Te Niaotanga ō Mataatua ō Te Arawa
Matatā Wastewater

Environmental Monitoring Programme
Te Hōtaka Aroturuki Taiao

In 2021, the Council commissioned an Environmental Monitoring Programme ("EMP") to characterise the existing environment and establish a baseline for assessing effects on receiving environments (current and future). The programme involved monthly monitoring of Matatā streams (upstream and downstream), the lagoon, town drains, seeps, the Tarawera River, and other sites within the Awakaponga catchment, spanning 26 surface water sites. Groundwater monitoring began with seven deep bores, with five additional shallow bores later installed to improve understanding of groundwater quality and flow. This represents the most comprehensive EMP the Council has undertaken to date and has been supported by several highly regarded freshwater ecologists and groundwater scientists actively involved in wastewater projects nationally, including:

Freshwater Ecology: Dr Ngaire Phillips and Dr Mike Stewart – Streamline Limited and Dr Mark James – Aquatic Environmental Sciences Limited (now retired)

Groundwater: Alan Pattle and Ella Boam – Pattle Delamore Partners Limited

Microbial Source Tracking: Dr Rebecca Stott – National Institute of Water and Atmospheric Research (NIWA)

Key Findings from the Environmental Monitoring Programme
Ngā hua o te Hōtaka Aroturuki Taiao

Three summary technical reports were commissioned by the project to assess the effects of on-site wastewater discharges in Matatā. These include a surface water quality assessment by Streamline Environmental, a groundwater impact evaluation by Pattle Delamore Partners (PDP), and a faecal source tracking investigation by the National Institute of Water and Atmospheric Research (NIWA). Collectively, these reports form a robust technical evidence base, indicating that discharges from septic tank systems are contributing to environmental contamination. When considered alongside the broader public health, cultural, and development benefits, the evidence provides a compelling case for progressing with reticulation. The reports are included in the appendices, and their key findings are outlined below.

Stewart, M. (2024). Update of Surface Water Quality State (Nov 21 to July 24) for Matatā WWTP Project and Comparison to Guidelines.

This report analyses surface water quality data from November 2021 to May 2024 for sites in and around Matatā, including streams, lagoons, drains, seeps, and nearby rivers. Results are compared to national and regional ecological and human health guidelines and thresholds (e.g., NPS-FM 2020, ANZG 2018, BOPRC RNRP). Faecal source tracking (FST) was conducted to help identify human vs non-human contamination sources. Key conclusions are:

- Waimea Stream downstream (SW5) had higher median concentrations of ammoniacal-N and TP compared to the upstream site (SW3). Human sources were detected on 7 of 10 sampling occasions (70%) at SW5 and on 1 of 11 occasions (9%) at SW3.
- Waitepuru Stream downstream (SW7) had higher TP and nitrate-N concentrations than upstream (SW6). Human sources were detected on 2 of 11 occasions (18%) at SW7 and not detected on any of 10 sampling occasions (0%) at SW6.
- At Matatā Lagoon West (SW23) human sources were detected on 2 of 3 sampling occasions (67%).
- At the Unnamed Drain (SW13) with human sources were detected on all 10 occasions (100%).
- Faecal source tracking confirmed the presence of human faecal markers in multiple locations, which are most likely as a result of septic tanks.
- The results suggest a consistent signal of water quality degradation from urban Matatā, with multiple indicators pointing to on-site wastewater system failure contributing to faecal contamination of surface waters.

Boam, E., & Pattle, A. (2024). Matatā Wastewater Project – Existing Groundwater Environment. PDP.

This report characterises the existing groundwater environment in Matatā. It includes data from groundwater bores, piezometers, and seeps collected between 2022 and 2024, alongside earlier investigations. The report updates the hydrogeological conceptual model, evaluates contaminant pathways from septic tank discharge, and compares observed groundwater quality to expected nutrient loads from on-site wastewater systems. A high-level mass balance assessment was also undertaken. Key conclusions are:

Groundwater investigations suggest a complex hydrogeological environment in Matatā, likely consisting of localised perched groundwater zones rather than a single aquifer system.

Perched groundwater could discharge to the regional groundwater system, directly to local streams or daylight through seeps along the terrace edge.

A nutrient mass balance analysis indicates that substantial nutrient attenuation may occur within the unsaturated zone before reaching deeper groundwater. Alternatively, contaminants from on-site systems may bypass groundwater and enter surface water via perched zones.

Evidence from surface water monitoring confirms that human wastewater contaminants are reaching surface water via a subsurface pathway (i.e. perched groundwater, seeps).

Water quality near the edge and base of the terrace is degraded compared to deeper groundwater, with elevated concentrations of organic nitrogen, ammoniacal nitrogen, and phosphorus pointing to wastewater as a likely primary source.

Other potential sources such as the township fertiliser load is at least an order of magnitude less than the soakage field load; overall, the load from septic tanks is expected to dominate the N load to the subsurface beneath the township.

While high groundwater levels are unlikely to compromise disposal field function on the alluvial terrace, disposal fields should be located further from stream banks to protect water quality.

In low-lying coastal and lagoon-adjacent areas, groundwater is close to the surface and soils are fine-textured, which impedes infiltration. This creates a heightened risk of ponding or overland flow in wet weather. These conditions may render conventional on-site disposal unfeasible, especially on 1,000 m² lots

At least 95 properties in Matatā do not meet the design and siting standards of AS/NZS 1547:2012, including setbacks of 15 metres from watercourses and 0.6 metres vertical separation to groundwater. Many of these sites also lack the 300–400 m² land area required for compliant irrigation fields.

Stott, R. (2024). Review of Microbiological and Physico-Chemical Monitoring in Matatā Township, including Analysis of Faecal Source Tracking Data.

This report presents the findings of faecal source tracking (FST) undertaken in Matatā between 2020 and 2024 as part of the Environmental Monitoring Programme (EMP). In 2012, an earlier assessment was carried out to evaluate the health risks associated with septic systems in Matatā (Gilpin and Lake, 2012). That assessment, based on a single round of monitoring using faecal indicator bacteria (FIB) and faecal source tracking analysis, concluded that there was no compelling evidence at the time to warrant the introduction of a centralised sewage disposal system, although it acknowledged that some on-site systems were not functioning adequately.

Since then, further monitoring has expanded both the spatial coverage of FIB sampling in surface and subsurface waters and the spatio-temporal analysis of FST. This report includes an analysis of surface water, the lagoon, shallow groundwater seeps, and deeper bores to identify sources of faecal contamination and assess potential health risks. The focus is on detecting microbial markers associated with humans, ruminants, birds, and dogs, with particular attention to contamination likely to be linked to on-site wastewater systems. Key conclusions are:

The 2012 ESR study concluded that reticulation was not warranted at that time. However, recent FST data shows contamination is now more widespread and at higher levels than previously detected.

FST results show widespread human faecal contamination in waters around Matatā and confirm inputs of contamination within the township, causing elevated concentrations of faecal source tracking (FST) markers.

Statistically significant increases in nutrients and faecal contamination were observed at the Waimea Stream downstream site (SW5) compared to upstream (SW3). Over 70% of samples at SW5 tested positive for human faecal contamination, compared to just 9% at SW3. These results indicate a persistent issue of human-sourced contamination within the township.

In Waitepuru Stream, human contamination was absent at the upstream site (SW6) but confirmed at the downstream site (SW7) in 18% of samples. Multiple sources were detected at SW7, including ruminant, avian, dog, and human.

The drain at 53 Arawa Street (SW13) consistently showed high levels of human faecal contamination, with every sample testing positive. Levels of the human marker crAssphage at this site were similar to those found in raw wastewater, suggesting inputs of inadequately treated sewage.

Human faecal markers were detected at three of four lagoon shoreline sites, SW23 (lagoon west), SW24 (mid), and SW25 (lagoon drain), with a 67% incidence at SW23.

Very high concentrations of the general faecal PCR marker were detected in shallow groundwater seeps (e.g., S1), but no human, ruminant, or avian markers were detected. This suggests contamination may reflect multiple flow paths or untested sources such as domestic pets.

In deeper groundwater (e.g., GW2), faecal indicator bacteria were not detected, but a slight signal for the general faecal marker was present. This suggests the water quality may be slightly compromised, although deeper groundwater microbiology did not reflect the contamination seen in shallow groundwater.

The findings from the three technical reports provide a comprehensive overview of the current state of the environment in Matatā. While each report focuses on different parameters and methods, the results should be considered collectively. Taken together, they show that surface waters, particularly in downstream stream reaches and drains, are affected by elevated nutrients and microbiological contamination, including confirmed human faecal markers. Groundwater investigations suggest that perched and shallow groundwater pathways may facilitate contaminant transport to surface water, although deeper groundwater sites appear less affected. The detection of human-sourced contamination at several monitoring locations, alongside indications of general faecal pollution in shallow groundwater, suggests that on-site wastewater systems are contributing to localised environmental effects.

Independent Peer Review – Environmental Science and Research
He arotake aropā – Te Pūtaiao me te Rangahau ā-taiao

At the request of His Worship the Mayor, an independent peer review was commissioned to assess the technical validity of the reports prepared for the Matatā Wastewater Project. The review panel comprised Dr Brent Gilpin, Dr Louise Weaver, Dr Sarah Coxon, and Bronwyn Humphries. Dr Gilpin had previously authored a report assessing the need for wastewater reticulation in Matatā, which concluded that, based on the limited data available at the time, there was insufficient evidence to justify reticulation solely on public health grounds. His involvement in the current review provides valuable continuity, while also recognising that public health is only one of several important considerations informing the decision to reticulate.

The scope of the independent peer review is as follows:

Review of Data and Findings:

Assess the reasonableness of the conclusions drawn in these final technical reports outlined above.

Areas of Focus:

Freshwater Ecology: Review the conclusions regarding the effects of septic tank discharge on local freshwater ecosystems.

Wastewater Management: Review the conclusions about the effectiveness of septic tanks and disposal methods, and potential alternatives.

Hydrogeology: Review the conclusions related to the effects of septic tank discharge on groundwater, including the movement and fate of contaminants.

Microbiology (Public Health): Review the conclusions about public health risks associated with microbial contamination and pathogens in water.

Overall, the report concludes:

ESR is "*in agreement with the overall conclusions made in the following reports: Stewart (2024), Boam and Pattle (2024) and Stott (2024).*" While *"further analysis or additional monitoring could better characterise contaminants," ESR considers it unlikely that this would "materially change the overall conclusions."*

If Matatā expands from ~250 to up to 1,200 properties, *"intensification of existing OWMS would most likely result in significant environmental degradation,"* and "*some form of reticulated wastewater management system would need to be developed."*

If no further development occurs, *"the decision on reticulation vs upgrades... does not need additional science."* Instead, it should focus on "*the relative costs and effectiveness of wastewater management options."*

ESR emphasises that *"science cannot make, nor force this decision";* it is *"an economic cost-benefit analysis"* combined with "*community decisions on how best to handle risks."*

Summary analytical findings of the peer review include:

Faecal source tracking (FST) confirms human sewage contamination at multiple sites, attributed to septic tank systems.

Two sites (Waitepuru downstream and one lagoon site) initially classified as showing human contamination should be considered "possible human" due to potential cross-reaction with wildfowl or ruminant markers. This reclassification does not change the overall conclusions.

Onsite wastewater systems are contributing to nutrient and microbial contamination in surface waters, posing environmental risks and likely risks to human health (not quantified).

Matatā's coastal and hydrogeological setting presents challenges, with contamination pathways influenced by perched groundwater and heterogeneous substrates.

Many properties lack sufficient area for compliant onsite wastewater disposal. Without intervention environmental degradation is likely to continue.

Summary of the recommendations include:

Integrate E. coli and other faecal indicator data with FST to improve interpretation of contamination sources.

Test specific sites (e.g., SW23 and SW24) for ruminant or wildfowl markers, but this may not change the overall conclusions.

Explore the hydraulic connection between groundwater and surface water in Matatā, particularly in areas near wastewater systems, to better understand contamination pathways and the impact of onsite systems.

Future monitoring could include testing for emerging organic contaminants (EOCs), such as sucralose and caffeine, which could provide further insight into wastewater impacts on surface water.

ESR recommends assessing the fate and transport of viral contaminants, such as bacteriophages, which could have greater mobility than bacteria and pose higher health risks.

Analyse the effect of heavy rainfall on contaminant pathways, particularly in shallow groundwater and surface waters, to understand how rainfall influences the spread of contaminants from septic tanks.

Conduct a detailed review of the age and design of onsite wastewater systems in Matatā, focusing on older systems that may contribute more significantly to contamination, and explore upgrades or replacements as necessary.

Attached to this Report:

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Stott, R. (2024). Review of Microbiological and Physico-Chemical Monitoring in Matatā Township, including Analysis of Faecal Source Tracking Data