Case study:
Stormwater discharge monitoring

Story by **Kathleen Kinney**, Boffa Miskell.

Tauranga City Council was granted a comprehensive stormwater consent in 2012 for the discharge of stormwater throughout Tauranga City.

Conditions of that consent required monitoring of stormwater quality and ecological values of freshwater and marine receiving environments.

A monitoring plan was developed with input from a team of ecologists from Boffa Miskell's Tauranga office and implemented the following year.

The end of 2017 marked the completion of five years of monitoring which provided data to assist in identifying sub-catchments with stormwater quality and/or receiving environment issues in order to focus on treatment and/or remediation efforts.

"The monitoring incorporates both stormwater discharge quality and the ecological values of receiving environments," says Boffa Miskell ecologist, Kieran Miller. "Monitoring of receiving environments is further divided into freshwater and marine ecosystems."

Stormwater samples were collected from 41 sites over five years. At each site, water samples were collected on five separate occasions each year, including quarterly baseline samples and a single storm event sample.

Baseline samples were collected from each site after a period of at least three days with no rainfall, while the storm event sample was collected within 24 hours of a less than one in ten-year rainfall event.

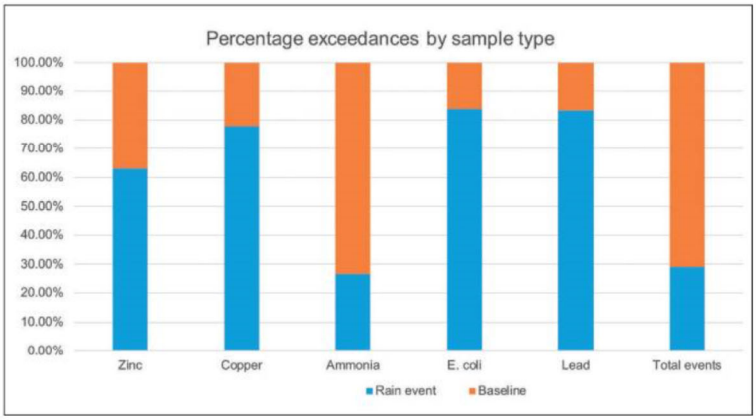
Samples were analysed for parameters, such as pH, total suspended solids, total petroleum hydrocarbons, chemical oxygen demand, nutrients, heavy metals and E. coli.

The results were compared against trigger values, and if a particular contaminant was found to exceed the trigger level over consecutive sampling occasions or in the same quarter over consecutive years, then further investigation of the contaminant source would be required.

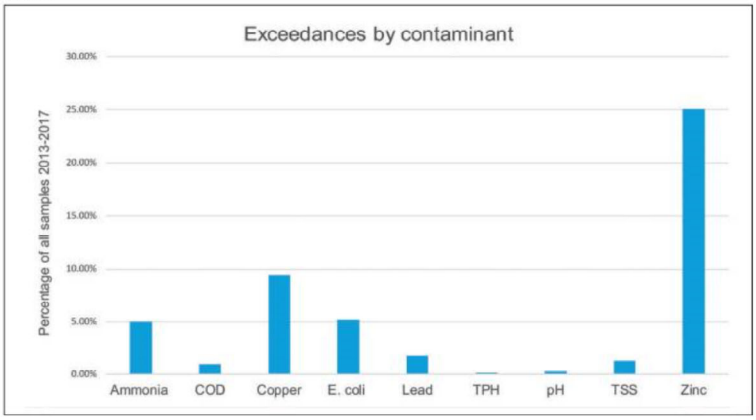
The sampling results are being used by Tauranga City Council to prioritise future work on sub-catchments with contaminant issues.

Of the 41 stormwater quality monitoring sites: Water quality samples from 24 sites (across 16 sub-catchments)

Graph 1.



Graph 2.



Graph 1: Although baseline event samples comprise the majority of samples, zinc, copper, E.coli and lead are disproportionately represented in rainfall event samples.

Graph 2: Zinc clearly is the headline contaminant for the measured sites.

contained contaminants which exceeded trigger values over consecutive sampling occasions and/or in the same quarter over consecutive years requiring further investigation.

Of the 28 freshwater ecology sites: Three sites recorded a contaminant which exceeded consent trigger levels, and nine sites were categorised as having poor ecological values, including poor macroinvertebrate indices, low fish diversity, and low habitat score.

Of the 49 marine ecology sites: Three sites recorded a contaminant which exceeded consent trigger levels, and three sites were categorised as having poor ecological values, including a low number of invertebrate species and low Shannon Weiner diversity index.

Zinc was the most common contaminant to repeatedly exceed trigger values, with this occurring at 23 sites. Copper was the next most common, with repeated exceedances occurring at six sites. E.coli repeatedly exceeded trigger values at four sites.

"The completion of the first five years of stormwater monitoring comes at an opportune time for Tauranga City Council," says Radleigh Cairns, TCC Consents officer.

"Council recently set up a new Environment Committee and are forming an environment strategy, which includes a focus on water quality, and protecting and enhancing Tauranga's natural environment.

"It is also the start of a new Long-Term Plan cycle, thus enabling funding for proposed mitigation to be included and the opportunity to collaborate with other programmes such as City Transformation and Parks restoration projects."

Proposed remedial actions include:

- Refining the monitoring programme to better represent the receiving environment, increase monitoring of stormwater discharges and remove redundant sites;
- Investigative sampling to identify the specific areas of a sub-catchment, or particular sites which are the source of contaminants;
- Pollution prevention audits or site investigations within sub-catchments which have recorded repeated contaminant exceedances;
- Installation of stormwater mitigation (rain gardens, bio-swales, filtration devices, floating wetlands) where contaminant issues are well understood and where exceedances cannot be attributed to individual sites; and
- Riparian enhancement and habitat restoration within open waterways to improve ecological values and protect existing values.

Kieran and Radleigh will jointly present a comprehensive report on this project at the Stormwater Conference in Queenstown this month. **WNZ**