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REGIONAL COUNCIL

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| Report | 09.707 |
| Date | 18 November 2009 |
| File | ENV/05/03/28 |

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| Committee | Regulatory Committee |
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# Mangatarere Stream catchment water quality investigation – progress report

## 1. Purpose

To provide an update on progress with the Mangatarere Stream catchment water quality investigation.

## 2. Background

The Mangatarere Stream is recognised in Greater Wellington's Regional Freshwater Plan for its trout spawning values as well as providing habitat for four species of endangered (threatened) native fish. The stream also discharges into the Waiohine River, a waterway with good water quality and significant cultural, recreational and ecological values.

State of the Environment (SoE) monitoring has consistently indicated that water quality in the lower reaches of the Mangatarere Stream is amongst the poorest in rivers and streams of the Wellington region, particularly in terms of dissolved nutrient concentrations. The catchment is subject to multiple stressors, including high water abstraction (e.g., for Carterton township and the Carrington Water Race) and reduced flows in summer, intensive land use (dairy farming and a large piggery), and the discharge of treated wastewater from Carterton township (above SH 2). There are also strong groundwater/surface water linkages in the catchment; for example, groundwater discharges to the Mangatarere Stream both directly and via its tributary streams, particularly downstream of Anderson's Line (Figure 1).

The principal aim of the Mangatarere catchment investigation was to better understand water quality within the catchment, with the view to determining the primary nutrient sources and the potential migration of nutrients from the soil zone to receiving waters, both groundwater and surface water.

## 3. Monitoring sites and parameters

Beginning in spring 2008, water quality samples were collected monthly from 12 stream sites (along with measurements of stream flow) and two-monthly

from 13 groundwater bores, focusing on the middle and lower catchment area downstream of the Mangatarere Gorge[1] (Figure 1). Samples were tested for a range of variables such as suspended sediment, nutrients and *E. coli* bacteria, as well as trace metals and major ions on several occasions. Macroinvertebrate and periphyton samples were also collected in some reaches of the Mangatarere Stream and its tributaries in late summer 2009.

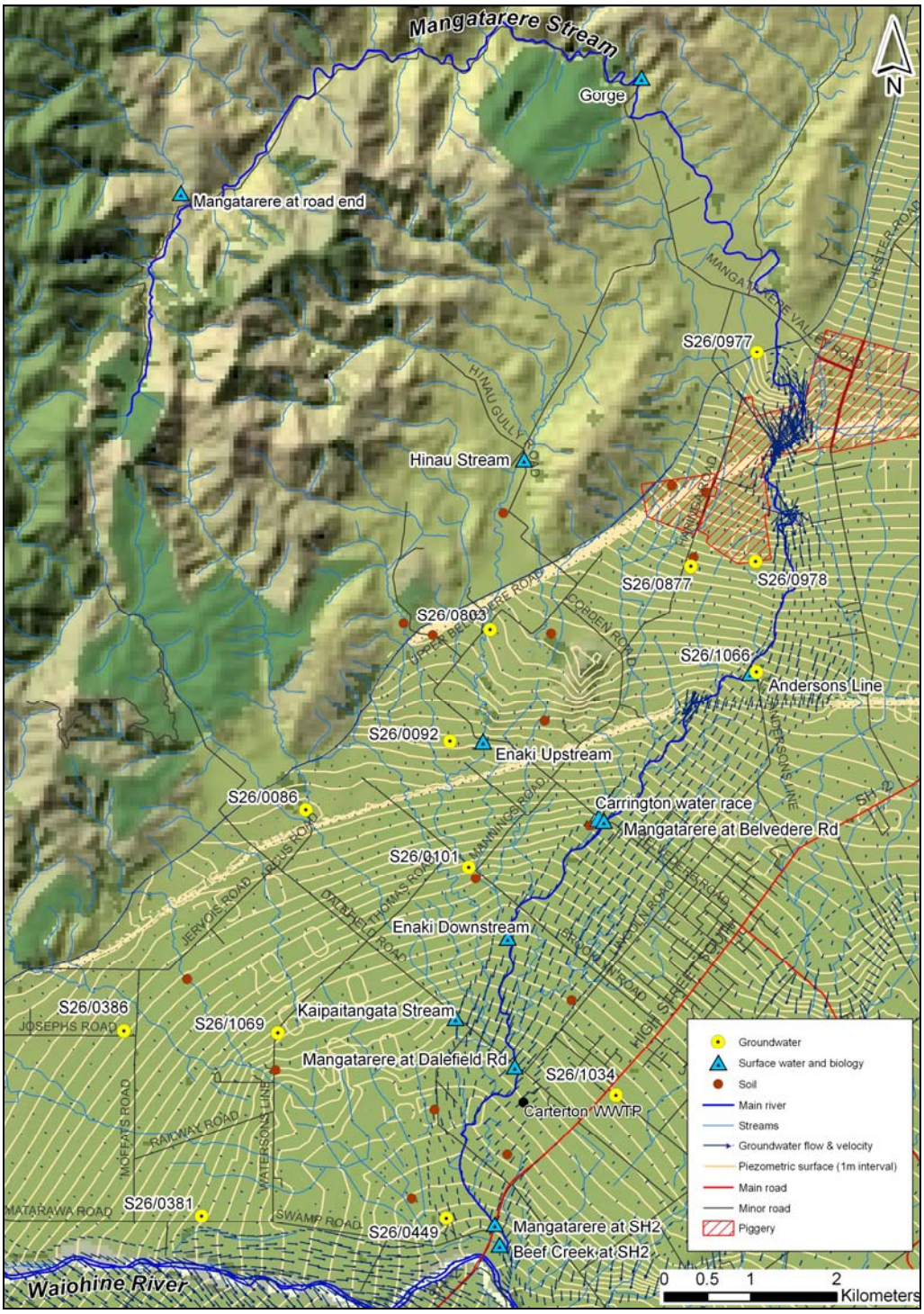


Figure 1: Stream, groundwater and soil locations sampled over September 2008 to October 2009. Groundwater flow direction and velocity are also shown.

[1] Although water quality is not pristine at the Gorge (low intensity farming is present in the foothills upstream), it is generally of excellent quality; downstream of this point, water quality declines markedly.

In addition to 12 months of water sampling, soil sampling was conducted once during spring 2009 at 16 locations under various land uses. Samples were tested for soil structure, nutrients, organic matter and trace elements.

## 4. Preliminary findings

Sampling was completed in early October and the water and soil quality results are still being compiled. However, a few comments can be made on the results that are available:

- Soil testing indicates low macroporosity throughout the Mangatarere catchment. This suggests that soil compaction may be an issue catchment-wide, with an increased risk of potential flow-on impacts for water quality in drains and streams as a result of reduced infiltration and greater sediment and nutrient run-off from the land.

- Median nitrate concentrations in eight of the 13 groundwater bores were above background concentrations, with sample results from two bores exceeding the national drinking water standard of 11.3 mg/L on two occasions.

- *E. coli* bacteria were detected in 11 groundwater bores on one or more sampling occasions. The highest *E. coli* count was 320,000 cfu/100 mL (exceptionally high) in a bore located amongst an area of dairy and beef farming.

- The median concentration of dissolved arsenic was double the national drinking water standard in one bore located in the lower catchment reaches. However, this bore is used only for stock supply and all sample results were consistently below stock drinking water guidelines. Two samples collected from another nearby bore used for potable water supply recorded arsenic concentrations just above the drinking water standard and elevated concentrations of arsenic were also detected in soil samples collected nearby. Both bore owners were notified of the elevated arsenic sample results.

- Some individual measurements from streams have highlighted the impact of farm practices on water quality. An example is the very high *E. coli*, nutrient and suspended sediment concentrations recorded in water samples from the Enaki Stream at Belvedere Road in January 2009 (Figure 2); dairy cows were observed in the water upstream at the time of sampling.

- The Carterton Wastewater Treatment Plant (WWTP) discharge is clearly having a significant effect on water quality in the lower Mangatarere Stream, accounting for the majority of dissolved phosphorus in the stream at SH2.

- Of the three main tributaries (Enaki Stream, Kaipaitangata Stream and Beef Creek), Beef Creek appears to be contributing the greatest nutrient load to the lower Mangatarere Stream. Shallow groundwater, contaminated

by above ground land use practices, is likely to be the major contributor to the elevated nitrate in the creek[2].

- As expected, there is a decline in ecological health with distance down the Mangatarere catchment; fewer sensitive stoneflies, mayflies and caddisflies are present in the lower reaches compared with further upstream where land use is less intensive.

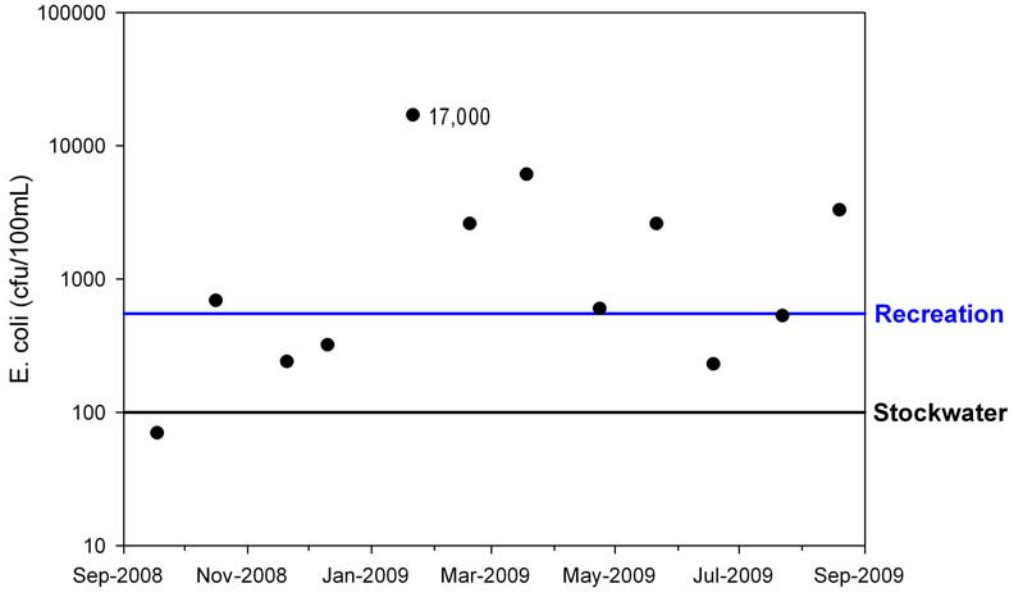


Figure 2: *E. coli* counts recorded in water samples from the Enaki Stream at Belvedere Road during September 2008 to August 2009. The ANZECC (2000) stock water guideline[3] and action level of the national recreational water quality guidelines are also shown to provide a 'benchmark' (the stream is not used for swimming at this location). Note the log-scale on the *y*-axis.

Although fish monitoring did not form part of the investigation, from existing records and recent fishing in the wider catchment, it appears that sensitive native fish species are absent from the Mangatarere Stream headwaters and its tributaries – despite being found in the headwaters of the Waiohine River catchment. The reason for this is unclear; it may suggest that the sensitive migratory native fish species are "choosing" not to migrate into the Mangatarere catchment.

## 5. Next steps

Once the complete set of results have been compiled, more detailed analyses will be undertaken, including an assessment of water quality trends using data from long-term SoE river and groundwater monitoring sites. Reid's piggery and Carterton WWTP resource consent monitoring data will also be examined, along with information obtained from recent compliance inspections of dairy

[2] Groundwater discharges into Beef Creek, the other tributary streams and directly into the Mangatarere Stream in the lower catchment reaches. Overall, the Mangatarere Stream gains about 200 L/s from groundwater between Anderson's Line and the Waiohine River confluence.

[3] Note this guideline is a "trigger value" that is generally applied to the median value of a data-set.

farms in the catchment by Greater Wellington's Environmental Regulation staff.

A draft technical report is likely to be available around May next year. The final report will be presented to the Regulatory Committee in June, with copies sent to interested landowners and consent holders, local iwi, and organisations such as Fish and Game, the Department of Conservation and Sustainable Wairarapa.

## 6. Recommendations

*That the Committee*:

1. ***Receives** the report.*

2. ***Notes** the content of the report.*

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