Tasman District Council

September 2024

Stormwater Monitoring Report 2023/24

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Stormwater Monitoring Report

1. Introduction/Summary

The stormwater quality team presents this first ever report on Stormwater Quality Monitoring.

The initial focus of stormwater quality monitoring is to establish the current condition of the receiving environment and the impact that stormwater discharges have on these. The efforts and achievements that have been made in this area form the content of this report. However, the wider monitoring requirements to measure progress towards the aspirations of the Stormwater Catchment Management Plans, are outside the scope of this report.

Over the past year, monitoring plans for the two largest urban areas have been developed and a monitoring network is being set up. The gathering of data has started but it is too early for there to be enough data to do robust data analysis and to report on trends.

1.1 Key achievements:

1. The first Stormwater Monitoring Plan was developed and signed off in 2023 for the Richmond UDA and monitoring commenced in this area in April 2023. Link to the Richmond Monitoring Plan: Richmond Stormwater Monitoring Plan.docx

2. The Motueka Stormwater Monitoring Plan was authorised by the Council's Monitoring and Enforcement Team Leader in May 2024 and monitoring had commenced in this area in November 2023. Link to the Motueka Monitoring Plan: Motueka Stormwater Monitoring Plan.docx

3. Half-yearly receiving environment monitoring has commenced at four sites in Richmond, at one site in Motueka and at one site in Mapua. This monitoring consists of sediment and water quality analysis, macro invertebrate sampling (MCI) and environmental DNA (E-DNA) sampling.

4. Rapid habitat assessments (RHA) for the above sites in point 3 were conducted.

5. Two continuous monitoring sites have been operational in Jimmy Lee creek in Richmond since September 2023. They record temperature, flow, as well as conductivity. This helps identify a range of discharge incidents that potentially contain contaminants.

6. A temperature logger has been installed in the upper catchment of Jimmy Lee Creek in Richmond in September 2023 and in Woodland Creek in Motueka in May 2024. This records continuous water temperature to help establish trends and range over time.

7. A baseline study has been conducted on the impacts of stormwater from Motueka on the enclosed part of the Moutere Estuary as well as at three stormwater outlets into the estuarine environment in Mapua. The final report was received in May 2024. This report can be accessed here: TDC sediment contaminants FINAL.pdf

8. Seven rounds of water quality monitoring during rain events have been carried out at a range of sites in Richmond and Motueka

9. Field measurements and observations are collected by our stormwater maintenance crew at 32 freshwater sites that are impacted by stormwater throughout the district's urban drainage areas at least four times a year.

10. A database that keeps track of stormwater improvement projects & actions and incorporates a scoring system measuring how these improvement projects contribute to the Catchment Management Plan aspirations is in development.

11. Fish barriers along the whole length of Reservoir Creek have been mitigated.

12. Investigative monitoring has led to the detection of illegal discharges and the source of pollution. Follow up actions ensure that these discharges will cease, and the cases help raise public awareness about the implications of stormwater pollution.

2. Monitoring Activity July 2023 to June 2024:

The initial aim of stormwater monitoring is to establish what state the receiving environment is in and what pressures the stormwater discharges exert on the receiving environment. Some aspects of this baseline monitoring will be carried out throughout our 6-year review period whereas other data is captured once and then repeated after six years. This will then help identify any trends of improvements or deterioration.

2.1 Richmond UDA

The Stormwater Monitoring Plan was approved by the Council's Monitoring and Enforcement Team Leader in October 2023

The map below Figure 1 shows the permanent stormwater monitoring sites in the Richmond UDA. Jimmy Lee Creek has been selected as the main receiving environment to monitor as it has well separated areas of land use along it. The upstream reaches have no urban stormwater discharges entering the stream and this is also where our upstream sampling site is located that provides a background reference. The next section downstream is dominated by residential development followed by the commercial town centre further downstream. Our second monitoring site sits at the border of those two in Washbourn Garden. The downstream monitoring site is located below the town centre within an industrial area but outside marine influences and unaffected by the tide. The fourth permanent sampling site is located in Borck Creek at Berryfield Bridge. The surroundings area has only recently been urbanised and greenfield development is ongoing upstream from our sampling site. Borck Creek itself is an artificially constructed stream and stormwater flood corridor. So, it is both a stormwater asset and a receiving environment.

Over the past year, the following sampling has been conducted in the Richmond UDA:

	Permanent Monitoring Sites (Receiving environment)	Stormwater Asset Monitoring Sites (sites vary)	Industrial outfall sites into stormwater network (sites vary)
Water Quality (Dry weather)	x		
Water Quality (Rain events)	x	x	x
Investigative Monitoring		x	x
Continuous Monitoring	x		
Sediment Quality	x		

Macro invertebrate count	x		
E-DNA Sampling	x		
Rapid Habitat Assessments	x		
Downer Field observations (see section 2.3.4 for what is monitored)	x	x	

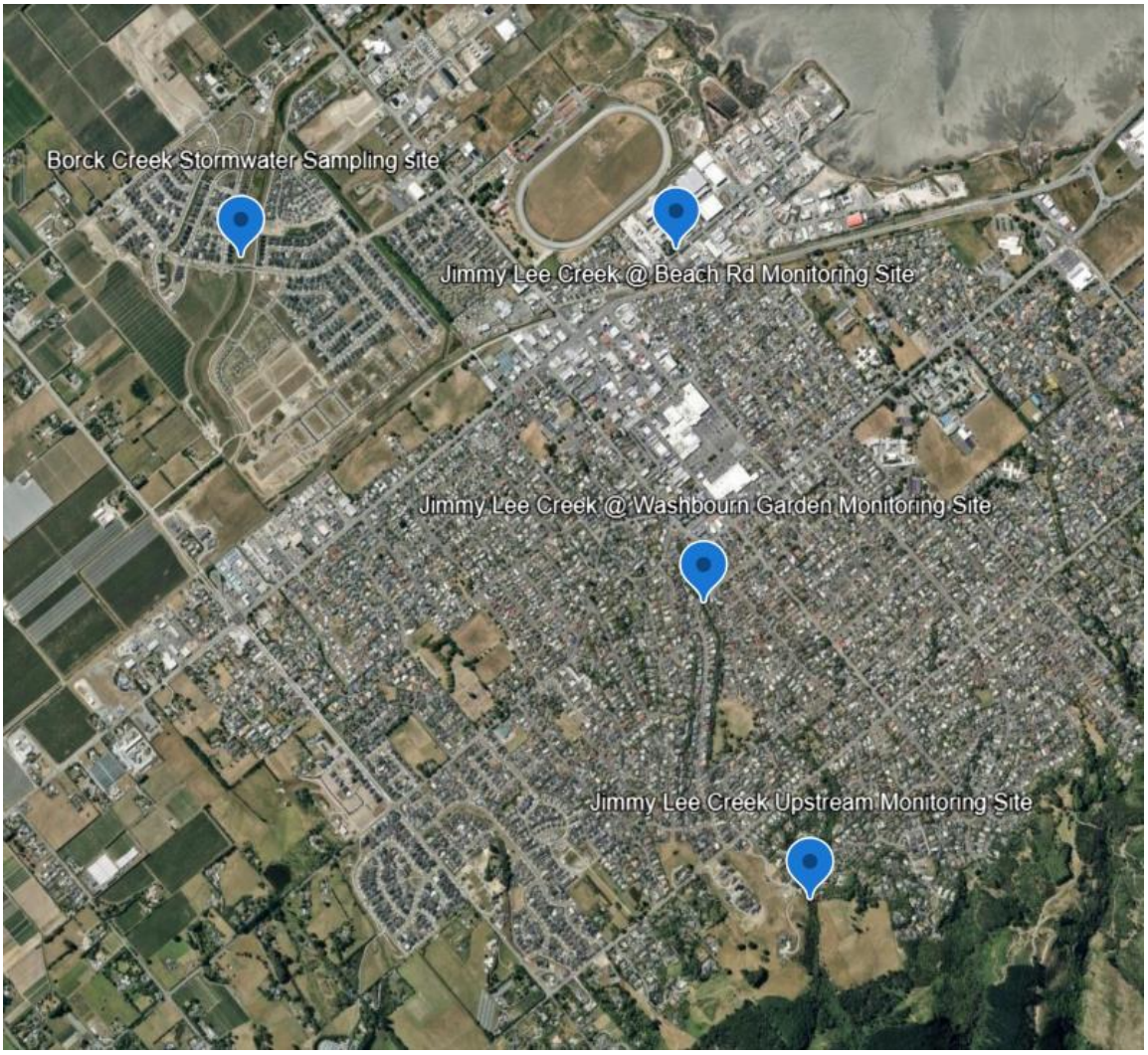


Figure 1: Permanent Monitoring Sites in the Richmond UDA

2.1.1 Water Quality Monitoring (dry weather) Richmond UDA:

An initial round of in-depth water quality monitoring was carried out at all three sites in Jimmy Lee Creek in Autum 2023 and in Borck Creek in Autum 2024. These are then followed by a less extensive analysis every six months. In total, three rounds have been completed for the Jimmy Lee Creek site and one round for Borck Creek.

The parameters analysed were:

Extended First round (to be repeated every 5 years)	Basic Round (every 6 months)
E.coli	E.Coli
Turbidity	Turbidity
Conductivity	Conductivity
pH	pH
Total Suspended Solids (TSS)	TSS

Metals (Total Recoverable and dissolved): Cu, Cd, Pb, As, Zn, Al	Metals (Total Recoverable): Cu, Zn
Nutrients: NO_3-N, NO_2-N, NH_4-N, DIN, TON, TN, TP, DRP	Nutrients: NO_2, NO_3, NH_4
Total organic Carbon (TOC)	
Total petroleum hydrocarbons (TPH)	TPH
Hardness	

Results for the Richmond Sites:

Site	Sample Type	Date	TPH (Total) (| Al (T	Al (dis	As (T	As (diss)	Cd (TF	Cd (dis	Cu(TF	Cu (dis	Pb (T	Pb (diss	Phosphorus (TR)	Zn(T	Zn (dis	Total Nitrogen	Total Org Carl	Carbon:Nitrogen	turbidit	pH	TS	Total Hardness	Calcium (dis	Magnesium	Total NH4	No2	No3	No3+No	DRP	e.co
Jimmy Lee @ Beach Rd	Aqueous	15/06/2023	0	0.039	0.006	0	0	0	0	0.0008	0	0	0	0.024	0.022	0.0197	3.2	2.1		1.16	7.9	0	86	19.7	8.8	0	0.005	2.9	2.9	0.197	80
Jimmy Lee @ Washbourn	Aqueous	15/06/2023	0	0.09	0.006	0	0	0	0	0.0008	0	0.0002	0	0.026	0.007	0.0034	2.2	3.4		2.2	7.9	0	94	23	8.7	0.013	0.002	2	2	0.022	47
Jimmy Lee Crushendall Rise	Aqueous	15/06/2023	0	0.05	0.01	0	0	0	0	0	0	0	0	0.033	0	0	2.3	2.5		1.67	7.9	0	83	21	7.4	0	0	2.1	2.1	0.029	4
Jimmy Lee @ Beach Rd	Aqueous	25/10/2023	0.3	0.013	0.031	0	0	0	0	0.0168	0.0014	0.0002	0.0001	0.039	0.059	0.045	0.045	3.1		2.2	8	0	83	19.3	8.5	0	0.01	2.1	2.1	0.029	150
Jimmy Lee @ Washbourn	Aqueous	25/10/2023	0	0.039	0.004	0	0	0	0	0.0009	0	0	0	0.027	0.029	0.027	1.56	0.8		1.1	7.9	0	105	26	9.6	0.018	0.008	1.32	1.33	0.022	240
Jimmy Lee Crushendall Rise	Aqueous	25/10/2023	0	0.029	0.005	0	0	0	0	0.001	0	0	0	0.037	0	0	1.44	0		0.96	8	0	119	31	9.9	0	0	0.96	0.96	0.04	7
Jimmy Lee @ Beach Rd	Aqueous	26/03/2024	0	0.0148	0.005	0	0	0	0	0.007	0.006	0	0	0.022	0.01	0.0087	2.4	1.1		0.48	8.2	0	90	17.7	11.2	0	0.012	2.2	2.2	0.0193	1000
Jimmy Lee @ Washbourn	Aqueous	26/03/2024	0	0.137	0.007	0	0	0	0	0.0012	0.0007	0.0004	0	0.061	0.01	0.0029	1.13	1.4		7.4	7.8	4	118	30	10.6	0.124	0.011	0.68	0.7	0.021	1200
Jimmy Lee Crushendall Rise	Aqueous	26/03/2024	0	0.04	0	0	0	0	0	0	0	0	0	0.053	0	0	0.49	1.4		0.65	8.1	4	146	38	12.4	0	0.001	0.4	0.4	0.053	160
Borck Creek @ Berryfield Bridge	Aqueous	30/04/2024	0	0.07	0	0	0	0	0	0.0008	0.0005	0	0	0.008				1.1		0.79	7.1	0	112	24	12.5	0.005	0.002	3.9	3.9	0.006	1

2.1.2 Sediment Quality Monitoring Richmond UDA:

At the same time as water quality monitoring was carried out (the first two rounds), sediment quality was also tested. Sediments are a good record of contaminants that have been introduced into the aquatic system over time. Sediment samples were collected from the top two centimetres of deposited sediments in the creek in accordance to the Ministry of Environment Sediment Assessment Methods Guide (Clapcott et al., 2011)

The parameters measured in sediments were:

Extended First round (to be repeated every 5 years)	**Basic Round (every 6 months)**
Metals (Total Recoverable): Al, Cu, Cd, Pb, As, Zn,	Metals (TR): Al, Cu, Cd, Pb, As, Zn
Nutrients: TN, TP,	Nutrients; TN, TP,
Grain size profile	Grain Size Profile
TOC	TOC
TPH	TPH
Semi volatile organic hydrocarbons (SVOC) including polycyclic aromatic hydrocarbons (PAH)	
Organochlorine and Organophosphorus Pesticides	

Of note were the following results:

- Metal concentrations were highest in the Beach Rd sample at the bottom of the catchment. Zn exceeded ANZ toxicant default guidelines with 700mg/kg dry weight (guideline values are: 200mg/kg for 95% species protection: 410mg/kg dry weight for 80% species protection (default guideline) dry wt. (Australian Government Initiative, 2024) None of the other contaminant tested values exceeded their corresponding guidelines.
- Hydrocarbons, traces of permethrin (a pesticide) & plasticisers were found in sediments at the Beach Rd site.

Permanent Sampling sites results

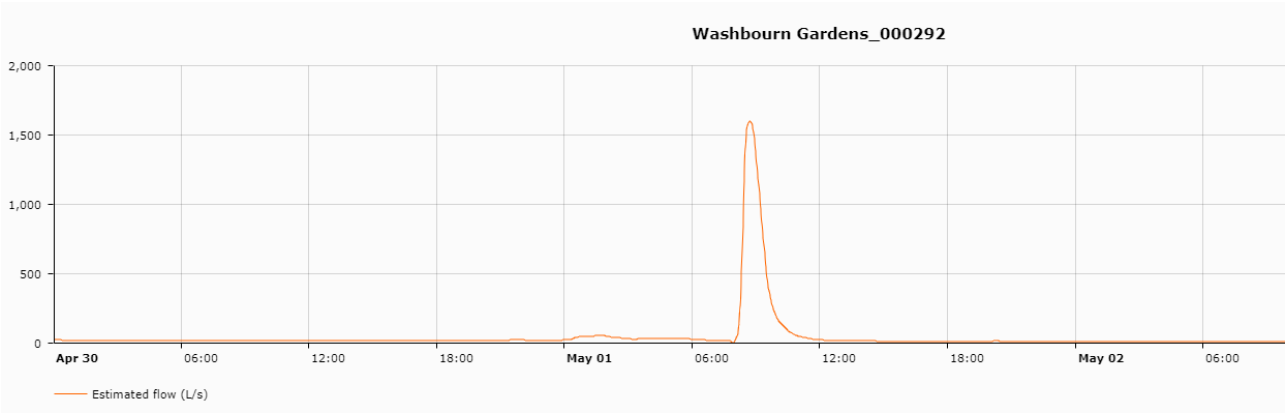
Site	Sample Type	Date	TPH (Total) (	Al (T	Al (dis	As (T	As (diss)	Cd (TF	Cd (dis	Cu(T	Cu (dis	Pb (T	Pb (diss	Phosp orus (TR)	Zn(	Zn (dis	Total Nitroge n	Total Org Carl	Carbo n:Nitr oge	Organophonitro &posporus Pesticides Detect	SVOC
Jimmy Lee @ Beach R	Sedimen t	15/06/2023	139	20000		8		0.14		33		68		560	700		0	0.76	16.8	Permethrin (0.017mg/kg dry wt)	Plasticiser (Bis92-ethlhexyl)phthalate (0.6 mg/kg dry wt)
Jimmy Lee @ Washbo	Sedimen	15/06/2023	0	154000		6		0		22		12.4		460	175		0	0.31	8.1	0	0
Jimmy Lee Crushenda	Sedimen	15/06/2023		163000		7		0		23		15.2		460	80		0.05	0.54	10.1		
Jimmy Lee @ Beach R	Sedimen	25/10/2023	0	17100		6		0.14		32		33		520	660		0.08	1.18	14.4		
Jimmy Lee @ Washbo	Sedimen	25/10/2023	0	14000		5		0		23		11.7		420	190		0	0.41	10.1		
Jimmy Lee Crushenda	Sedimen	25/10/2023	157	17400		6		0		23		14.4		570	77		0.08	0.99	12		
Borck Creek @ Berryfi	Sedimen	30/04/2024	0	24000		5		0		30		9		610	82		0.13	1.19	9.1		

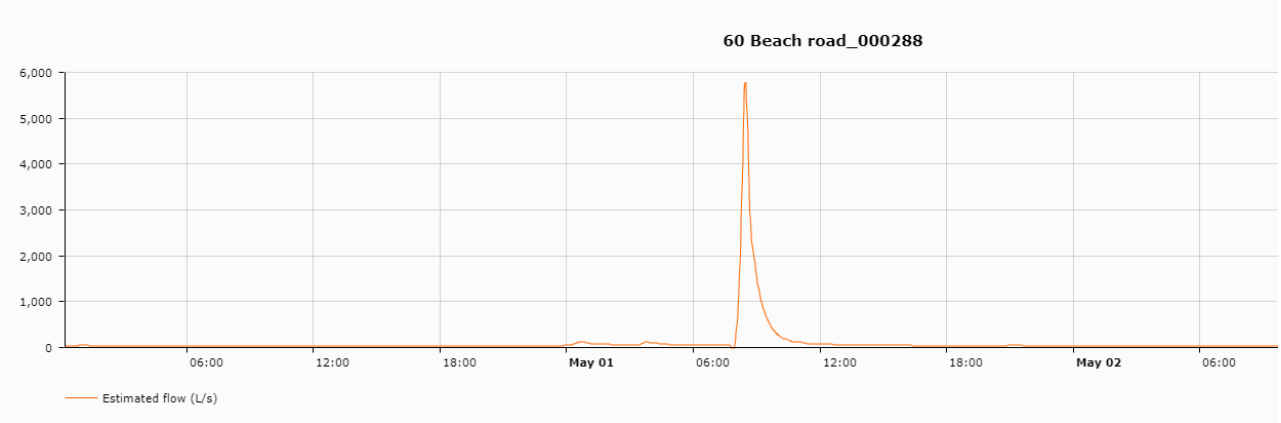
2.1.3 Continuous Monitoring Richmond UDA:

Two continuous monitoring stations which broadcast the data every 15 minutes have been set up in Jimmy Lee creek and have been gathering information since September 2023 (Figure 2). This data has given us some good insights in understanding how flow and conductivity are affected during rain events, but also in detecting illegal discharges. So far, these monitoring sites have alerted the council to a range of contaminated water discharges including swimming pool water containing chlorine or salt, cleaning agents and food processing waste. Due to having some alerts set up at the monitoring stations, some of these could be detected and then traced back to the source. Conductivity has been the main parameter that is used to create these alerts. Conductivity in a waterway is relatively stable at a given location but many discharges do increase the conductivity in water significantly.

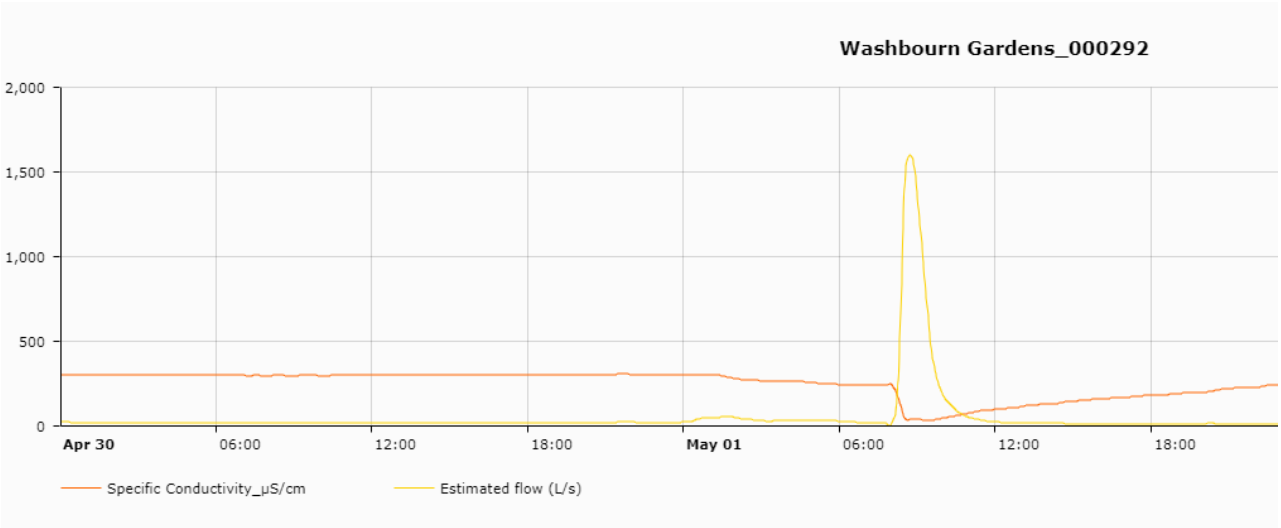
Figure 2 Beach Rd continuous monitoring site

During rain events a very steep hydrograph can be observed with surprisingly high flows: The below graphs show the hydrographs at both of our continuous monitoring stations for the rainfall event of the 01/05/2024 which had a peak intensity of 12.5 mm/hr, measured at the nearest rainfall gauge (Richmond TDC office).

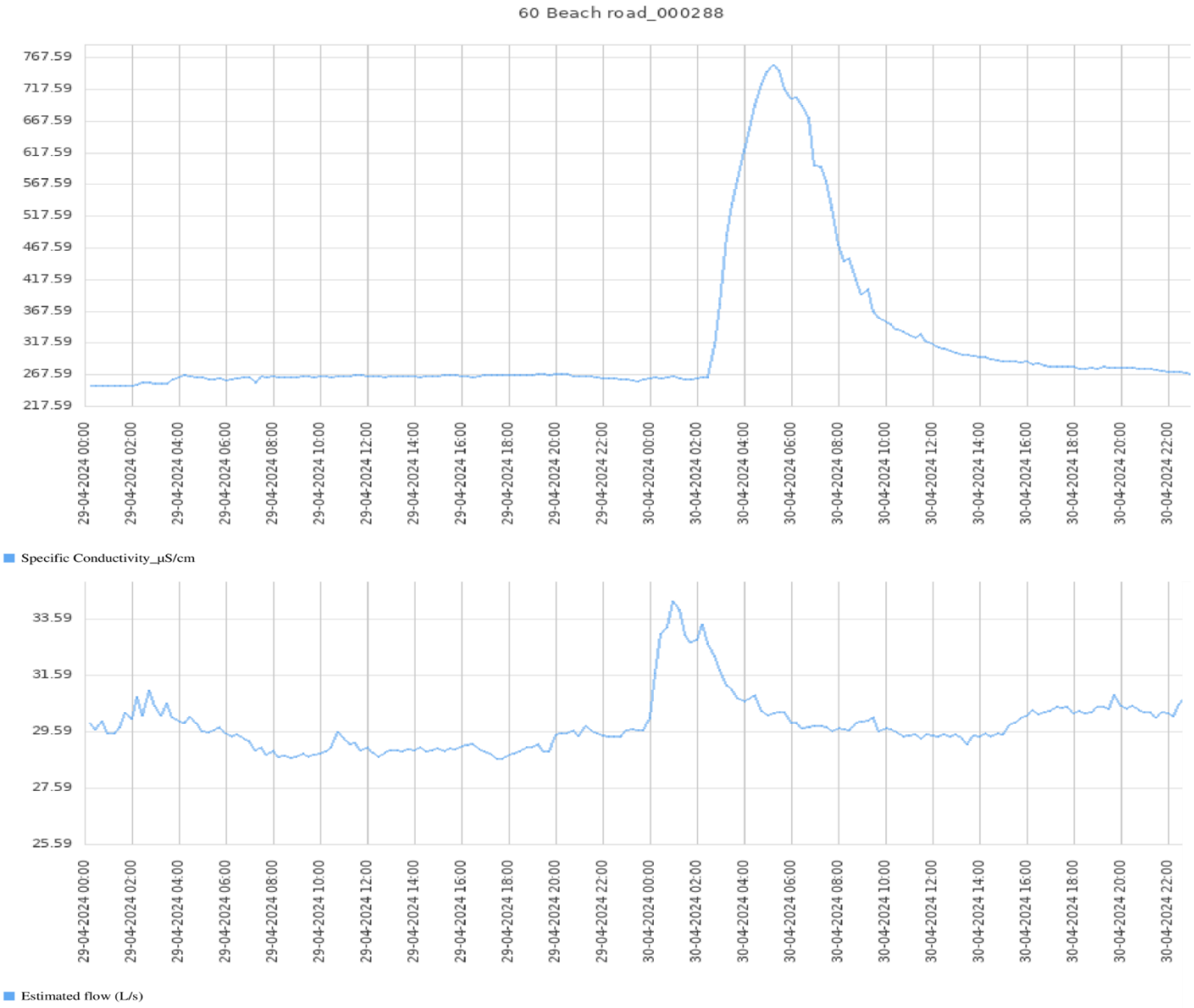




It was observed that conductivity drops when flows increase due to rainfall:



The graphs below show how a contaminated discharge may be detected: Increased conductivity with increased flow but no rain:



Statistics for 29/09/23 to 30/6/24	**Beach Rd**	**Washbourn**
Average Flow	56.7 l/s	16.7
Average Dry weather flow : Any flow below 70l/s (Beach Rd) or 30 l/s (Washbourn)	32.3 l/s	10.0
Max. Peak Flow	9396 l/s (	2251
Minimum Flow	15.5	5.5
Average Conductivity	245 microS/cm	271
Average Dry Weather Conductivity	253	277
Max. Conductivity	756	437
Min. Conductivity	22	20
Detected Discharge Events: Beach Rd: Conductivity above 300: Washbourn: Conductivity above 320	22 October 27/28 October 30-31 October 2 November 14/15 November 28 November	10 October 25 October 31 October 27/28 November 30 Nov to 1 Dec 5 December

	30 November 15 December 9 January 10/11 February 9 March 30 April 4 June 19 June	14/15 December 11 Feb 20/21 Feb 27 -31 May
Rainfall events		
Average Water Temperature	16.5	15.8
Average Dry Weather Temperature	16.7	16.1
Min Temp	8.8	7.3
Max Temp	24.9	25.2

2.1.4 Rain Event Monitoring Richmond UDA:

Seven rounds of rain event monitoring were carried out in Richmond. For rain events to qualify, they had to have at least a one week of prior dry weather.

First flush samples were collected using Nalgene stormwater sampling bottles. See Figure 3Figure 4.They were placed 2cm above the current water level in a water body or suspended from the grill in a sump as pictured in Figure 4 and Figure 5, Once they filled up they self-sealed and then were collected following the rain event, or when the water subsided so that it was safe to collect them.

Figure 3: Nalgene Stormwater Sampling Bottle (self-sealing)

Figure 4: Stormwater sampling bottles installed in a Roadway Sump

Figure 5: Stormwater sampling bottles installed in an open waterway

These first flush samples were analysed in the laboratory for a range of parameters including total suspended solids, heavy metals, hydrocarbons and E. coli.

First flush is the runoff that is likely to carry the highest contaminant load. There is also a high variability in stormwater contamination levels due to the many environmental factors that affect it. The initial rounds of rain event sampling are mainly to gain an approximate understanding of stormwater pollution. Copper and Zink are very high in almost all samples. They originate mainly from galvanised roofs, car brake linings and tyre wear. They do accumulate in the receiving environment. E. coli levels were highest in open waterways at the bottom of the catchment.

Hydrocarbons are sometimes captured, however, due to the sampling mechanism and bottles being plastic, hydrocarbon results need to be treated with caution; it is expected that they are higher than the results indicate.

Rain Event Monitoring Results					80% Level of species protection							
summary for yearly report 2024					0.14	0.04	0.0025	0.012	0.031			
					95% Level of species protection							
					0.013	0.001	0.0013	0.0034	0.008			
Sampling site	Sampling Date	Turbidity (ntu)	Conductivity (mS/m	TSS (g/m^3)	As(TR) (g/m3)	Cr(TR)(g/m3)	Cu (TR) (g/m3)	Pb (TR)(g/m3)	Zn (TR) (g/m3)	E.coli (cfu/100ml)	TPH Total (C7-C36)(g/m3)	pH
RW Poutama Ck @ 43 Oakdale Gr	28/08/2023	43	24	92	0.0012	0.0104	0.0052	0.00186	0.05	58	0	
SW Gladstone Rd @ 18 Gladstone Rd	28/08/2023	122	15.2	138	0.0019	0.0081	0.0183	0.0035	0.121	10	0	
SW Residential Catchment @Cemetery	28/08/2023	18.9	20.2	46	0	0.00096	0.0022	0.00051	0.058	2	0	
RW Poutama Ck @ 43 Oakdale Gr	4/09/2023	16.7	15	30	0	0.0041	0.0034	0.00072	0.037		0	
SW Gladstone Rd @ 18 Gladstone Rd	4/09/2023	470	14.9	400	0.0058	0.035	0.053	0.016	0.48		1.5	
SW Residential Catchment @Cemetery	4/09/2023	6.7	15.6	19	0	0.00072	0.0027	0.00034	0.045		0	
RW Poutama St Catchment @ Outlet	4/09/2023				0.0029	0.0095	0.0195	0.008	1.21		0	
RW Poutama Ck @ 43 Oakdale Gr	22/09/2023	4.6	20.2	7	0	0.00128	0.00142	0.00023	0.066			7.6
SW Gladstone Rd @ 18 Gladstone Rd	22/09/2023	157	18.5	104	0.0024	0.0108	0.022	0.0048	0.19			7.5
SW Residential Catchment @Cemetery	22/09/2023	0.69	23.8	5	0	0.00063	0.00069	0.00019	0.045			7.8
RW Poutama St Catchment @ Outlet	22/09/2023	12.9	22.2	21	0.0142	0.0067	0.0144	0.005	1.71			7.1
SW 10 Gladstone Rd Outlet ot Railway Reserve	18/01/2024	152	35.6		0.0061	0.0156	0.043	0.0159	0.5			7.5
SW 66 Gladstone Rd Outlet to Railway Reserve	18/01/2024	144	11.8		0.0137	0.04	0.046	0.0131	0.93			7.8
RW Jimmy Lee Ck @ 42 Beach Rd	26/01/2024	5.5	26	26	0.0017	0.003	0.005	0.0026	0.177	39000	0	
RW Jimmy Lee @ Washbourn Gardens	26/01/2024	14	31.6	53	0.0022	0.0039	0.0107	0.0048	0.22	7700	0	
RW Jimmy Lee Ck @ 42 Beach Rd	15/04/2024	31	12.9	157	0.0056	0.0164	0.046	0.037	1.11			
RW Jimmy Lee Ck @ Washborun Gardens	10/06/2024	40	31.3	330	0.0026	0.0055	0.0119	0.0072	0.25	400	0	
RW Jimmy Lee Ck @ 42 Beach Rd	10/06/2024	20	13.8	87	0.0024	0.0041	0.0109	0.0061	0.32	22000	0	
SW 10 Gladstone Rd Outlet to Railway Reserve	10/06/2024	148	10.9	220	0.0022	0.0133	0.0177	0.0105	0.48	300	0.4	

They above table shows the rain event sampling results: The 80 and 95% species protection levels refer to the official Australian and New Zealand freshwater quality guidelines and indicate what percentage of species are likely to survive up to this limit of contamination (Australian Government Initiative 2024).

2.1.5 Investigative Monitoring Richmond UDA

Investigative monitoring has been conducted in response to some suspicious discharges or complaints against individual businesses as well as to understand the nature of different discharges arising from a range of land uses. This monitoring goes hand in hand with the rain event monitoring; in fact, quite a few rain monitoring sites were chosen for investigative purposes.

Figure 6: A range of possible discharges that have been investigated as part of our monitoring programme in 2023/24

Areas of investigation focused on road runoff, industrial sites runoff, and wastewater contamination due to leaks.

The wastewater contamination issue was investigated in a separate project run by the Environmental Information team. The report has not yet been finalised.

Three rounds of road runoff sampling have been carried out. As expected, Zn & Cu levels were high as well as TSS. Visually the sump water samples were grey black.

Stormwater outlets from a concrete manufacturer and a car mechanic workshop led to some further environmental compliance team led investigations. This was also the case for multiple discharges that had been observed in our stormwater network either by the public or our stormwater maintenance team from Downers.

A comparative study of a residential, an industrial and a roading stormwater catchment helped decide on the prioritisation, location and type of a treatment device that is now being implemented at the stormwater outlet of Poutama Street.

2.1.6 E-DNA sampling Richmond UDA:

Environmental DNA (E-DNA) Sampling was carried out at all four permanent sampling sites and some of the highlights discovered were:

- Longfin Eels found at all sites sampled
- Shortfin Eels found throughout the Jimmy Lee catchment but lower numbers in the upper catchment. Longfin and Shortfin Eels are found in Borck Creek
- Redfin Bullies, Common Bullies & Inanga found only at the downstream site (Beach Road).
    - The lack of native fish at the top of a catchment where the habitat is least degraded is a strong indication that fish barriers are preventing migratory fish from reaching these sections of the stream.
- Pest Fish: No Gambusia have been detected in the Jimmy Lee Catchment but some DNA of Clown Loach in the downstream sample. Gambusia have been detected in Borck Creek.
- Argentine Ant DNA was present at Washbourn as well as at Beach Rd indicating this pest species is present in the Jimmy Lee Creek vicinity.
- Rat DNA was found throughout the catchment with high numbers of Black Rats in the upstream catchment and High numbers of Norway Rat DNA in the Beach Rd samples. In Borck Creek, Norway Rat DNA was also detected.
  All our E-DNA results are publicly available on the Wilderlab website: Explore — wilderlab (https://www.wilderlab.co.nz/explore)

2.1.7 Macro Invertebrate Sampling Richmond UDA:

Three rounds of sampling have been carried out to date.

Jimmy Lee @		June 2023	October 2023	March 2024	April 2024
Beach Rd (downstream Site)	MCI	64	61	59	
	QMCI	2.14	2.81	2.93	
Washbourne	MCI	83	76	114	
	QMCI	2.26	3.99	6.08	
Cushendall (Upstream Site)	MCI	126	120	65	
	QMCI	7.37	6.68	3.86	
Borck Creek at Berryfield Bridge	MCI				65
	QMCI				3.66

The Macroinvertebrate Community Index (MCI) and Quantitative Macroinvertebrate Community Index (QMCI) are slightly different ways of scoring the diversity and abundance of macroinvertebrates that were counted at each site. Generally, the higher the Index, the better the health of a waterway: Stark (2007) suggests the following interpretation (Figure 7):

Table 2. Interpretation of MCI-type biotic indices

Stark & Maxted (2004, 2007) quality class	Stark (1998) descriptions	MCI MCI-sb	SQMCI & QMCI SQMCI-sb & QMCI-sb
Excellent	Clean water	> 119	> 5.99
Good	Doubtful quality or possible mild pollution	100–119	5.00–5.90
Fair	Probable moderate pollution	80–99	4.00–4.99
Poor	Probable severe pollution	< 80	< 4.00

Figure 7 MCI scoring reference (LAWA, 2024)

The national bottom line for MCI is a score of 90, so the scores for the two downstream sites as well as the Borck creek site fall below that value (LAWA 2024)

The absence of a diverse Macroinvertebrate Fauna in the mid and lower catchment is likely an effect of the heavily modified stream system; all of it has been straightened, approximately 1.5km's of it are piped and the other parts are heavily rock armoured or retained with concrete or treated timber.

Pollutant runoff and a highly flashy hydrological regime (high peak flows with a short duration in response to a rainfall event) also makes it very difficult for native macroinvertebrate and fish to thrive.

2.1.8 Rapid Habitat Assessment

Rapid Habitat Assessments were completed for all four permanent sites (Jimmy Lee Creek Sites May 2023, Borck Creek Site, May 2024) These assessments will be repeated for Catchment Management Plan Review that happens every six years. A Rapid Habitat Assessment quickly evaluates stream habitat quality by visually inspecting factors like bank structure, stream bed composition, and riparian vegetation to assign a habitat quality score. It's a concise method that combines physical observations with water quality indicators to gauge the overall health of aquatic environments (Cawthron 2024)

Site	RHA Score	The RHA is scored out of 100, so the closer the score is to 100, the better the stream condition.
Jimmy Lee Creek @ Beach Rd	36	
Jimmy Lee Creek @ Washbourn	41	
Jimmy Lee Creek @ Cushendall Rise	92	
Borck Creek @ Berryfield Bridge	64	

2.2 Motueka UDA

The Stormwater Monitoring Plan was approved by Compliance in May 2024

Motueka is very flat and has no rivers or creeks flowing through it; a few small creeks have their sources within the stormwater UDA and are only fed by groundwater or stormwater. They are all tidally influenced and dry up at their upstream reaches during summer. Most of the monitoring methods are targeted either at freshwater streams flowing permanently or estuarine environments which makes monitoring in these streams difficult.

The estuaries surrounding Motueka have been identified as primary receiving water bodies and are the focus for a baseline study. We are trialling one site for freshwater monitoring in Woodland Creek.

Over the past year, the following sampling has been conducted in the Motueka UDA:

	Permanent Monitoring Sites Receiving environment	Stormwater Asset Monitoring Sites (sites vary)	Industrial outfall sites into stormwater network (sites vary)
Water Quality (Dry weather)	x		
Water Quality (Rain events)	x	x	x
Investigative Monitoring		x	x
Sediment Quality	x		x
Macro invertebrate count	x		
E-DNA Sampling	x		
Rapid Habitat Assessments	x		
Downer Field observations	x	x	
Estuarine Sediment Quality	x		

2.2.1 Water Quality Monitoring Dry Weather

One round of water quality monitoring in Woodland Creek has been completed for Motueka. The same parameters and approach applies as for the Richmond permanent sites in point 2.1.1

Permanent Sampling sites results

Site	Sample Type	Date	TPH (Total)	Al (T	Al (dis	As (T	As (diss)	Cd (T	Cd (dis	Cu(T	Cu (dis	Pb (T	Pb (diss	Phosphorus (TR)	Zn(T	Zn (dis	Total Nitrogen	Total Org Carl	Carbon:Nitrogen	turbidit	pH	TS	Total Hardness	Calcium (dis	Magnesium	Total NH4	No2	No3	No3+No	DRP	e.co
Woodland Ck 40 Sanderlane	Aqueous	30/10/2023	0	0.0081	0.003	0	0	0	0	0.0009	0.0008	0.0001	0	0.016	0.03	0.031	1.05	0.8		0.53	7.2	0	86	16.8	10.8	0.007	0.01	0.94	0.95	0.0082	390

2.2.2 Sediment Quality Monitoring

A comprehensive study was conducted on the effects of stormwater discharges to the enclosed part of the Moutere Estuary. See Figure 8 for the monitoring sites that were chosen and its associated stormwater catchments. Figure 10 Shows a table of the main laboratory results. The colour coding relates to the state on the ecological impacts for each

contaminant at each site.

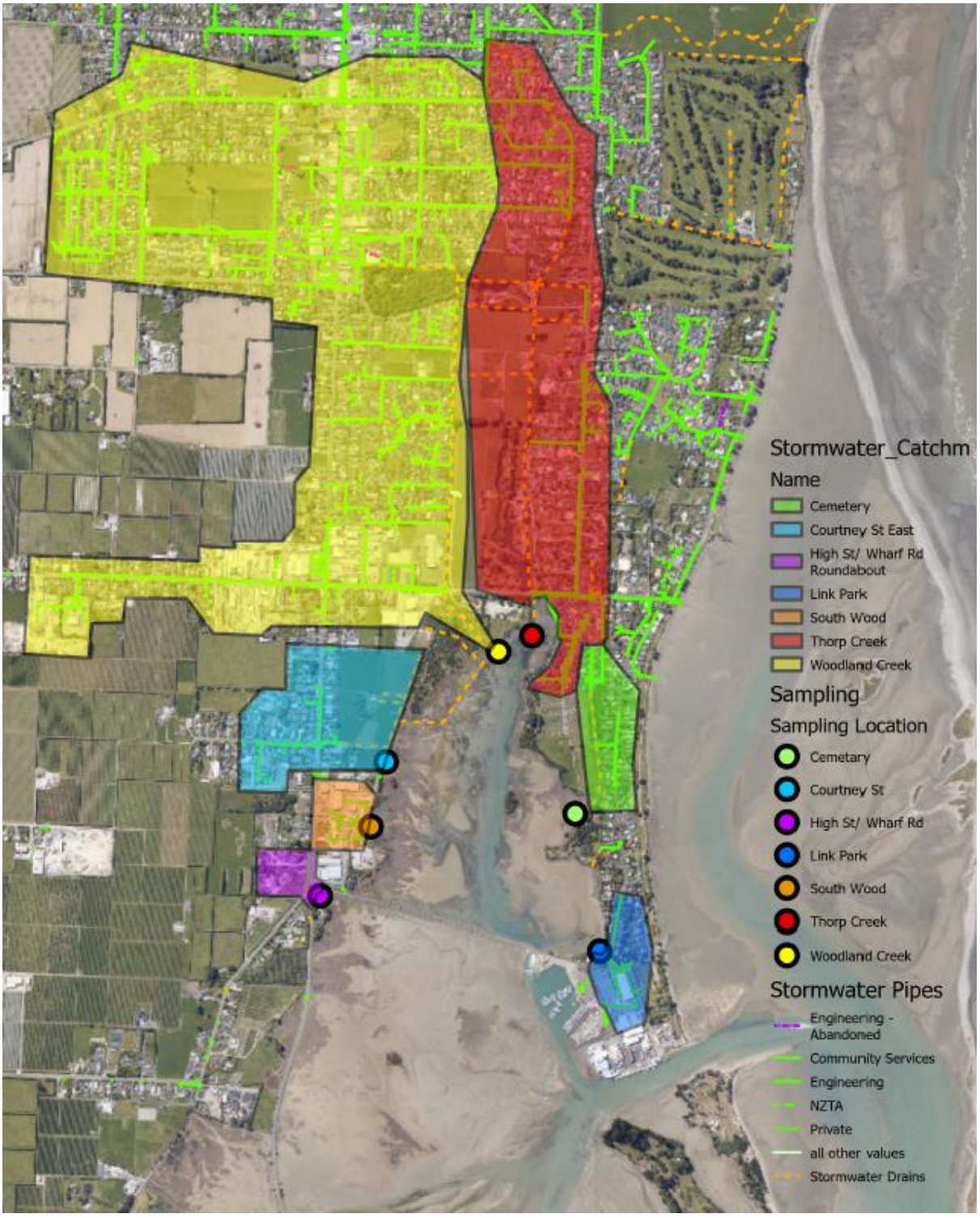


Figure 8 Motueka Estuary sampling sites with associated stormwater catchments

It found that for most sites, levels of stormwater-related contaminants in estuarine sediments near the sampled outlets were below the Default Guideline Values (DGV) for adverse ecological effects, however there were some detections of emergent contaminants (Plasticisers were detected at a couple of sites). The report suggests that it is likely that levels of some contaminants such as plasticisers, Cu, & Zn will increase and suggests repeating the sampling in five years.

Figure 9 Sediment sampling in the Moutere Estuary February 2024

Very Good | Good | Fair | Poor

Analyte	Units	01-Thor-M	02-Wdck-M	03-Cour-M	04-Sowo-M	05-Whrd-M	06-Ceme-M	07-Link-M	08-RefA-M	09-RefB-M	10-Seat-W	11-Morl-W	12-Aran-W	13-RefD-W
Grain size, trophic state indicators and metals														
Mud	%	75.9	77.5	84.5	67.7	80.2	42.0	45.7	34.7	21.2	21.4	7.4	66.9	59.0
aRPD	mm	2	2	-	-	0	-	3	10	3	5	5	-	-
TOC	%	1.58	1.87	1.94	2.10	3.20	0.26	1.09	0.40	0.26	0.32	0.32	0.85	0.48
TN	mg/kg	1700	2000	1800	1400	2100	< 500	1000	600	< 500	< 500	< 500	900	600
TP	mg/kg	680	760	850	640	830	620	590	570	450	510	360	690	500
As	mg/kg	5.8	7.6	6.4	25.0	5.5	7.5	5.4	4.7	5.3	3.7	2.4	7.6	5.7
Cd	mg/kg	0.061	0.077	0.052	0.063	0.052	0.013	0.039	0.027	0.012	0.015	0.017	0.023	0.020
Cr	mg/kg	40	44	36	133	44	30	35	34	29	25	25	52	58
Cu	mg/kg	18.6	24.0	16.9	134.0	32.0	6.2	19.3	9.1	6.9	4.8	4.9	14.7	11.2
Hg	mg/kg	0.03	0.04	0.04	0.03	0.04	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.03	0.03
Pb	mg/kg	12.2	15.6	22.0	27.0	87.0	6.4	10.9	5.6	4.7	3.8	3.5	11.4	7.5
Ni	mg/kg	54	61	39	43	51	49	55	81	67	63	80	76	95
Zn	mg/kg	78	120	117	240	200	41	74	38	33	35	33	63	45
Semivolatile organic compounds														
DDD	ug/kg	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
DDE	ug/kg	< 2	< 2	1.03	< 2	2.50	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
DDT	ug/kg	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Total DDT	ug/kg	< 2	< 2	1.03	< 2	2.50	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Chlordane	ug/kg	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Endrin	ug/kg	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Dieldrin	ug/kg	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Lindane	ug/kg	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Total PAHs	ug/kg	304	326	149	133	269	< 2	183	< 2	< 2	< 2	< 2	< 2	< 2
Bis(2-ethylhexyl)phthalate	ug/kg	< 500	< 500	< 500	< 500	937.5	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500
Di(2-ethylhexyl)adipate	ug/kg	< 200	160.4	< 200	< 200	< 200	< 200	< 200	< 200	< 200	< 200	< 200	< 200	< 200

< All values below lab detection limit

Comparison of results against ratings for ecological health

Figure 10: Summary of laboratory results

Sediment

2.2.3 Continuous Monitoring:

A temperature logger has been installed in June 2024 in Woodland creek and so far, is the only continuous monitoring in the Motueka UDA. No data has been collected yet.

2.2.4 Rain Event Monitoring:

A first round of rain event monitoring has been carried out in June 2024. The table below shows the results:

Rain Event Monitoring Results												
summary for yearly report 2024					80% Level of species protection							
					0.14	0.04	0.0025	0.012	0.031			
					95% Level of species protection							
					0.013	0.001	0.0013	0.0034	0.008			
Sampling site	Sampling Date	Turbidity (ntu)	Conductivity (mS/m	TSS (g/m^3)	As(TR) (g/m3)	Cr(TR)(g/m3)	Cu (TR) (g/m3)	Pb (TR)(g/m3)	Zn (TR) (g/m3)	E.coli (cfu/100ml)	TPH Total (C7-C36)(g/m3)	pH
SW 27 Huffam St Sump	10/06/2024	76	18.9	250	0.0146	0.022	0.045	0.031	0.95	130	0.4	
SW Motueka Library Carpark Sump	10/06/2024	98	25.7	380	0.0047	0.0146	0.069	0.0161	0.54	1900	3.8	
RW Woodland @ New World outlet	10/06/2024	13.7	6.7	51	0.0027	0.0043	0.075	0.0039	0.56	3	0	
RW Woodland @ Avalon Court Bridge	10/06/2024	15.3	7.3	43	0.0014	0.0016	0.0123	0.0057	0.33	700	0	
RW Woodland @ Avalon Court Bridge	10/06/2024	8.8	2.3	16	0.002	0.0013	0.0037	0.0038	0.122	600	0	

2.2.5 Investigative Monitoring

Some investigative sediment sampling has been conducted in the top end of Woodland Creek. Levels of Hydrocarbons (TPH) and Zinc were above the guideline values for TPH at one site and Zn for both sites. (The corresponding limits are: TPH: 550mg/kg dry weight and Zn: 410mg/kg dry weight).

Site	Sample Type	Date	TPH (Total) (C7-C36	Cu(TR)	Zn(TR)
Woodland Creek @ New World Outlet	Sediment	30/10/2023	1180	41	570
Woodland Creek @ Avalon Court Bridge	Sediment	30/10/2023	200	94	920

The estuary sediment study has led to some investigation at a timber treatment plant. The council compliance team has taken over this case and investigations are ongoing.

2.2.6 E-DNA Sampling

E-DNA analysis has been carried out at our permanent site in Wooldand Creek at 40 Sanderland Drive.

The Wilderlab website: Explore — wilderlab makes our results publicly available and also shows a good visual representation of what they found: (see Figure 11).

High numbers of DNA were found from Inanga which is a good indicator that Woodland Creek is a spawning site for Inanga. Shortfin eel DNA is present in high numbers. There are lower numbers of Longfin Eels as well as some estuarine fish species present. This indicates that this site is tidally influenced.

Figure 11: Visual representation of the main species DNA that was detected in Woodland Creek

2.2.7 MCI results: Woodland Creek

These results should be treated with some caution as it is noted that it is occasionally flooded by saltwater during very large tides.

The second round of sampling was delayed for this site until June 2024 due to weather and water level conditions (results are still pending).

Woodland Creek @		
40 Sanderlane Dr October 2023	MCI	65
	QMCI	4.17
Avalon Court Bridge June 2023	MCI	78
	QMCI	3.66

Applying the J Stark interpretation as well as the NIWA bottom line as outlined in section 2.1.7 Woodland creek scores poor and below the national bottom line for stream health.

2.2.8 Rapid Habitat Assessment

A Rapid Habitat Assessment was completed for Woodland Creek in October 2023. The site scored 58 out of a possible 100. This assessment will be repeated for the Catchment Management Plan review that happens every six years.

2.3 Monitoring in other UDA's

While Catchment Management Plans and Monitoring plans have not been finalised for UDA's other than Richmond and Motueka, there have been opportunities to start monitoring at a range of locations across the district's UDA's.

2.3.1 Mapua UDA

Currently there is no Catchment Management Plan or associated Monitoring Plan in place for this UDA but it can be assumed that monitoring will follow a similar format to that in Motueka or Richmond. Therefore, it was decided to make a start on monitoring, especially combining the estuarine baseline study with the Motueka one made good sense.

2.3.2 Sediment Quality Monitoring

Three sites in the path of stormwater outlets were in the estuarine environment in Mapua. This study was carried out in conjunction with the Motueka estuarine study, and the results can be found in the same report (see above link). Also see Figure 12 for sampling locations and associated stormwater catchments and Figure 10 for a summary of laboratory results and how they impact the estuarine ecosystem at the tested level.

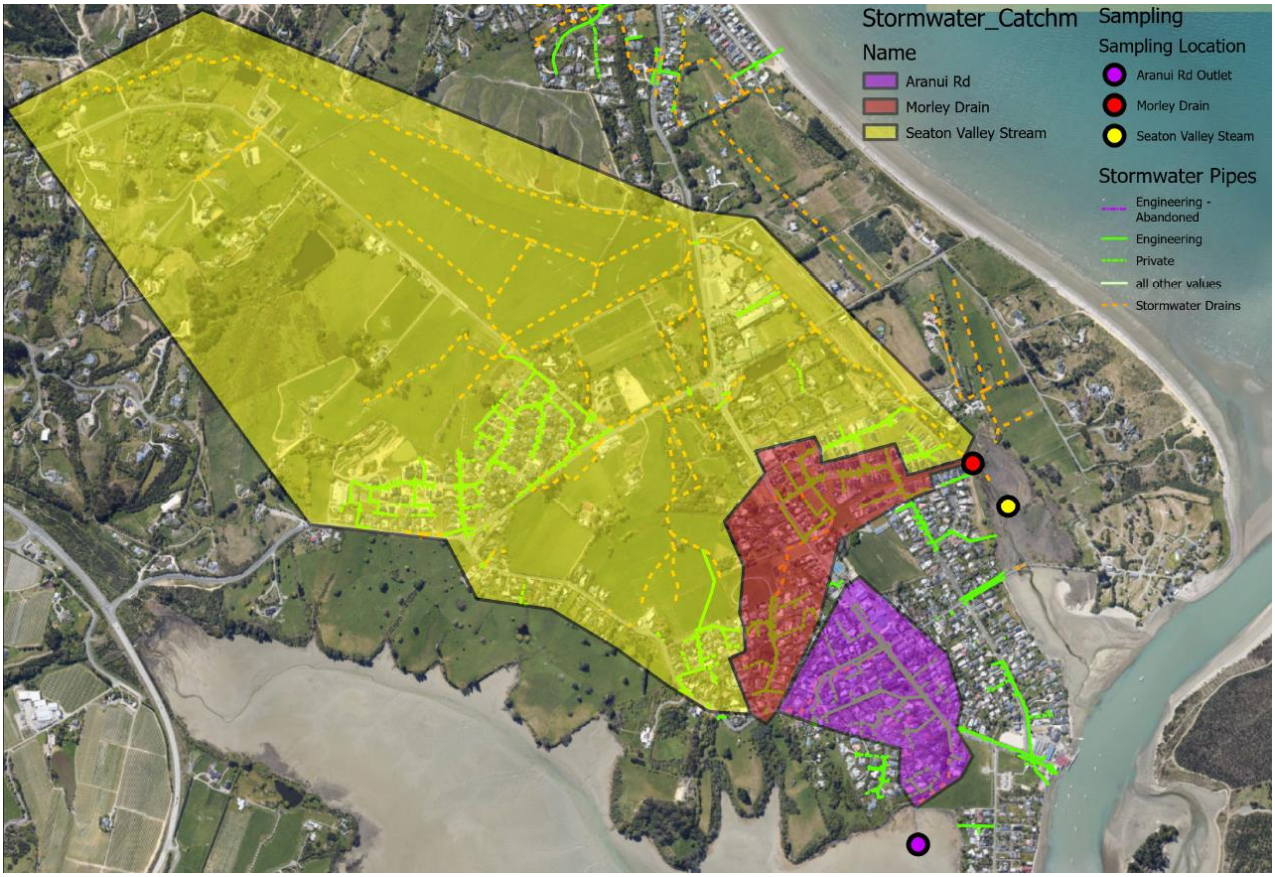


Figure 12 Mapua estuarine sampling sites with associated stormwater catchments.

2.3.3 Takaka Investigative Monitoring:

Following a fire at the ITM store and warehouse in Takaka town centre, the sediments at the outlet into the stormwater swale heading towards Motupipi steam were found to contain very high levels of Zink. Further testing at four locations downstream of the outlet in the swale were carried out to see if the Zink was likely to contaminate the stream. It was found that the sediments further downstream contained lower levels of Zn than those at the outlet:

12 April 2024	Outlet Motupipi St	D/S from Orange Mechanic	D/S from Waitipu Engineering	U/S of Motupipi Stream
Zn (sediment) mg/kg dry wt	1160	880	500	185
Zn (aqueous) g/m^3	0.159 (Dissolved) 0.175(Total)			0.0017 (Dissolved) 0.0064 (Total)

2.3.4 Downer district-wide monitoring:

36 monitoring sites have been selected across the district measuring environmental parameters by stormwater maintenance staff from our maintenance contractor using a portable sonde (measuring device) and visual observations.

Data collection started in November 2023.

The following table is an example of what gets measured at each site. Each site gets monitored at least four times a year. Once sufficient data has been collected, it can be analysed for trends and comparisons can be drawn.

Location	Murchison				
Site	RW Neds Ck @ 32 Hotham St				

Parameter	Units	08/11/23 8:19	07/12/23 10:25	08/02/24 10:38	12/03/24 9:38	30/04/24 10:09
Weather		Cloudy	Sunny	Cloudy	Cloudy	Cloudy
Last Rainfall	Days	1.0	0.0	4.0	4.0	1.0
Rainfall amount	mm	2.0	0.2	0.2	3.2	0.2
Water level		dry weather flow	dry weather flow	dry weather flow	dry weather flow	dry weather flow
Temperature	°C	13.5	13.8	16.2	14.2	10.7
Conductivity	µS/cm	142.5	152.0	154.0	149.8	151.8
Turbidity	ntu	0.5	7.9	2.6	3.9	1.2
Dissolved Oxygen	%	90.9%	77.0%	69.5%	68.8%	81.6%
pH		7.3	6.9	7.1	7.3	8.2
Photo downstream		Photo	Photo	Photo	Photo	Photo
Photo upstream		Photo	Photo	Photo	Photo	Photo
Comment		Turbidity is -0.54				
Total Filamentous Algae Cover	%	0.0%	0.0%	0.0%	0.0%	0.0%

3. Next Steps:

- Continue Monitoring at the existing permanent sites; but the Woodland Creek Site may have to be moved due to tidal influences.
- Rainwater monitoring: Have a targeted approach to site selection and repeat sampling the same sites three times to see if there is some consistency in the results. Look into ways of monitoring whole rain events using either Nalgene bottles or auto sampling equipment.
- Sediment quality monitoring at sites in the Waimea Estuary near Richmond stormwater outfalls.
- Ensure that high quality data is being collected by making certain that the equipment is calibrated correctly, and samples are collected in accordance with guidelines.
- Establish an improvement scoring system for the stormwater improvement register
- Carry out some continuous monitoring in Borck Creek and Reservoir Creek.
- Establish a monitoring programme for the Littatraps that have just been installed in the Richmond CBD
- Establish stormwater monitoring plans when Catchment Management Plans for remaining UDA's are finalised.
- Analyse and interpret continuous and field data as this data set grows

4. References:

Australian Government Initiative 2024. Australia & new Zealand: Guidelines for Fresh and Marine Water Quality, Toxicant Default Guideline values for sediment quality, Toxicant default guideline values for sediment quality (waterquality.gov.au) (https://www.waterquality.gov.au/anz-guidelines/guideline-values/default/sediment-quality-toxicants) (as viewed 12/07/2025)

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Stark JD, Maxted JR 2007. A user guide for the Macroinvertebrate Community Index. Prepared for the Ministry for the Environment. Cawthron Report No.1166. 58 p