02 October 2023

File Ref: OIAPR1274023063-16792

[redacted]

Tēnā koe [redacted]

Request for information 2023-235

I refer to your request for information dated 7 September 2023, which was received by Greater Wellington Regional Council (Greater Wellington) on 7 September 2023. You have requested the following:

"*I am eagerly anticipating the release of the report concerning the pollution of the Mangaone Stream, which includes the results of the stream pollution monitoring.*"

Greater Wellington's response follows:

Attached is the 2023 report as requested.

The report summarises contaminant levels in the lower Mangaone and Ōtaki River catchment (Katihiku and Pāhiko Streams). The report demonstrates that contaminants, particularly *E. coli*, were highest lower in the catchment. This was attributed to sandy soils and a high water table lower in the catchment which allow for *E. coli* to easily leach through the soil profile from the surrounding agricultural land and be carried to the stream via subsurface flow. Although faecal contamination and swimming water quality was the main driver for this sampling programme, this programme also revealed widespread nutrient pollution across the catchment.

If you have any concerns with the decision(s) referred to in this letter, you have the right to request an investigation and review by the Ombudsman under section 27(3) of the Local Government Official Information and Meetings Act 1987.

Please note that it is our policy to proactively release our responses to official information requests where possible. Our response to your request will be published shortly on Greater Wellington's website with your personal information removed.

Nāku iti noa, nā

Lian Butcher
Kaiwhakahaere Matua Rōpū Taiao| Group Manager Environment Group

MEMO

TO	Councillor Penny Gaylor, Fathima Iftikar, David Hipkins
COPIED TO	Evan Harrison, Andy Brown, Matt Hickman, Natasha Tomic, Barry Loe, Michele Frank, Shaun Andrewartha, Will Syben
FROM	Amanda Valois, Senior Freshwater Scientist
DATE	11 July 2023

FOR YOUR INFORMATION

Water Quality of the Katihiku, Pāhiko and Mangaone Streams

Background

The Kāpiti coast is well known for beautiful swimming beaches and scenic estuaries. However, coastal water quality is under threat from land-based pollution sources, which are often transported to the marine environment by streams and rivers. Te Horo Beach is a popular swimming beach which is been impacted by faecal pollution. Swimming water quality was generally good over the 2022/23 bathing period, with only one water quality exceedance recorded. However, the long-term grade for the beach is poor, i.e., the risk of illness is more than 10% from contact with the water due to high concentrations of faecal indicator bacteria.

There is a caution in place for Te Horo Beach in the area of the beach where the Mangaone Stream discharges. The Mangaone Stream, which drains a predominately low-lying pastoral catchment, is a significant source of faecal contaminants, sediment, and nutrients to the coast. This is evident in the water quality monitoring data for Mangaone Stream. Monthly monitoring of the Stream approximately 500 m from its discharge point to Te Horo Beach shows high concentrations of *Escherichia coli* (*E. coli*), dissolved reactive phosphorus (DRP), nitrate-nitrogen and ammonical-nitrogen, and low visual clarity (an indicator of suspended sediment).

The Katihiku and Pāhiko Streams emerge from wetland areas to the north of the Mangaone Stream. They transverse the Katihiku marae and flow into the Katihiku wetland before passing through floodgates and entering the Ōtaki estuary. Like the Mangaone Stream, the Katihiku and Pāhiko Streams cross agricultural lands. Coloured discharge had been noted in the Katihiku Stream on a number of occasions and reported as a potential source of contaminants.

There is strong community interest in understanding the sources of faecal contamination to Te Horo Beach as well as water quality issues more broadly in the Greater Ōtaki area. In June 2022, a collaborative water quality investigation was initiated on the Katihiku marae. This investigation was initiated due to observations of visible pollution in the Katihiku Stream.

Objectives

The purpose of this water quality investigation was to provide an understanding of the baseline water quality in the Katihiku, Pāhiko and Lower Mangone Streams to guide further management and/or monitoring actions.

The specific objectives of this investigation were to determine;

- the water quality contaminants present in these streams and their relationship to water quality guidelines;
- the concentrations of contaminants during low and high flows; and
- the potential for these streams to be a significant source of contamination to Te Horo Beach and the Katihiku wetland.

Methodology

Water quality samples were collected monthly from July to December 2022 from all sites on the Katihiku and Pāhiko Stream. The Mangaone Stream was not sampled in October and November.

Water samples were jointly collected by a member of the Katihiku hapu and Mountains to Sea Wellington (MTSW) and couriered that day to Hill Laboratories in Hamilton. Water samples were analysed using the Farm Surface Water testing suite at Hill Laboratories which measures: total nitrogen (TN), nitrate-nitrogen, total phosphorus (TP), dissolved reactive phosphorus (DRP), turbidity and *Escherichia coli* (*E.coli*)

Water quality variables were compared to the Australian and New Zealand Guidelines (ANZG) for Fresh & Marine Water Quality[1] and the Recreational Water Quality Guidelines[2] . These guidelines provide a starting point for assessing water quality and should be used with other lines of evidence in a weight-of-evidence process to determine if water quality represents a risk to a particular management value. *E. coli* concentrations were compared to 540 cfu/100 mL, which is where the risk of infection from primary contact is around 5 percent.

Results

A summary of the water quality results at each site is presented in Table 1. Water quality results were compared with ANZG Default Guidelines Values (DGVs) for River Environment Classification of Warm Wet Low Elevation (WW/L) streams. Median concentrations of every water quality variable at every site (except for Dissolved Reactive Phosphorus at site 0C6, the upper Mangaone site – highlighted in bold) exceeded the guidelines.

1 https://www.waterquality.gov.au/anz-guidelines/guideline-values/default
2 https://www.esr.cri.nz/assets/WATER-CONTENT/files/Recreational-Water-Quality-Guidelines-Update-September-2021.pdf

Table 1. Median values of turbidity (NTU), *E. coli* (cfu/100 mL), TN (mg/L), nitrate-nitrogen (mg/L), TP (mg/L) and DRP (mg/L) across the six monitoring sites. ANZG DGV's were exceeded at all sites except for DRP concentrations at OC6 (highlighted in bold).

	Turbidity	*E. coli*	TN	Nitrate	TP	DRP
DVGs	**5.2 NTU**	**540 cfu/100 mL**	**0.292 mg/L**	**0.065 mg/L**	**0.024 mg/L**	**0.014 mg/L**
Katihiku Stream						
OC1	52	10,000	1.8	0.1	0.32	0.04
OC2	95	10,000	3.5	1	1	0.06
OC3	36	9,000	2.5	0.36	0.4	0.05
Pahiko Stream						
OC4	9.9	2,100	4.0	2.5	0.08	0.03
Mangaone Stream						
OC5	34.7	2,650	1.9	1.7	0.12	0.04
OC6	16	1,400	0.7	0.84	0.03	**0.01**

Suspended sediment

Visual clarity was not measured due to safety but turbidity was measured as part of the laboratory analysis. The ANZG DGV for turbidity for this stream class is 5.2 NTU. Low values (<5.2 NTU) were only recorded at the upper Mangaone site (OC6) during periods of minimal rain.

The two upper Katihiku sites (OC1 and OC2) were highly turbid at all times. Site OC2 was particularly turbid, with measurements of 712 and 250 NTU in November and December. Such high levels of turbidity was unusual as these were periods of low rainfall.

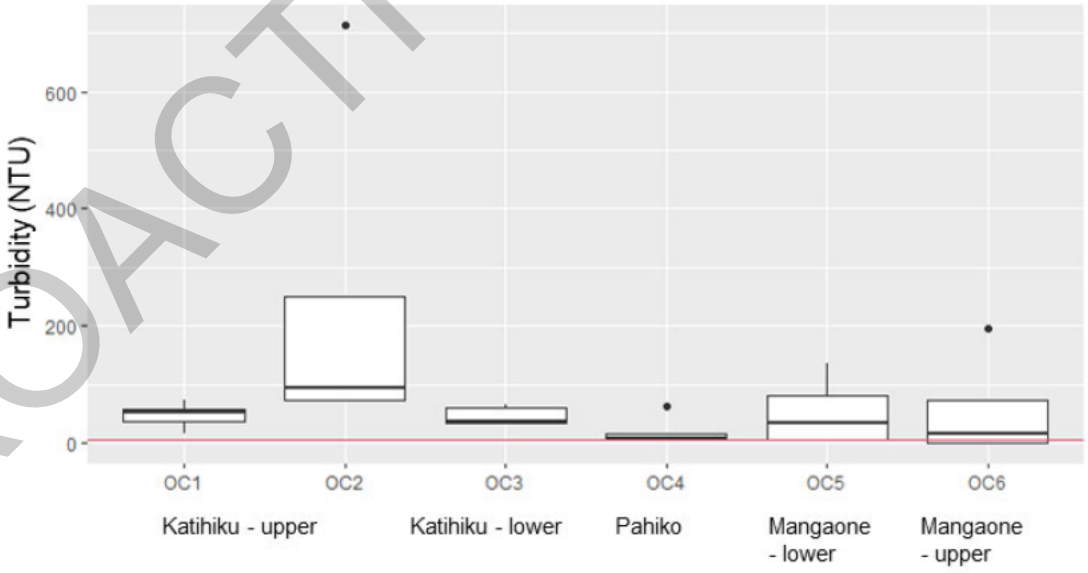

Figure 1. Concentrations of turbidity (NTU) across the 6 sites. Horizontal red line indicates the ANZG DVG of 5.2 NTU.

Faecal contamination

The concentrations of *E. coli* were very high across all sites and all dates with no sites below 1,000 cfu/100 mL. 540 cfu/100 mL is considered a red alert (action) for single samples under the Recreational water quality guidelines. There was a clear link with rainfall, with the highest concentrations in July when there was 44 mm of rainfall in 24 hours.

The highest concentrations of *E. coli* occurred in the uppermost Katihiku Stream site (OC1), where 97,000 cfu/100 mL was recorded in July. Concentrations decreased in the stream as it crossed the marae, suggesting most of the *E. coli* inputs occurred prior to reaching the marae. The Katihiku Stream would be a significant source of *E. coli* pollution to the Otaki estuary.

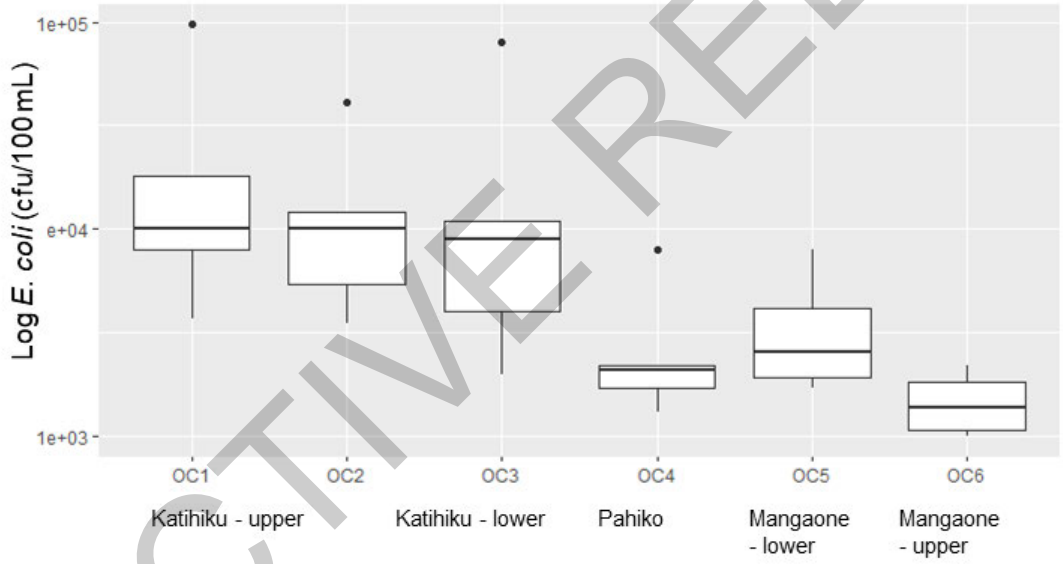

Figure 2. Concentrations of E. coli (note the log scale) across the 6 sites. No red line is provided as all samples exceeded 540 cfu/100 mL (red/action alert for single samples under the Recreational Water Quality Guidelines).

Nutrients – Nitrogen

ANZG guidelines for nitrate-nitrogen for this stream class is 0.065 mg/L, for which most samples were above. Nitrate concentrations generally above 1 mg/L can lead to plant and algal growth[3] (the red line in Figure 1). Nitrate concentrations differed markedly between the two upper Katihiku sites, with the tributary (site OC2) responsible for most of the nitrate inputs into the Katihiku Stream (ranging between 0.86-2.7 mg/L). Concentrations at the other two sites never exceeded 0.5 mg/L (which are still above ANZG guidelines).

3 https://environment.govt.nz/assets/Publications/Files/essential-freshwater-impact-of-existing-periphyto

High concentrations of nitrate-nitrogen were also recorded in the Pāhiko Stream (2.1-5.4 mg/L) and the lower Mangaone Stream (site OC5) (0.76-2.8 mg/L), revealing how widespread nitrate pollution is in this area.

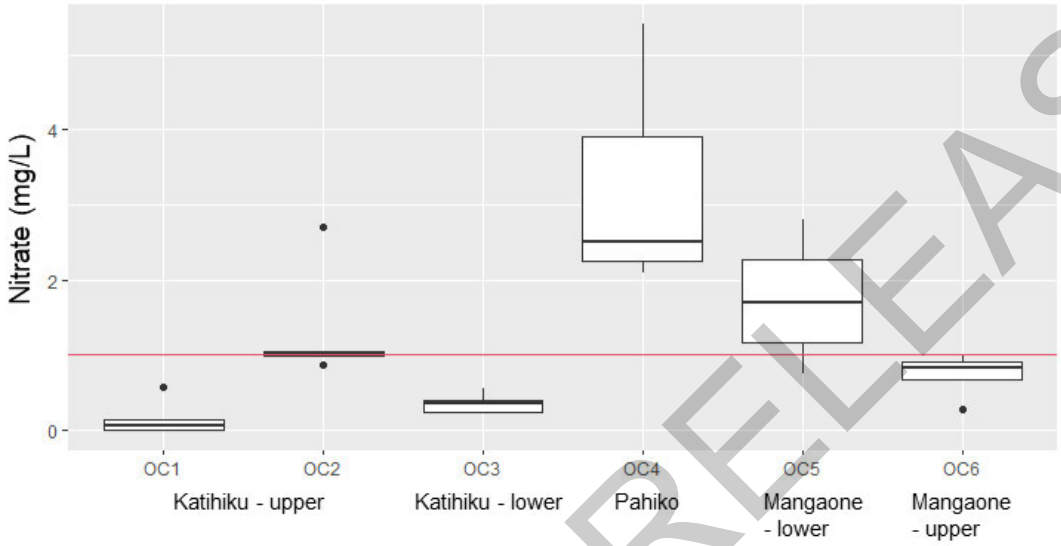

Figure 3. Concentrations of nitrate (mg/L) across the 6 sites. Horizontal red line indicates 1 mg/L, which was a recommended bottom line for dissolved inorganic nitrogen (DIN).

Nutrients - Phosphorus

Dissolved reactive phosphorus (DRP) concentrations are generally low in streams and can cause plant and algal blooms at very low levels. ANZG guidelines for this stream class are 0.014 mg/L. Concentrations below this guideline were only recorded at the upper Mangaone Stream site (OC6). The highest inputs (> 0.1 mg/L) were recorded across all sites in the Katihiku Stream and Pāhiko Stream during the high flow event in July 2022.

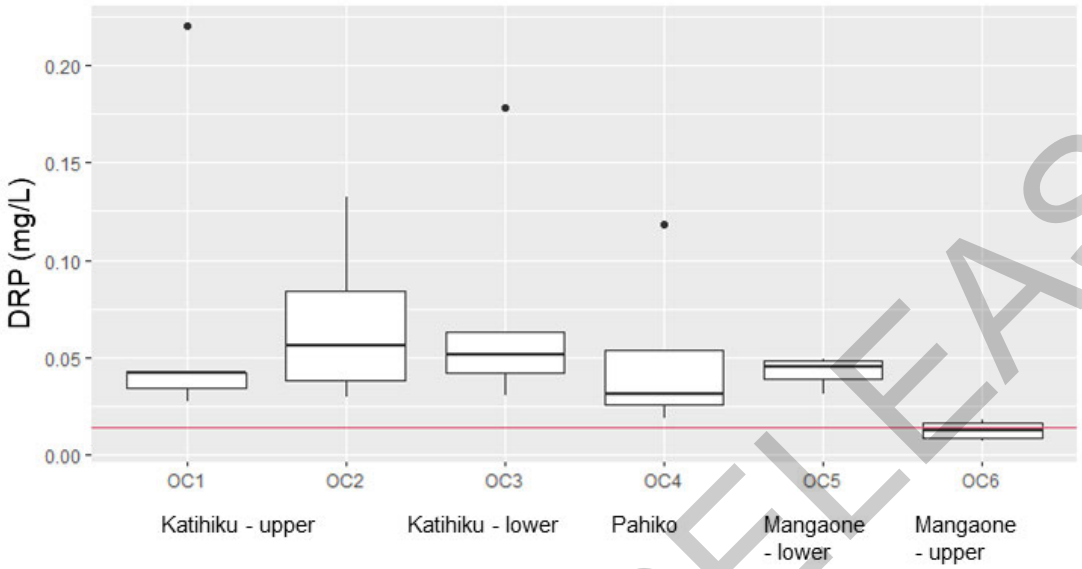

Figure 4. Concentrations of DRP (mg/L) across the 6 sites. Horizontal red line indicates the ANZG DVG of 0.014 mg/L.

Unusual results

On November 4th, 2022, very high concentrations of total phosphorus (7.79 mg/L) and total nitrogen (6.78 mg/L) were recorded at site OC2 along with turbidity levels of 712 NTU - in comparison, turbidity levels at other sites ranged between 10-37 NTU on that day. This indicates direct inputs of organic material into the tributary of the Katihiku Stream. As *E. coli* levels were relatively low, these inputs were not associated with high faecal inputs.

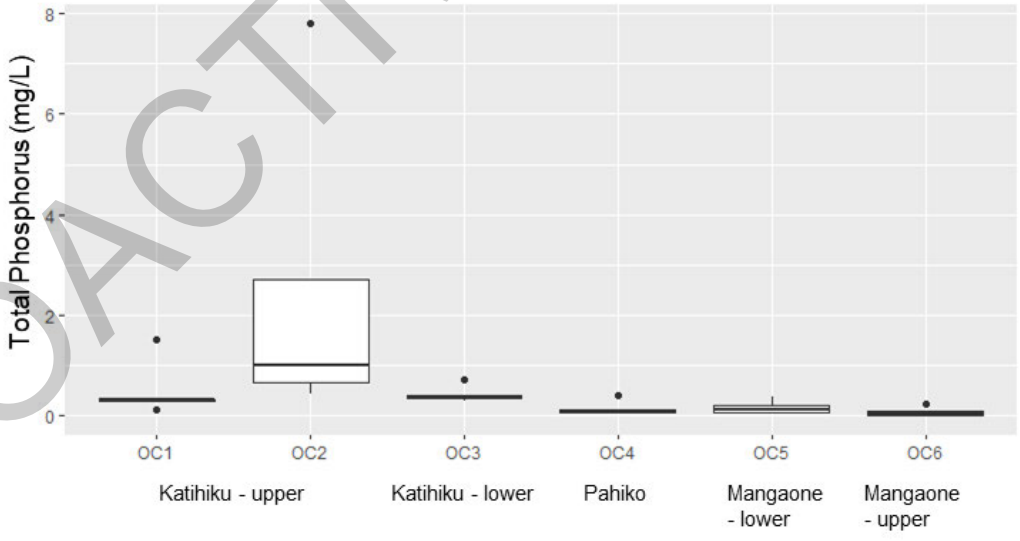

Figure 4. Concentrations of TP (mg/L) across the 6 sites. Note the high concentrations at Site OC2 (Katihiku Stream) driving by a large input (7.79 mg/L) in November.

Summary

- The Katihiku Stream was very high in *E. coli* and DRP (dissolved reactive phosphorus). Although concentrations were the highest during periods of rain, concentrations were well above guidelines even during drier periods.
- The small tributary to the Katihiku was a significant source of nitrate at times. Very high levels of nitrate were also recorded in the Pahiko Stream (up to 5.4 mg/L).
- There was a large input of organic matter into the Katihiku Stream in November 2022 independent of rainfall that resulted in very high turbidity, TP, and TN concentrations that requires further investigation.
- In the Mangaone Stream, concentrations of *E. coli* at the lower site were always higher than the upper site. There are inputs from agricultural land along this 2.5 km stretch of the stream. Focussing on reducing faecal inputs in the lower Mangaone Stream will be necessary to improve swimming water quality at Te Horo Beach.

A Valois

Amanda Valois
Senior Freshwater Scientist
Knowledge and Insights