Adaptive Environmental Consulting

## Marokopa – Annual River Monitoring Summary - 2024

Catchment monitoring by Marokopa River Care commenced in May 2022. It covers four monitoring sites sampled on a quarterly basis. In addition, the Waikato Regional Council (WRC) has two monitoring sites, sampled monthly. At the time the catchment group was formed a water quality baseline was calculated for Marokopa River using five years of monthly monitoring data (Jan 2016 – Dec 2020) from two sites at Marokopa River and Tawarau River. The locations of all six monitoring are shown on Map 1 (see, page 2).

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

### Key Resources Being Lost from the Land

Monitoring results show the key resources being lost from the Marokopa River catchment are Sediment and *E. coli*. Suspended sediment was elevated in 5 out of 6 sites, reflected by a reduction in water clarity. *E. coli* was the second most commonly elevated contaminate, being elevated in 4 out of 6 sites. *E. coli* represents a loss of organic matter and nutrients as it is largely associated with animal manure in rural catchments. Dissolved reactive phosphorus concentrations were also slightly elevated at two sites, Marokopa River and Tawarau River.

The below water quality dials summarise the results collected from the 6 sites in the Marokopa catchment. The dial on the left shows the baseline for the catchment, cover 5 years of regional council monitoring at Marokopa River and Tawarau River, 116 individual samples in total. The dial on the right combines all data collected in the catchment in 2024, 40 samples in total. Arrows indicate either an increase or decrease in values compared to the sub-catchment baseline levels. An increase in water clarity is positive for river health while an increase in all other indicators may impair river health.

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

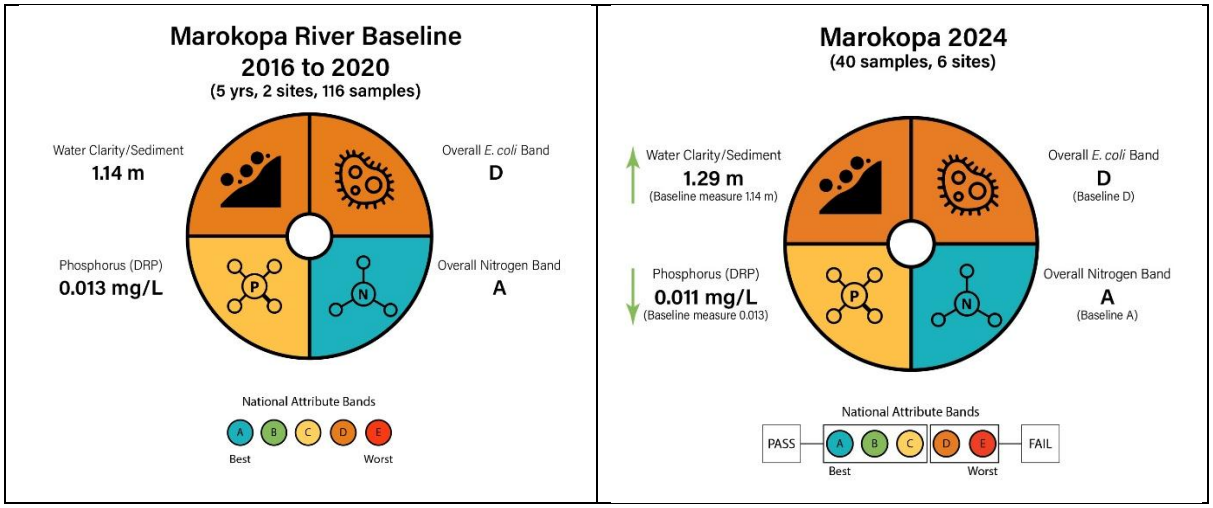


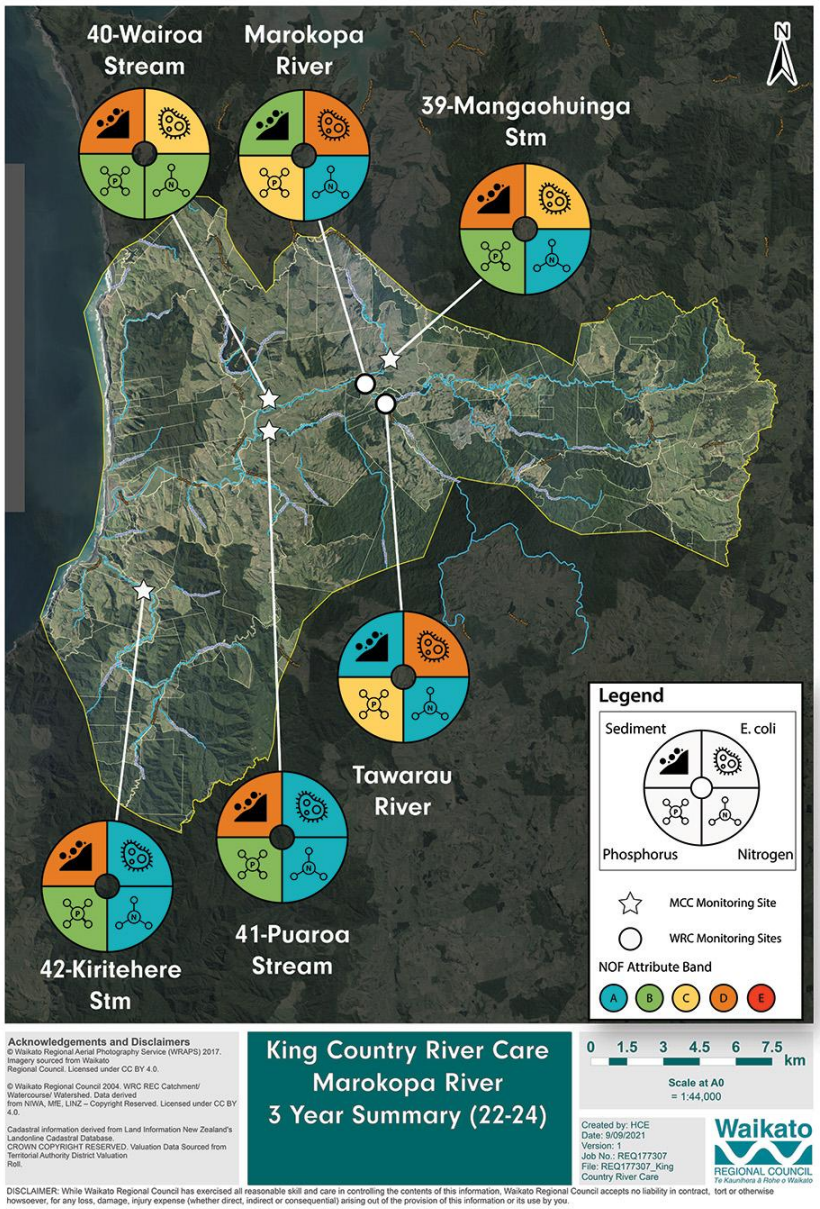

*Figure 1. Water quality dials for the six sites in the Marokopa catchment. The dial on the left shows the sub-catchment baseline (2016-2020) and the dial on the right combines results collected in the 2024 monitoring period.*

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 95$^{th}$ percentile (or upper 5% of *E. coli* concentrations).

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

The dials on the map below show water quality data from six monitoring sites in the Marokopa River catchment. Each dial reflects all data collected at the site since the KCRC monitoring programme in 2022, see Map 2 below.




*Map 1. Water quality monitoring results for 3 years of data at the four KCRC monitoring sites and the two WRC Sites in the Marokopa Catchment.*

**Water Quality Tables**

Table 1 on the following page presents the results for all six monitoring sites (four KCRC sites and two Waikato Regional Council sites). The results of the five-year water quality baseline (2016 – 2020) are shown on the bottom row.

## Where and which Resources are Being Lost

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

1. Sediment: All sites, except for Tawarau River, had elevated sediment loadings. Wairoa River had the highest concentration of suspended sediment.
2. *E. coli*: Elevated at four sites but low at Puaroa Stream and Kiritehere Stream. The highest concentrations were recorded at the two regional council monitoring sites (Marokopa and Tawarau River).
3. Dissolved Reactive Phosphorus: Slightly elevated at the two regional council monitoring sites.

Water quality results have been assessed under national (NPS-FM) water quality targets and have been colour coded as shown the adjacent key, Figure 4.

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 95$^{th}$ percentile (or upper 5% of *E. coli* concentrations).

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

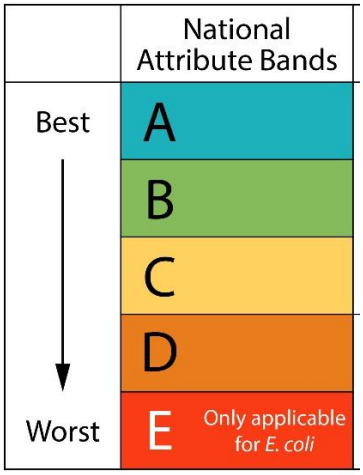



*Figure 2 Key for grading shown in Tables 1 to 3*

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

| Marokopa River Annual Summary 2024 | Number of Samples | Human Health | | | | | Ecosystem Health | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Water Quality | | | | | | | | | Sediment | |
| | | E. coli/100 ml | | | | | Nitrate Toxicity (TON mg N/L) | | Ammonia Toxicity (mg N/L) | | Dissolved Inorganic Nitrogen-DIN (mg N/L) | | Overall Nitrogen Band | Dissolved Reactive Phosphorus (mg/L) | | Water Clarity Value[1] | National Bottom Line |
| KCRC SITES Lab: Analytica | | % Exc. > 540 | % Exc. > 260 | Median | 95th Percentile | Overall Band | Median | 95th Percentile | Median | Maximum | Median | 95th Percentile | | Median | 95th Percentile | Median | |
| 39-Mangaohuinga Str | 4 | 25% | 25% | 155 | 606 | D | 0.47 | 0.63 | 0.003 | 0.006 | 0.48 | 0.63 | A | 0.008 | 0.011 | 1.13 | 1.34 |
| 40-Wairoa Str | 4 | 25% | 25% | 195 | 1,053 | D | 0.47 | 0.64 | 0.013 | 0.030 | 0.50 | 0.65 | A | 0.007 | 0.008 | 0.78 | 1.34 |
| 41-Puaroa Str (Marokopa F | 4 | 0% | 25% | 100 | 392 | B | 0.27 | 0.36 | 0.003 | 0.010 | 0.27 | 0.37 | A | 0.006 | 0.007 | 1.03 | 1.34 |
| 42-Kiritehere Str | 4 | 0% | 25% | 86 | 255 | B | 0.06 | 0.12 | 0.003 | 0.009 | 0.07 | 0.12 | A | 0.007 | 0.010 | 1.05 | 1.34 |
| WRC SITES Lab: Hills | | | | | | | | | | | | | | | | | |
| Tawarau River (976_1) | 12 | 25% | **58%** | 230 | **1,285** | **E** | 0.29 | 0.39 | 0.004 | 0.006 | 0.30 | 0.40 | A | 0.011 | 0.020 | 1.58 | 0.61 |
| Marokopa River (531-3) | 12 | **33%** | 33% | **300** | **1,720** | **E** | 0.32 | 0.44 | 0.004 | 0.006 | 0.32 | 0.44 | A | 0.012 | 0.018 | 1.36 | 1.34 |
| **Marokopa River Baseline (Jan-2016 to Dec-2020)** | 116 | 24% | 46% | 230 | **1,830** | **D** | **0.30** | **0.43** | **< 0.01** | **0.088** | **0.32** | **0.44** | **A** | **0.013** | **0.021** | **1.14** | **1.34** |

[1]*Water clarity has been converted from measured turbidity using the formular ln(CLAR) = 1.21 – 0.72 ln(TURB) (Franklin, Booker & Stoffels, 2020).*

**River Flow Graph**

The graph below shows river flow recorded by Waikato Regional Council at Marokopa River Falls between 1 Jan 2023 and 31 Dec 2024. The black arrows indicate quarterly sampling days (Figure 2).

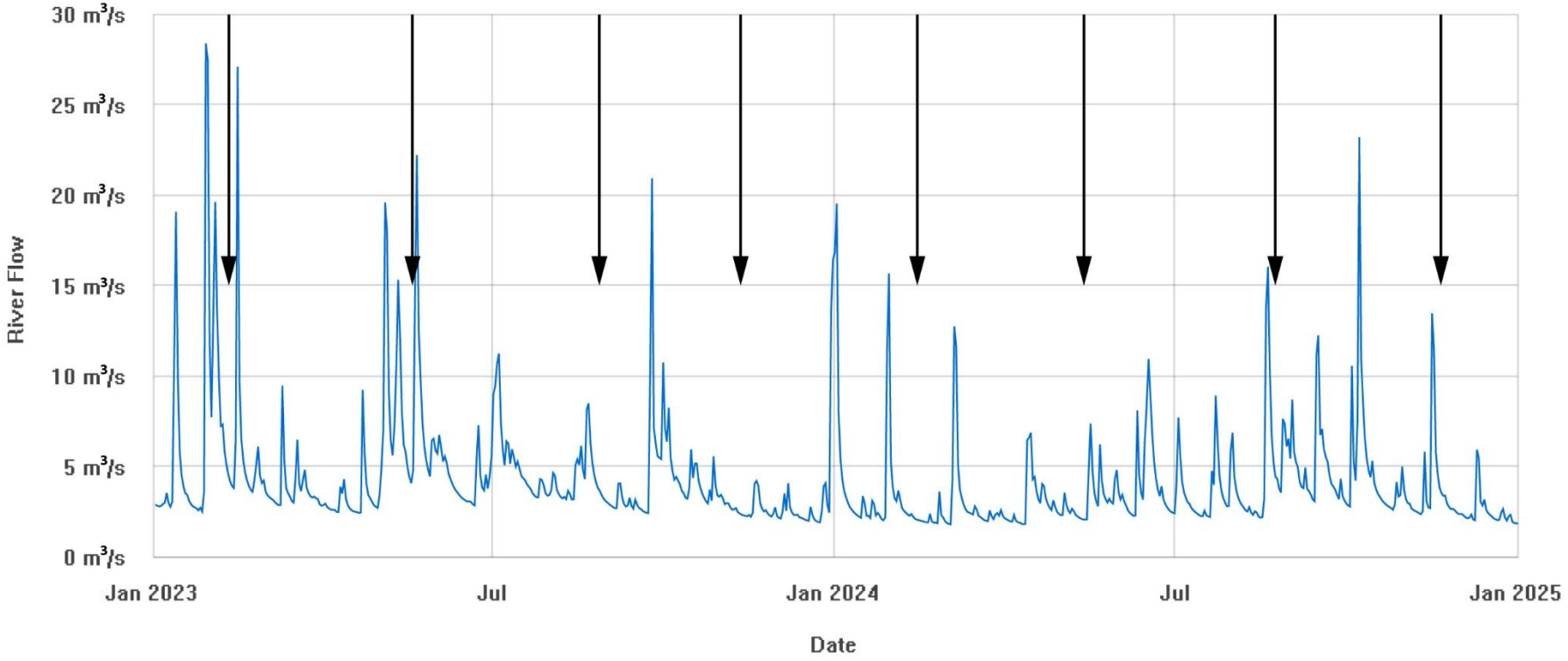



*Figure 2. River flow recorded by Waikato Regional Council at Marokopa River Falls. The black arrows indicate catchment monitoring days.*