ 3,903.82	$ 3,903.82		
A2.1.3	DN32 Double Check Valve **(Provisional Item)**	1	Ea	$ 3,701.82	$ 3,701.82	$ 3,701.82	$ 3,701.82	$ 3,701.82	$ 3,701.82		
A2.1.4	DN25 Double Check Valve	4	Ea	$ 2,845.43	$ 11,381.72	$ 2,845.43	$ 11,381.72	$ 2,845.43	$ 11,381.72	$ 2,845.43	$ 11,381.72
A2.1.5	DN20 Double Check Valve	53	Ea	$ 1,422.43	$ 75,388.79	$ 1,422.43	$ 75,388.79	$ 1,422.43	$ 75,388.79	$ 1,422.43	$ 75,388.79
A2.1.6	Supply and install DN15 to DN20 Service Connection per SD600-414A	1	Ea	$ 1,360.63	$ 1,360.63	$ 1,360.63	$ 1,360.63	$ 1,360.63	$ 1,360.63	$ 1,360.63	$ 1,360.63
A2.1.7	Supply and install greater than DN20 Service Connection per SD600-414A **(Provisional Item)**	1	Ea	$ 2,099.06	$ 2,099.06	$ 2,099.06	$ 2,099.06	$ 2,099.06	$ 2,099.06		
A3	**SURFACE REINSTATEMENT FOR DEVICE LOCATION**										
A3.1	Asphaltic Concrete	34	Ea	$ 797.24	$ 27,106.16	$ 797.24	$ 27,106.16	$ 797.24	$ 27,106.16	$ 797.24	$ 27,106.16
A3.2	Concrete (Footpath)	10	Ea	$ 759.06	$ 7,590.06	$ 759.06	$ 7,590.60	$ 759.06	$ 7,590.60	$ 759.06	$ 7,590.60
A3.3	Concrete (Driveway) **(Provisional Item)**	1	Ea	$ 759.06	$ 759.06	$ 759.06	$ 759.06	$ 759.06	$ 759.06		
A3.4	Paving (to match existing Footpath)	4	Ea	$ 1,880.03	$ 7,520.12	$ 1,880.03	$ 7,520.12	$ 1,880.03	$ 7,520.12	$ 1,880.03	$ 7,520.12
A3.5	Berm/Grass	7	Ea	$ 297.51	$ 2,082.57	$ 297.51	$ 2,082.57	$ 297.51	$ 2,082.57	$ 297.51	$ 2,082.57
A3.6	Gravel	5	Ea	$ 311.03	$ 1,555.15	$ 311.03	$ 1,555.15	$ 311.03	$ 1,555.15	$ 311.03	$ 1,555.15
A4	**MISCELLANOUS**										
A4.1	Supply & Install Trafficable cover and lid for service connection/toby box	16	Ea	$ 622.96	$ 9,967.36	$ 622.96	$ 9,967.36	$ 622.96	$ 9,967.36	$ 622.96	$ 9,967.36
A4.2	Move service connection/toby box out of driveway **(Provisional Item)**	100%	LS	$ 875.19	$ 875.19	$ 875.19	$ 875.19	$ 875.19	$ 875.19		
A4.3	Cap & abandon existing lateral service connection	1	Ea	$ 182.00	$ 182.00	$ 182.00	$ 182.00	$ 180.00	$ 180.00	$ 182.00	$ 182.00
	SEPARABLE PORTION A TOTAL (GST exclusive)				**$ 172,491.06**		**$ 172,491.60**		**$ 206,326.92**		**$ 161,152.65**

NO	SCHEDULE ITEM	QUANTITY	UNIT	RATE	AMOUNT	Number Check		Engineers Estimate		Award Amounts	
B1	**LOCATE & CONFIRM LATERAL SIZE**										
B1.1	Locate lateral service connection, connectivity & confirm size with PDU Project Manager prior to installation of device	3	Ea	$ 198.40	$ 595.20	$ 198.40	$ 595.20	$ 1,736.46	$ 5,209.38	$ 198.40	$ 595.20
B1.2	Confirm pipe size, connectivity and inform PDU Project Manager prior to installation of device	2	Ea	$ 289.00	$ 578.00	$ 289.00	$ 578.00	$ 289.00	$ 578.00	$ 289.00	$ 578.00
B2	**SITE SPECIFIC INSTALLATION**										
B2.1	**Supply & Install Backflow Device**										
B2.1.1	DN50 Double Check Valve **(Provisional Item)**	1	Ea	$ 4,121.24	$ 4,121.24	$ 4,121.24	$ 4,121.24	$ 4,121.25	$ 4,121.25		
B2.1.2	DN40 Double Check Valve	1	Ea	$ 3,903.82	$ 3,903.82	$ 3,903.82	$ 3,903.82	$ 3,903.82	$ 3,903.82	$ 3,903.82	$ 3,903.82
B2.1.3	DN32 Double Check Valve **(Provisional Item)**	1	Ea	$ 3,701.82	$ 3,701.82	$ 3,701.82	$ 3,701.82	$ 3,701.82	$ 3,701.82		
B2.1.4	DN25 Double Check Valve **(Provisional Item)**	1	Ea	$ 2,845.43	$ 2,845.43	$ 2,845.43	$ 2,845.43	$ 2,845.43	$ 2,845.43		
B2.1.5	DN20 Double Check Valve	6	Ea	$ 1,422.43	$ 8,534.58	$ 1,422.43	$ 8,534.58	$ 1,422.43	$ 8,534.58	$ 1,422.43	$ 8,534.58
B2.1.6	Supply and install DN15 to DN20 Service Connection per SD600-414A **(Provisional Item)**	1	Ea	$ 1,360.63	$ 1,360.63	$ 1,360.63	$ 1,360.63	$ 1,360.63	$ 1,360.63		
B2.1.7	Supply and install greater than DN20 Service Connection per SD600-414A **(Provisional Item)**	1	Ea	$ 2,099.06	$ 2,099.06	$ 2,099.06	$ 2,099.06	$ 2,099.06	$ 2,099.06		
B3	**SURFACE REINSTATEMENT FOR DEVICE LOCATION**										
B3.1	Asphaltic Concrete	1	Ea	$ 622.96	$ 622.96	$ 622.96	$ 622.96	$ 797.24	$ 797.24	$ 622.96	$ 622.96
B3.2	Concrete (Footpath)	1	Ea	$ 759.06	$ 759.06	$ 759.06	$ 759.06	$ 759.06	$ 759.06	$ 759.06	$ 759.06
B3.3	Concrete (Driveway) **(Provisional Item)**	1	Ea	$ 759.06	$ 759.06	$ 759.06	$ 759.06	$ 759.06	$ 759.06		
B3.4	Paving (to match existing Footpath) **(Provisional Item)**	1	Ea	$ 1,880.03	$ 1,880.03	$ 1,880.03	$ 1,880.03	$ 1,880.03	$ 1,880.03		
B3.5	Berm/Grass	3	Ea	$ 297.51	$ 892.53	$ 297.51	$ 892.53	$ 3,867.63	$ 11,602.89	$ 297.51	$ 892.53
B3.5	Gravel	1	Ea	$ 311.03	$ 311.03	$ 311.03	$ 311.03	$ 311.03	$ 311.03	$ 311.03	$ 311.03
B4	**MISCELLANOUS**										
B4.1	Supply & Install Trafficable cover and lid for service connection/toby box	1	Ea	$ 622.96	$ 622.96	$ 622.96	$ 622.96	$ 622.96	$ 622.96	$ 622.96	$ 622.96
B4.2	Move service connection/toby box out of driveway **(Provisional Item)**	100%	LS	$ 875.19	$ 875.19	$ 875.19	$ 875.19	$ 875.19	$ 875.19		
B4.3	Cap & abandon existing lateral service connection **(Provisional Item)**	1	Ea	$ 182.00	$ 182.00	$ 182.00	$ 182.00	$ 180.00	$ 180.00		
	SEPARABLE PORTION B TOTAL (GST exclusive)				**$ 34,644.60**		**$ 34,644.60**		**$ 50,141.43**		**$ 16,820.14**

NO	SCHEDULE ITEM	QUANTITY	UNIT	RATE	AMOUNT	Number Check		Engineers Estimate		Award Amounts	
C1	**LOCATE & CONFIRM LATERAL SIZE**										
C1.1	Locate lateral service connection, connectivity & confirm size with PDU Project Manager prior to installation of device	5	Ea	$ 198.40	$ 992.00	$ 198.40	$ 992.00	$ 1,736.46	$ 8,682.30	$ 198.40	$ 992.00
C1.2	Confirm pipe size, connectivity and inform PDU Project Manager prior to installation of device **(Provisional Item)**	1	Ea	$ 289.00	$ 289.00	$ 289.00	$ 289.00	$ 289.00	$ 289.00		
C2	**SITE SPECIFIC INSTALLATION**										
C2.1	**Supply & Install Backflow Device**										
C2.1.1	DN50 Double Check Valve **(Provisional Item)**	1	Ea	$ 4,121.24	$ 4,121.24	$ 4,121.24	$ 4,121.24	$ 4,121.25	$ 4,121.25		
C2.1.2	DN40 Double Check Valve **(Provisional Item)**	1	Ea	$ 3,903.82	$ 3,903.82	$ 3,903.82	$ 3,903.82	$ 3,903.82	$ 3,903.82		
C2.1.3	DN32 Double Check Valve **(Provisional Item)**	1	Ea	$ 3,701.82	$ 3,701.82	$ 3,701.82	$ 3,701.82	$ 3,701.82	$ 3,701.82		
C2.1.4	DN25 Double Check Valve **(Provisional Item)**	1	Ea	$ 2,845.43	$ 2,845.43	$ 2,845.43	$ 2,845.43	$ 2,845.43	$ 2,845.43		
C2.1.5	DN20 Double Check Valve	3	Ea	$ 1,422.43	$ 4,267.29	$ 1,422.43	$ 4,267.29	$ 1,422.43	$ 4,267.29	$ 1,422.43	$ 4,267.29
C2.1.6	Supply and install DN15 to DN20 Service Connection per SD600-414A **(Provisional Item)**	1	Ea	$ 1,360.63	$ 1,360.63	$ 1,360.63	$ 1,360.63	$ 1,360.63	$ 1,360.63		
C2.1.7	Supply and install greater than DN20 Service Connection per SD600-414A **(Provisional Item)**	1	Ea	$ 2,099.06	$ 2,099.06	$ 2,099.06	$ 2,099.06	$ 2,099.06	$ 2,099.06		
C3	**SURFACE REINSTATEMENT FOR DEVICE LOCATION**										
C3.1	Asphaltic Concrete (Footpath) **(Provisional Item)**	1	Ea	$ 622.96	$ 622.96	$ 622.96	$ 622.96	$ 797.24	$ 797.24		
C3.2	Concrete (Footpath) **(Provisional Item)**	1	Ea	$ 759.06	$ 759.06	$ 759.06	$ 759.06	$ 759.06	$ 759.06		
C3.3	Concrete (Driveway) **(Provisional Item)**	1	Ea	$ 759.06	$ 759.06	$ 759.06	$ 759.06	$ 759.06	$ 759.06		
C3.4	Paving (to match existing Footpath) **(Provisional Item)**	1	Ea	$ 1,880.03	$ 1,880.03	$ 1,880.03	$ 1,880.03	$ 1,880.03	$ 1,880.03		
C3.5	Berm/Grass **(Provisional Item)**	1	Ea	$ 297.51	$ 297.51	$ 297.51	$ 297.51	$ 3,867.63	$ 3,867.63		
C3.5	Gravel	1	Ea	$ 311.03	$ 311.03	$ 311.03	$ 311.03	$ 311.03	$ 311.03	$ 311.03	$ 311.03
C4	**MISCELLANOUS**										
C4.1	Supply & Install Trafficable cover and lid for service connection/toby box	1	Ea	$ 622.96	$ 622.96	$ 622.96	$ 622.96	$ 622.96	$ 622.96	$ 622.96	$ 622.96
C4.2	Move service connection/toby box out of driveway **(Provisional Item)**	100%	LS	$ 875.19	$ 875.19	$ 875.19	$ 875.19	$ 875.19	$ 875.19		
C4.3	Cap & abandon existing lateral service connection **(Provisional Item)**	1	Ea	$ 182.00	$ 182.00	$ 182.00	$ 182.00	$ 180.00	$ 180.00		
	SEPARABLE PORTION C TOTAL (GST exclusive)				**$ 29,890.09**		**$ 29,890.09**		**$ 41,322.80**		**$ 6,193.28**

NO	SCHEDULE ITEM	QUANTITY	UNIT	RATE	AMOUNT	Number Check		Engineers Estimate		Award Amounts	
A1	**LOCATE & CONFIRM LATERAL SIZE**										
A1.1	Locate lateral service connection, connectivity & confirm size with PDU Project Manager prior to installation of device	22	Ea	$ 198.40	$ 4,364.80	$ 198.40	$ 4,364.80	$ 1,736.46	$ 38,202.12	$ 198.40	$ 4,364.80
A1.2	Confirm pipe size, connectivity and inform PDU Project Manager prior to installation of device	1	Ea	$ 289.00	$ 289.00	$ 289.00	$ 289.00	$ 289.00	$ 289.00	$ 289.00	$ 289.00
A2	**SITE SPECIFIC INSTALLATION**										
A2.1	**Supply & Install Backflow Device**										
A2.1.1	DN50 Double Check Valve	3	Ea	$ 4,121.25	$ 12,363.75	$ 4,121.25	$ 12,363.75	$ 4,121.25	$ 12,363.75	$ 4,121.25	$ 12,363.75
A2.1.2	DN40 Double Check Valve **(Provisional Item)**	1	Ea	$ 3,903.82	$ 3,903.82	$ 3,903.82	$ 3,903.82	$ 3,903.82	$ 3,903.82		
A2.1.3	DN32 Double Check Valve **(Provisional Item)**	1	Ea	$ 3,701.82	$ 3,701.82	$ 3,701.82	$ 3,701.82	$ 3,701.82	$ 3,701.82		
A2.1.4	DN25 Double Check Valve	4	Ea	$ 2,845.43	$ 11,381.72	$ 2,845.43	$ 11,381.72	$ 2,845.43	$ 11,381.72	$ 2,845.43	$ 11,381.72
A2.1.5	DN20 Double Check Valve	53	Ea	$ 1,422.43	$ 75,388.79	$ 1,422.43	$ 75,388.79	$ 1,422.43	$ 75,388.79	$ 1,422.43	$ 75,388.79
A2.1.6	Supply and install DN15 to DN20 Service Connection per SD600-414A	1	Ea	$ 1,360.63	$ 1,360.63	$ 1,360.63	$ 1,360.63	$ 1,360.63	$ 1,360.63	$ 1,360.63	$ 1,360.63
A2.1.7	Supply and install greater than DN20 Service Connection per SD600-414A **(Provisional Item)**	1	Ea	$ 2,099.06	$ 2,099.06	$ 2,099.06	$ 2,099.06	$ 2,099.06	$ 2,099.06		
A3	**SURFACE REINSTATEMENT FOR DEVICE LOCATION**										
A3.1	Asphaltic Concrete	34	Ea	$ 797.24	$ 27,106.16	$ 797.24	$ 27,106.16	$ 797.24	$ 27,106.16	$ 797.24	$ 27,106.16
A3.2	Concrete (Footpath)	10	Ea	$ 759.06	$ 7,590.06	$ 759.06	$ 7,590.60	$ 759.06	$ 7,590.60	$ 759.06	$ 7,590.60
A3.3	Concrete (Driveway) **(Provisional Item)**	1	Ea	$ 759.06	$ 759.06	$ 759.06	$ 759.06	$ 759.06	$ 759.06		
A3.4	Paving (to match existing Footpath)	4	Ea	$ 1,880.03	$ 7,520.12	$ 1,880.03	$ 7,520.12	$ 1,880.03	$ 7,520.12	$ 1,880.03	$ 7,520.12
A3.5	Berm/Grass	7	Ea	$ 297.51	$ 2,082.57	$ 297.51	$ 2,082.57	$ 297.51	$ 2,082.57	$ 297.51	$ 2,082.57
A3.6	Gravel	5	Ea	$ 311.03	$ 1,555.15	$ 311.03	$ 1,555.15	$ 311.03	$ 1,555.15	$ 311.03	$ 1,555.15
A4	**MISCELLANOUS**										
A4.1	Supply & Install Trafficable cover and lid for service connection/toby box	16	Ea	$ 622.96	$ 9,967.36	$ 622.96	$ 9,967.36	$ 622.96	$ 9,967.36	$ 622.96	$ 9,967.36
A4.2	Move service connection/toby box out of driveway **(Provisional Item)**	100%	LS	$ 875.19	$ 875.19	$ 875.19	$ 875.19	$ 875.19	$ 875.19		
A4.3	Cap & abandon existing lateral service connection	1	Ea	$ 182.00	$ 182.00	$ 182.00	$ 182.00	$ 180.00	$ 180.00	$ 182.00	$ 182.00
	SEPARABLE PORTION A TOTAL (GST exclusive)				**$ 172,491.06**		**$ 172,491.60**		**$ 206,326.92**		**$ 161,152.65**

NO	SCHEDULE ITEM	QUANTITY	UNIT	RATE	AMOUNT	Number Check		Engineers Estimate		Award Amounts	
B1	**LOCATE & CONFIRM LATERAL SIZE**										
B1.1	Locate lateral service connection, connectivity & confirm size with PDU Project Manager prior to installation of device	3	Ea	$ 198.40	$ 595.20	$ 198.40	$ 595.20	$ 1,736.46	$ 5,209.38	$ 198.40	$ 595.20
B1.2	Confirm pipe size, connectivity and inform PDU Project Manager prior to installation of device	2	Ea	$ 289.00	$ 578.00	$ 289.00	$ 578.00	$ 289.00	$ 578.00	$ 289.00	$ 578.00
B2	**SITE SPECIFIC INSTALLATION**										
B2.1	**Supply & Install Backflow Device**										
B2.1.1	DN50 Double Check Valve **(Provisional Item)**	1	Ea	$ 4,121.24	$ 4,121.24	$ 4,121.24	$ 4,121.24	$ 4,121.25	$ 4,121.25		
B2.1.2	DN40 Double Check Valve	1	Ea	$ 3,903.82	$ 3,903.82	$ 3,903.82	$ 3,903.82	$ 3,903.82	$ 3,903.82	$ 3,903.82	$ 3,903.82
B2.1.3	DN32 Double Check Valve **(Provisional Item)**	1	Ea	$ 3,701.82	$ 3,701.82	$ 3,701.82	$ 3,701.82	$ 3,701.82	$ 3,701.82		
B2.1.4	DN25 Double Check Valve **(Provisional Item)**	1	Ea	$ 2,845.43	$ 2,845.43	$ 2,845.43	$ 2,845.43	$ 2,845.43	$ 2,845.43		
B2.1.5	DN20 Double Check Valve	6	Ea	$ 1,422.43	$ 8,534.58	$ 1,422.43	$ 8,534.58	$ 1,422.43	$ 8,534.58	$ 1,422.43	$ 8,534.58
B2.1.6	Supply and install DN15 to DN20 Service Connection per SD600-414A **(Provisional Item)**	1	Ea	$ 1,360.63	$ 1,360.63	$ 1,360.63	$ 1,360.63	$ 1,360.63	$ 1,360.63		
B2.1.7	Supply and install greater than DN20 Service Connection per SD600-414A **(Provisional Item)**	1	Ea	$ 2,099.06	$ 2,099.06	$ 2,099.06	$ 2,099.06	$ 2,099.06	$ 2,099.06		
B3	**SURFACE REINSTATEMENT FOR DEVICE LOCATION**										
B3.1	Asphaltic Concrete	1	Ea	$ 622.96	$ 622.96	$ 622.96	$ 622.96	$ 797.24	$ 797.24	$ 622.96	$ 622.96
B3.2	Concrete (Footpath)	1	Ea	$ 759.06	$ 759.06	$ 759.06	$ 759.06	$ 759.06	$ 759.06	$ 759.06	$ 759.06
B3.3	Concrete (Driveway) **(Provisional Item)**	1	Ea	$ 759.06	$ 759.06	$ 759.06	$ 759.06	$ 759.06	$ 759.06		
B3.4	Paving (to match existing Footpath) **(Provisional Item)**	1	Ea	$ 1,880.03	$ 1,880.03	$ 1,880.03	$ 1,880.03	$ 1,880.03	$ 1,880.03		
B3.5	Berm/Grass	3	Ea	$ 297.51	$ 892.53	$ 297.51	$ 892.53	$ 3,867.63	$ 11,602.89	$ 297.51	$ 892.53
B3.5	Gravel	1	Ea	$ 311.03	$ 311.03	$ 311.03	$ 311.03	$ 311.03	$ 311.03	$ 311.03	$ 311.03
B4	**MISCELLANOUS**										
B4.1	Supply & Install Trafficable cover and lid for service connection/toby box	1	Ea	$ 622.96	$ 622.96	$ 622.96	$ 622.96	$ 622.96	$ 622.96	$ 622.96	$ 622.96
B4.2	Move service connection/toby box out of driveway **(Provisional Item)**	100%	LS	$ 875.19	$ 875.19	$ 875.19	$ 875.19	$ 875.19	$ 875.19		
B4.3	Cap & abandon existing lateral service connection **(Provisional Item)**	1	Ea	$ 182.00	$ 182.00	$ 182.00	$ 182.00	$ 180.00	$ 180.00		
	SEPARABLE PORTION B TOTAL (GST exclusive)				**$ 34,644.60**		**$ 34,644.60**		**$ 50,141.43**		**$ 16,820.14**

NO	SCHEDULE ITEM	QUANTITY	UNIT	RATE	AMOUNT	Number Check		Engineers Estimate		Award Amounts	
C1	**LOCATE & CONFIRM LATERAL SIZE**										
C1.1	Locate lateral service connection, connectivity & confirm size with PDU Project Manager prior to installation of device	5	Ea	$ 198.40	$ 992.00	$ 198.40	$ 992.00	$ 1,736.46	$ 8,682.30	$ 198.40	$ 992.00
C1.2	Confirm pipe size, connectivity and inform PDU Project Manager prior to installation of device **(Provisional Item)**	1	Ea	$ 289.00	$ 289.00	$ 289.00	$ 289.00	$ 289.00	$ 289.00		
C2	**SITE SPECIFIC INSTALLATION**										
C2.1	**Supply & Install Backflow Device**										
C2.1.1	DN50 Double Check Valve **(Provisional Item)**	1	Ea	$ 4,121.24	$ 4,121.24	$ 4,121.24	$ 4,121.24	$ 4,121.25	$ 4,121.25		
C2.1.2	DN40 Double Check Valve **(Provisional Item)**	1	Ea	$ 3,903.82	$ 3,903.82	$ 3,903.82	$ 3,903.82	$ 3,903.82	$ 3,903.82		
C2.1.3	DN32 Double Check Valve **(Provisional Item)**	1	Ea	$ 3,701.82	$ 3,701.82	$ 3,701.82	$ 3,701.82	$ 3,701.82	$ 3,701.82		
C2.1.4	DN25 Double Check Valve **(Provisional Item)**	1	Ea	$ 2,845.43	$ 2,845.43	$ 2,845.43	$ 2,845.43	$ 2,845.43	$ 2,845.43		
C2.1.5	DN20 Double Check Valve	3	Ea	$ 1,422.43	$ 4,267.29	$ 1,422.43	$ 4,267.29	$ 1,422.43	$ 4,267.29	$ 1,422.43	$ 4,267.29
C2.1.6	Supply and install DN15 to DN20 Service Connection per SD600-414A **(Provisional Item)**	1	Ea	$ 1,360.63	$ 1,360.63	$ 1,360.63	$ 1,360.63	$ 1,360.63	$ 1,360.63		
C2.1.7	Supply and install greater than DN20 Service Connection per SD600-414A **(Provisional Item)**	1	Ea	$ 2,099.06	$ 2,099.06	$ 2,099.06	$ 2,099.06	$ 2,099.06	$ 2,099.06		
C3	**SURFACE REINSTATEMENT FOR DEVICE LOCATION**										
C3.1	Asphaltic Concrete (Footpath) **(Provisional Item)**	1	Ea	$ 622.96	$ 622.96	$ 622.96	$ 622.96	$ 797.24	$ 797.24		
C3.2	Concrete (Footpath) **(Provisional Item)**	1	Ea	$ 759.06	$ 759.06	$ 759.06	$ 759.06	$ 759.06	$ 759.06		
C3.3	Concrete (Driveway) **(Provisional Item)**	1	Ea	$ 759.06	$ 759.06	$ 759.06	$ 759.06	$ 759.06	$ 759.06		
C3.4	Paving (to match existing Footpath) **(Provisional Item)**	1	Ea	$ 1,880.03	$ 1,880.03	$ 1,880.03	$ 1,880.03	$ 1,880.03	$ 1,880.03		
C3.5	Berm/Grass **(Provisional Item)**	1	Ea	$ 297.51	$ 297.51	$ 297.51	$ 297.51	$ 3,867.63	$ 3,867.63		
C3.5	Gravel	1	Ea	$ 311.03	$ 311.03	$ 311.03	$ 311.03	$ 311.03	$ 311.03	$ 311.03	$ 311.03
C4	**MISCELLANOUS**										
C4.1	Supply & Install Trafficable cover and lid for service connection/toby box	1	Ea	$ 622.96	$ 622.96	$ 622.96	$ 622.96	$ 622.96	$ 622.96	$ 622.96	$ 622.96
C4.2	Move service connection/toby box out of driveway **(Provisional Item)**	100%	LS	$ 875.19	$ 875.19	$ 875.19	$ 875.19	$ 875.19	$ 875.19		
C4.3	Cap & abandon existing lateral service connection **(Provisional Item)**	1	Ea	$ 182.00	$ 182.00	$ 182.00	$ 182.00	$ 180.00	$ 180.00		
	SEPARABLE PORTION C TOTAL (GST exclusive)				**$ 29,890.09**		**$ 29,890.09**		**$ 41,322.80**		**$ 6,193.28**