

Key points

- Soil quality monitoring across 15 new sites in Marlborough highlighted that in general soil quality is acceptable. However there are some issues with soil compaction, particularly at cropping sites, which will need monitoring over time.
- Trace element monitoring indicates that values in Marlborough are typical of background concentrations found in New Zealand soils, except cadmium which was elevated at some sites.
- Soil compaction has been found across a number of dairy farms sites. This is likely to affect pasture growth in these soils.
- We all have a part to play in maintaining soil quality.

Why do we monitor soils?

- Soils are the protective skin of our planet - they store water and nutrients, mitigate greenhouse gas emissions, filter and breakdown pollutants and act as a buffer between the atmosphere and aquatic environments.
- Soils are at the heart of our economy, underpinning our agriculture, viticulture, forestry and tourism industries.
- Not least, soils are the platform on which we live and build our houses.
- However, soils are fragile and if they are not carefully managed they are at risk of degradation.
- It is therefore vital we have detailed information on what effect we are having on our soils.

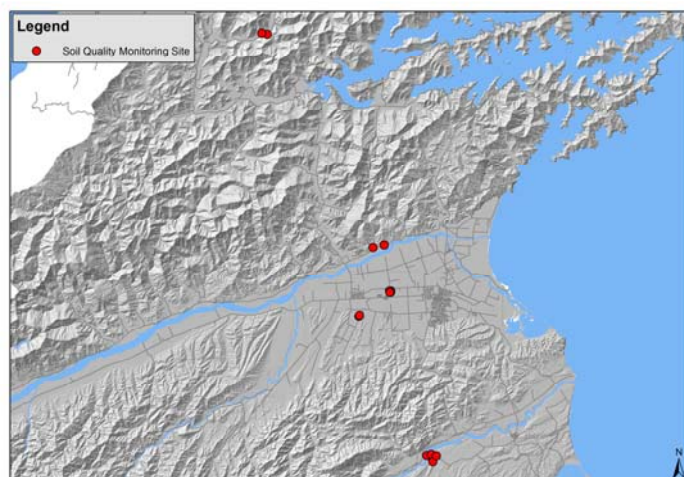


Figure 1. Location of soil quality monitoring sites sampled in 2010.

What happened in 2010?

Soil quality monitoring

To determine what effect land use practices are having on the quality of our soils, the Council undertakes a soil quality monitoring program.

The monitoring program involves collecting soil samples from sites that represent the main land use activities and soil types within our region and testing them for physical, chemical and biological properties shown to be robust indicators of soil quality.

Currently there are 60 soil quality monitoring sites across our region.

In 2010, 15 new sites were sampled covering four different land use activities including cropping/rotation cropping, viticulture, drystock pasture and dairying and representing 11 different soil types from 3 soil orders.

What have we found?

- Monitoring results indicate that only 6 soils met all their soil quality targets, 3 others had one indicator out of the target range while remainder had 2 or more indicators out of the target range.
- Several sites showed signs of poor physical condition. This included soil compaction i.e. high bulk density, low macroporosity and low aggregate stability. These were mostly the cropping/rotational cropping sites which also often had low or depleted soil carbon contents.
- This puts these soils at risk of poor aeration, impeded drainage and surface crusting all of which may potentially affect crop performance and predispose the soil to surface runoff, nutrient loss, erosion and flooding.

Trace Elements in Soils

- Soils were sampled from 126 sites across Marlborough that represented different soil types and land use activities in the region and analysed for total recoverable arsenic, cadmium, copper, nickel, chromium, lead, zinc and, at selected sites, fluorine.
- Trace element concentrations in soils were similar to typical background concentrations found in New Zealand soils.
- With the exception of cadmium, there didn't appear to be any difference in trace element concentrations between land use activities.
- For cadmium it was found that there were higher concentrations on dairy sites; possibly related to higher inputs of phosphate fertiliser which has been shown to contain cadmium as an incidental impurity.
- While soil cadmium concentrations were above background, in the majority of cases in the medium term concentrations are unlikely to accumulate to concentrations that will exceed the proposed guideline values.



Figure 2. Example of soil recovering after pugging at one the dairy sites sampled

Soil compaction/pugging

- Soils were sampled from 51 dairy pasture sites and analysed for soil macroporosity and bulk density - two measures of soil compaction/pugging.
- It was found that all the sites sampled (with the exception of those soils taken from under fencelines) showed evidence of soil compaction/pugging.
- This is likely a result of animal treading on pastures when they are too wet which has effectively reduced the large pore fraction in these soils.
- The degree of soil compaction/pugging found is likely to have a negative effects on spring pasture growth.
- There are a number of potential prevention/mitigation methods that can be employed to reduce or minimise soil compaction/pugging including:
 - Graze wet paddocks before the wet part of the year
 - Drainage of wet soils
 - Good pasture cover
 - Use of feeding platforms
 - Standoff areas
 - Decreasing winter stock numbers by moving stock onto well drained soil types off-site
 - Shallow (i.e. 20 cm) mechanical loosening of soil
 - Cultivation possibly prior to re-grassing

What else is the Marlborough District Council doing?

- Sampling and testing soils under various land uses to monitor the quality of soils across the region.
- Undertaking specific soil monitoring programs including:
 - Effects of winery waste on soil properties
 - Risk map for land application of liquid wastes
 - Mapping loess soil Southeast of Blenheim
 - Investigation of landscape re-contouring in South Marlborough

What can you do?

- Get your soil fertility right to meet your production goals by undertaking a nutrient budget for your farming system.
- Maintain or enhance soil organic matter by growing annual cover crops between productive crops and reducing cultivation and soil disturbance in cropping soils and applying compost, organic manure or effluent to the soil.
- Look after soil structure by avoiding working the soil when it is wet.