

Upper Mangaokewa – Annual River Monitoring Summary - 2024

Catchment monitoring by King Country River Care commenced in May 2021 and covers between 4 to 6 monitoring sites sampled on a quarterly basis. Waikato Regional Council (WRC) has one monitoring site at Lawrence St Bridge, Te Kuiti, which is monitored monthly. A water quality baseline was calculated from the time the catchment group was formed using five years (Jan 2015 – Dec 2019) of monthly monitoring data, collected at the WRC site. The location of the 7 monitoring sites are shown on Map 1 (see page 2).

2024 represents the fourth consecutive year of catchment monitoring. Water samples were collected on 14 Feb, 13 May, 22 August and 18 November, during stable weather to avoid any significant rainfall events. River flow strongly influences water quality and the river flow hydrograph for the Upper Mangaokewa River is provided on page 5.

Key Resources Being Lost from the Land

Monitoring results show the key resources being lost from the Upper Mangaokewa catchment in 2024 were Nitrogen, Sediment (reflected by low water clarity) and *E. coli*. Nitrogen and Suspended Sediment were elevated in 3 out of 5 sites, while *E. coli* was elevated in 2 sites. Loss of Sediment and Nitrogen represents a loss of soil and nutrients, while elevated *E. coli* represents a loss of organic matter and nutrients as it is largely associated with animal manure in rural catchments.

The below water quality dials summarise the results collected in the Upper Mangaokewa catchment. The dial on the left shows the baseline for the catchment, covering 5 years of regional council monitoring at Lawrence Street Bridge in Te Kuiti. The dial on the right combines all data collected in 2024 at five sites, 28 samples in total. Arrows indicate either an increase or decrease in values compared to the sub-catchment baseline. Arrows indicate either an increase or decrease in values compared to the sub-catchment baseline. **An increase in water clarity is positive** for river health while **an increase in all other indicators may impair river health**.

In 2024, indicators for phosphorus and water clarity/suspended sediment met water quality limits, while Nitrogen and *E. coli* did not. Compared to the baseline – Water clarity was greater in 2024 and the concentration of dissolved reactive phosphorus and *E. coli* were lower (see Figure 1).

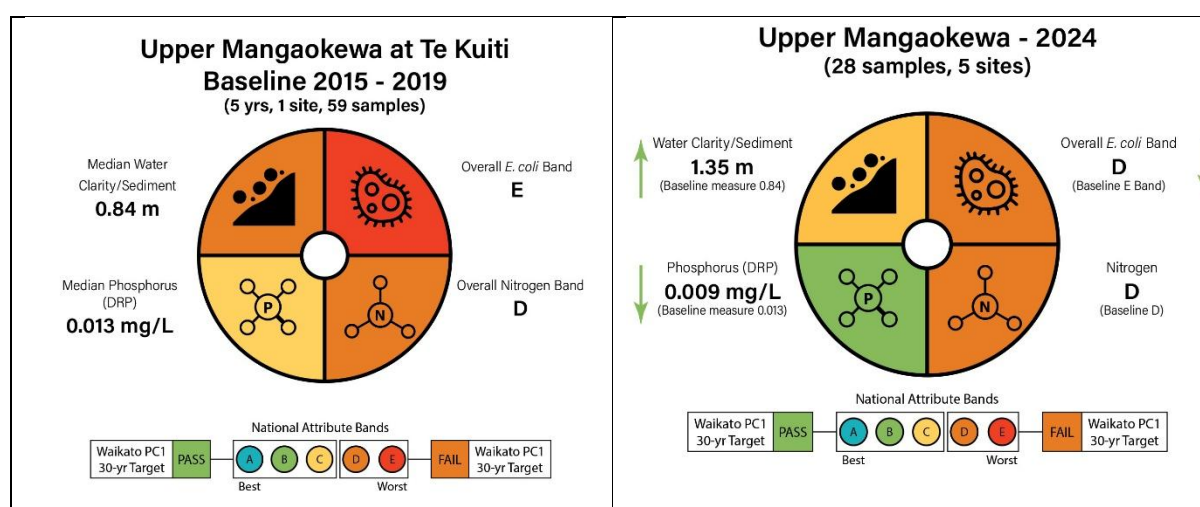


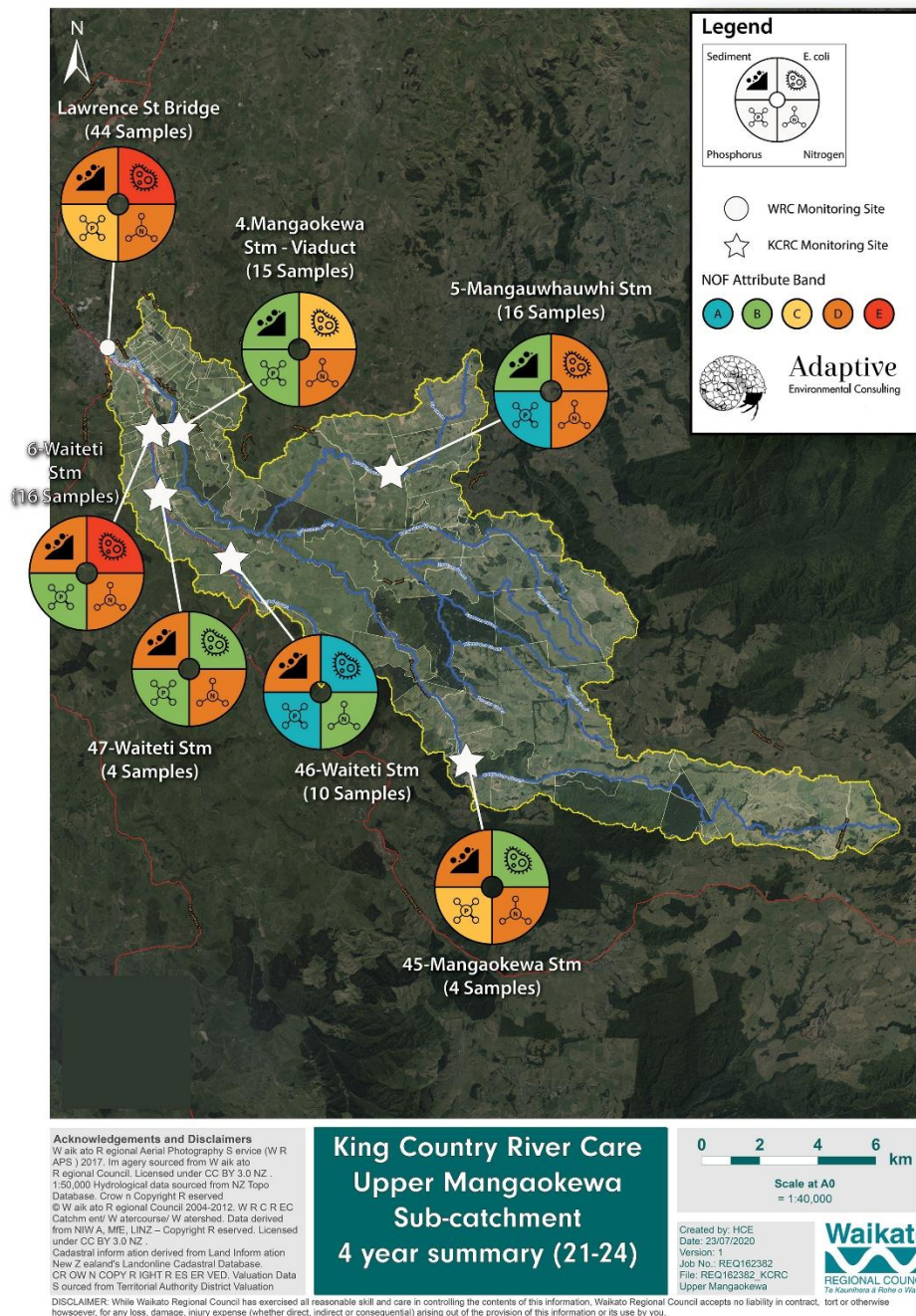
Figure 1. Water quality dials for the five sites in the Upper Mangaokewa catchment. The dial on the left shows the sub-catchment baseline (2015-2019) and the dial on the right combines results collected in the 2024 monitoring period.

The above results have been assessed against the national freshwater attribute bands under the national policy statement for freshwater (NPS-FM 2020).

The overall *E. coli* band is based on the following four measures, the percentage of samples exceeding 540 (CFU/100ml), the percentage of samples exceeding 260 (CFU/100ml), the median value and the 95th percentile (or upper 5% of *E. coli* concentrations).

The overall nitrogen band is based on the following six measures, Nitrate Toxicity (median and 95th percentile), Ammonia Toxicity (median and maximum annual value) and Dissolved Inorganic Nitrogen (median and 95th percentile).

The dials on the map below show water quality data from seven monitoring sites in the Upper Mangaokewa River catchment. Each dial reflects all data collected at the site since the KCRC monitoring programme in 2021, see Map 1 below.



Map 1. Water quality monitoring results for 4 years of data at the six monitoring sites in Upper Mangaokewa and the WRC Site at Lawrence St Bridge.

Water Quality Tables

Table 1 on the following page presents detailed results for the five monitoring sites (4 KCRC site and 1 WRC site) over the 2024 period. The results of the five-year water quality baseline (2015 – 2019) are shown on the bottom row.

Which resources are being lost, and where is this occurring?

The key resources being lost from the catchment listed in order of significance were:

1. Sediment: Elevated at three sites, two in the mid to lower Waiteti stream and Lawrence Street Bridge, Te Kuiti. The Te Kuiti site had the lowest water clarity – indicative of the highest suspended sediment loading.
2. Nitrate-Nitrogen: Elevated at three sites, the Mangawhauwhi Stream, Mangaokewa viaduct and Lawrence Street Bridge. Mangawhauwhi stream returned the highest concentration.
3. *E. coli*: Elevated at two sites, the Waiteti stream viaduct and Lawrence Street Bridge. Lawrence Street Bridge had the highest concentrations by far.

Water quality results have been assessed under both regional (PC1) & national (NPS-FM) water quality targets and have been colour coded as shown the adjacent key, Figure 2.

The overall *E. coli* band is based on the following four measures, the percentage of samples exceeding 540 and 260 (CFU/100ml), the median value and the 95th percentile (or upper 5% of *E. coli* concentrations).

The overall nitrogen band is based on the following six measures, Nitrate Toxicity (median and 95th percentile), Ammonia Toxicity (median and maximum annual value) and Dissolved Inorganic Nitrogen (median and 95th percentile).

	National Attribute Bands		Waikato PC1 30-yr Target
Best	A		
	B	→	Pass (National Attribute Bands Apply)
	C		
	D		
Worst	E Only applicable for <i>E. coli</i>	→	Fail

Figure 2 Key for grading shown in Tables 1 to 3

Table 1) Water quality indicators for individual sites in the Upper Mangaokewa catchment recorded over the 2024 monitoring period. Measured values have been assessed against the National Attribute Bands (NPS-FM, 2020).

Upper Mangaokewa ¹	Number of Samples	Human Health					Ecosystem Health										
		<i>E. coli</i> /100 ml					Water Quality										Sediment
Nitrate (mg N/L)							Ammonia (mg N/L)		Dissolved Inorganic Nitrogen-DIN (mg N/L)		Overall Nitrogen Band	Dissolved Reactive Phosphorus (mg/L)		Water Clarity Value ²	National Bottom Line		
Median		95th Percentile	Median	Annual Maximum	Median	95th Percentile	Median	95th Percentile	Median	95th Percentile		Median					
Annual Summary 2024		% Exc. > 540	% Exc. > 260	Median	95th Percentile	Overall Band	Median	95th Percentile	Median	Annual Maximum	Median	95th Percentile	Median	95th Percentile	Median		
KCRC SITES Lab: Analytica																	
4-Mangaokewa Stm (viaduct)	4	0%	25%	96	287	B	0.64	0.81	0.005	0.009	0.64	0.82	D	0.009	0.010	1.56	1.34
5-Mangawhauwhi Stm	4	0%	25%	185	326	C	0.76	0.98	0.008	0.010	0.77	0.99	D	0.005	0.009	2.34	1.34
6-Waiteti Stm (viaduct entrance)	4	50%	50%	355	677	E	0.48	0.67	0.010	0.020	0.49	0.69	B	0.005	0.009	1.06	1.34
46-Waiteti stream (Upper)	4	0%	25%	75	319	B	0.21	0.35	0.007	0.010	0.21	0.36	B	0.005	0.006	1.09	1.34
WRC SITES Lab: Hills																	
Lawrence Street Br	10	50%	75%	560	3,385	E	0.59	0.90	0.007	0.018	0.61	0.92	D	0.011	0.023	1.01	1.34
Mangaokewa R. Baseline (Jan-2015 to Dec-2019)	59	44%	73%	480	16,400	E	0.63	1.03	0.014	0.240	0.630	1.060	D	0.013	0.028	0.84	1.34

¹Assessed against PC1 & NPS-FM where the most stringent measures apply.

²Water clarity has been converted from measured turbidity using the formular $\ln(\text{CLAR}) = 1.21 - 0.72 \ln(\text{TURB})$ (Franklin, Booker & Stoffels, 2020).

River Flow Graph

The graph below shows river flow recorded by Waikato Regional Council at Mangaokewa River between 1 Jan 2023 and 31 Dec 2025. The black arrows indicate quarterly sampling days (Figure 2).

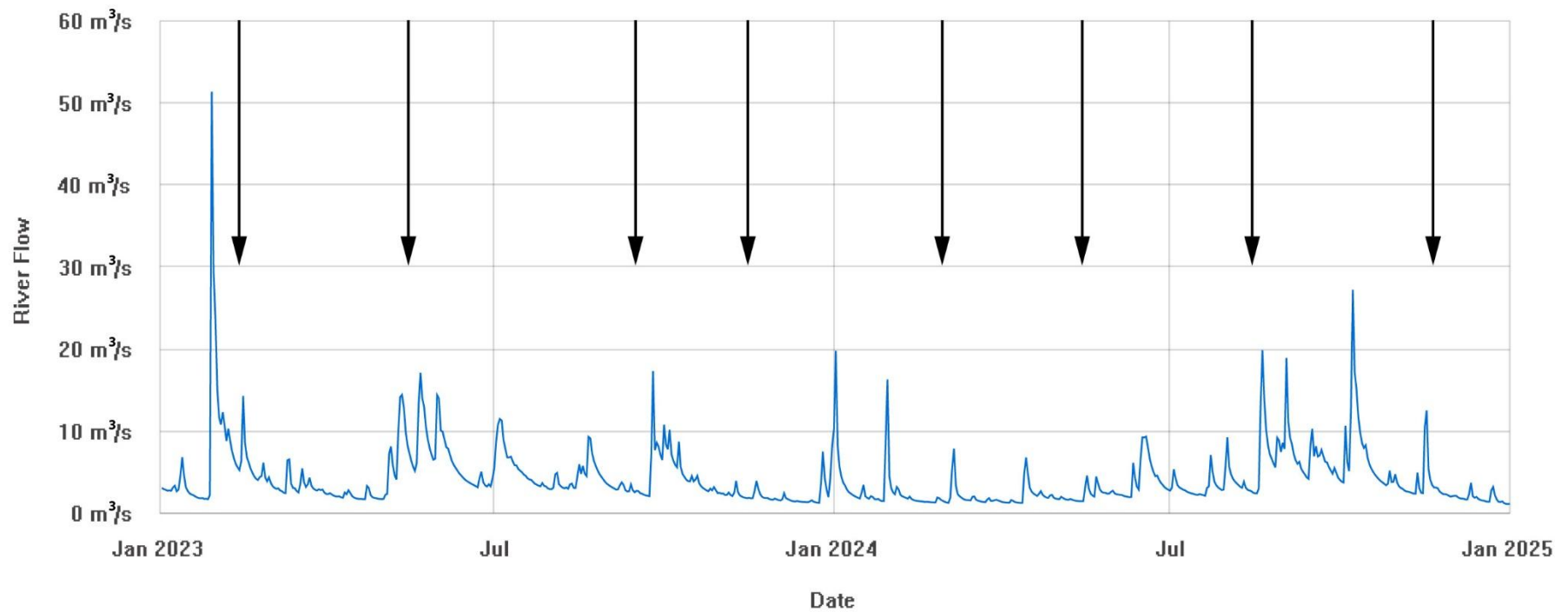


Figure 2. River flow recorded by Waikato Regional Council at Mangaokewa River. The black arrows indicate catchment monitoring days.