

Case Study

Wainono Dairy Farm uses the HydroMetrics GW50PC to monitor Environmental Footprint



Challenge

To improve the environmental footprint of Wainono Dairy Farm by monitoring and analysing real-time continuous water quality data as it flows underground from the top to the bottom of the farm.

Formerly the dairy farm relied on quarterly 'grab' samples taken manually and sent to a laboratory for testing. The infrequent nature of the data captured made it difficult to establish trends or capture the magnitude and timing of fluctuations in nitrate levels after weather events or seasonal farming practices.

Solution

Three shallow groundwater nitrate monitoring sites were established using HydroMetrics GW50PC sensors. Data is being captured and analysed with support from the in-house HydroMetrics team.

Benefits

Benefits to date of the HydroMetrics GW50PC sensors include:

- Easy-to-access real-time information on the frequency and magnitude of seasonal nitrate concentration spikes stemming from different weather events
- Insights into the impact of farm and neighbouring land management on water quality
- Quantitative data to inform Wainono Dairy Farm's environmental investment, e.g. riparian planting, and to measure the impact
- Generation of clear evidence of a landowner's commitment to responsible environmental management
- Engagement of other local farmers and stakeholders through the provision of relevant, accessible water quality data, to increase understanding of water quality across the catchment



Wainono Dairy Farm uses the HydroMetrics GW50PC to monitor Environmental Footprint

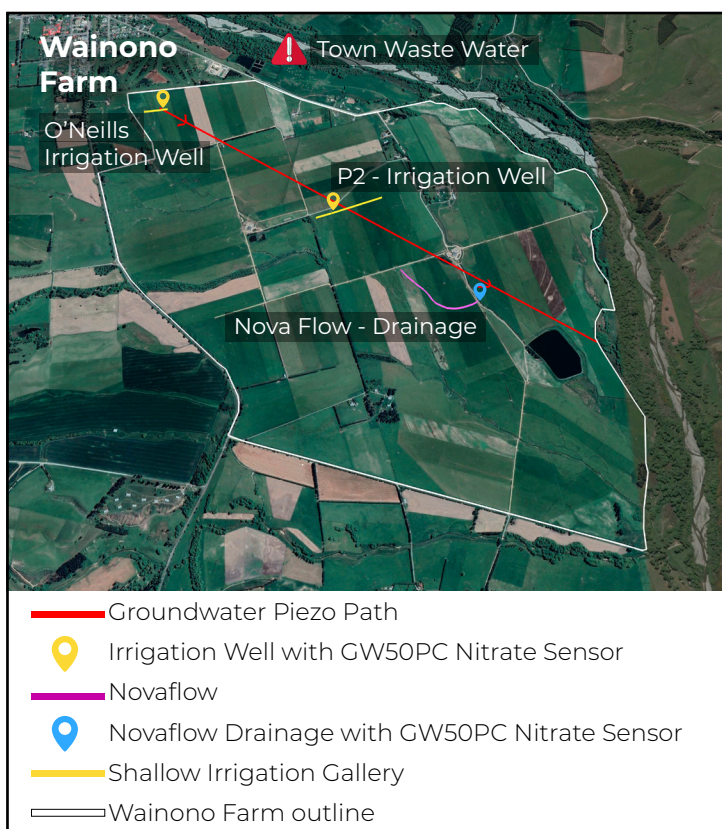
A partnership approach

Wainono Dairy Farm and The AgriBusiness Group (a primary sector business consultancy), supported by the Our Land and Water Rural Professionals Fund, are evaluating the application of real-time water quality monitoring, and sharing their findings with universities, the local irrigation company, water catchment groups, community stakeholders, industry representatives, rural professionals, and the local iwi Te Rūnanga o Arowhenua.

Setting up the nitrate sensors

“Quarterly sampling just didn’t provide the full picture,” explains John Wright, Shareholder and Managing Director of Wainono Dairy Farm Ltd. “I didn’t know if a spike or a dip was a one-off or part of a pattern. I had been looking for a solution like the HydroMetrics nitrate sensor for a long time.”

Three nitrate sensors are installed in a transect along the general groundwater flow direction to allow comparison of upper, middle and lower farm nitrate concentrations and dynamics. A new weather station installation also provides information to support the analysis of the nitrate readings in relation to environmental variables.



Background:

Wainono Dairy Farm is located near Fairlie in the heart of the South Island of New Zealand.

A 672 hectare dairy farm running 3.5 cows per hectare, it is mostly irrigated with relatively low annual fertiliser applications. Average rainfall is 739mm/year.

The farm borders a river and has several tributaries. It encompasses 10 soil types ranging from poorly to well-drained.

The farm is located in what has been defined as a high nitrogen concentration area, meaning reductions in nitrogen losses are required.

Accessing the real-time data

Data is uploaded to a portal hosted by HydroMetrics. John and nominated stakeholders, including John’s irrigation company, are all able to access the data in real-time. “I access the data every three or four days and always before and after a weather event,” he says. “It’s easy, efficient and straightforward to understand.”

Interpreting the rich information

Even though it is early days for Wainono Dairy Farm, John can already see the power of real-time data collection.

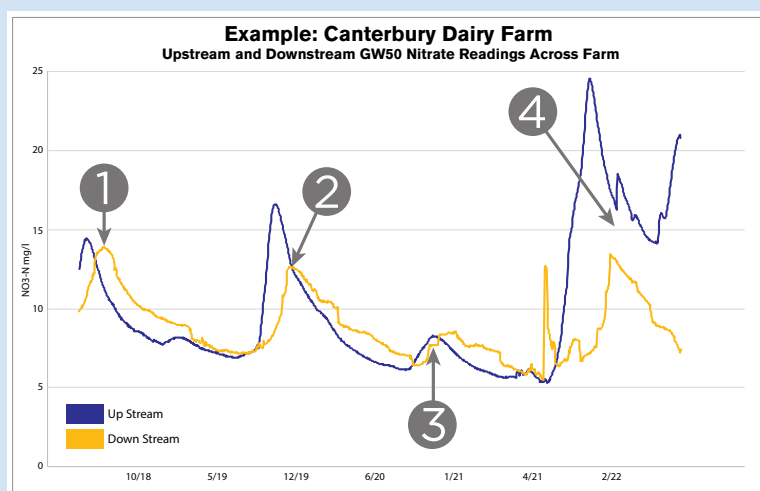
“Levels are going up and down quite a bit, as we suspected from the quarterly spot samples we took previously, but now we can go much further and identify trends. I can already see the potential in terms of how we manage our grazing and when and where we fertilise. We are also detecting high nitrate levels in the groundwater coming onto our property which is interesting.”



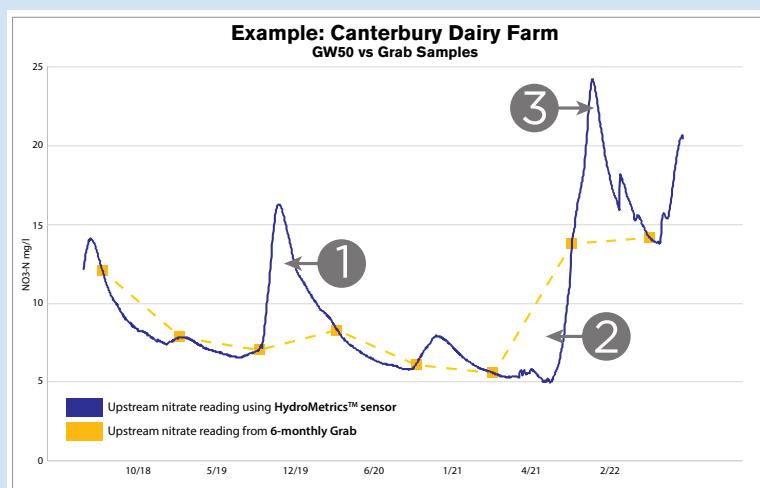
Wainono Dairy Farm uses the HydroMetrics GW50PC to monitor Environmental Footprint

Example: Canterbury Dairy Farm

Another farm located in the central South Island has been collating data for over four years and has had similar insights. This farm has also identified high variability of nitrates across the seasons through the use of the HydroMetrics GW50 probes. Here, the upstream (in terms of groundwater flow) spikes of nitrate appear on the farm boundary and travel across the farm to be seen some weeks later at the bottom boundary. There is no evidence the farm is contributing to these periods of increased nitrate concentration.



- 1 High nitrate pulse arrived at upper boundary of farm before moving to the lower boundary
- 2 Downstream peak concentration typically lower than upstream indicating farm not contributing significantly to elevated nitrates
- 3 Dry winter with limited leaching reducing nitrates received in the shallow groundwater
- 4 Extreme rain even 200mm+ after previous dry winter creates significant leaching event



- 1 Sensor detects NO₃-N spike
- 2 Sensor detects NO₃-N reduction
- 3 Sensor detects NO₃-N spike

Benefits:

- Reasonable confidence that the high levels of nitrates are not a result of their farm management. It would appear the spikes are generated by land use activities upstream of the farm.
- A good understanding of typical lag time as nitrates cross the farm to inform farm management.
- Formulation of a historical and ongoing record of nitrate levels to further inform farm management. This will help determine the impact of future farm system changes in relation to shallow groundwater nitrate concentrations.



Wainono Dairy Farm uses the HydroMetrics GW50PC to monitor Environmental Footprint

Minimising the farm's environmental footprint

Wainono Dairy Farm takes its responsibility to minimise the business's environmental footprint on groundwater and waterways very seriously and is prepared to invest to achieve results. Like any business though, John and his fellow shareholders want to be able to measure the impact of their investment.

"The sensors are already helping us to identify if we do have a problem, and if we do, what is causing it. We also see this data as a way of informing any environmental measures we take, such as riparian planting. Over time, we will be able to see if our planting really does make a difference to nitrate levels."

Additionally, John is setting the farm up for any future governmental regulatory data requirements. "We are pro-actively creating a rich baseline data set of nitrate levels over time prior to a regulator requiring the information for compliance purposes. We will have way more valuable data than that provided by spot grab sampling and a thorough understanding of the nitrate levels on our farm."

HydroMetrics service and support

Wainono Dairy Farm is also accessing the support provided by the geohydrologist team at HydroMetrics. "The support has been great. I have been able to get hold of them whenever I need them, and I am looking forward to their analysis of the data we have collated so far."



Want real-time information on nitrate levels on your farm?



Phone: +64 3 325 3700
Email: info@hydrometrics.co.nz
www.hydrometrics.co.nz

Lincoln Agritech,
Engineering Drive,
Lincoln University
Christchurch

