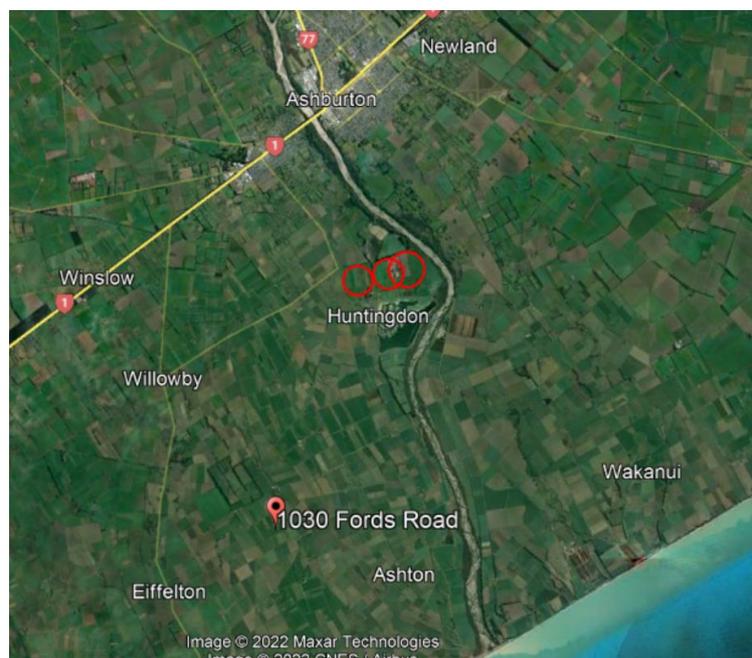


Flemington Farm - Understanding, Monitoring and Managing our Environmental Footprint

We are a family operation, farming in Flemington (1030 Fords Road), Mid Canterbury. We have some unique opportunities and challenges to monitor our environment. Our farm has tile drains essential in the autumn and spring. We have community drains. Our irrigation is from 60+ m deep wells.

We are 224 dairy platform, 750 peak cows. Stocking rate 3.34 cows. We aim for high per cow production (500+ kgMS/cow) on a grass-based farm system with a pinch of grain for the summer, and fodder beet to close the season.



Nitrogen Loss With overseer

Baseline 2009-14	28
2019/20	25
2020/21	18

Our target for 2035 is 20. While we are fortunate to have heavy soils which leach less nitrogen compared to light Lismores, we have worked hard and made a concerted effort to drop our overseer nitrogen leaching by 36%. We changed fertiliser program and established and grazed plantain. Fodder beet (low protein) used for shoulder season. We have dropped our milk production and have not been able to maintain our profitability to achieve this drop in Overseer Nitrogen leaching.

In the long term – with management practices the science and Overseer highlights we have done the right thing and will drop our environmental footprint. We trust overseer and have faith in the science. However, the short term the results and the monitoring are raising some concerns.



Effluent Monitoring and Management

- Run weeping wall system.
- Store effluent in pond, can store all winter, flush as quick as can during the season.
- Green Water washes the yards. E.g., very concentrated effluent.
- Weeping wall effluent have noted twice the concentration of nitrogen compared to peers with a two-pond system.

Solids:

Test the solids before they go on. Hills laboratory. Send a peanut butter jar in the courier. Costs \$78 / test last year.

54 Tonne wet / Ha. Apply once per year. Spread the solids across 6.5 – 7 Ha (next years fodder beet). Do in the spring pre fodder beet.

Nitrogen	34 kg/Ha
Phosphate	4.5 kg/Ha
Potash	10.0 kg/Ha

Liquids:

- Direct injection into pivot.
- Runs 10 % solution. E.g., 90 parts irrigation + 10 parts effluent
- Did a flow meter test on the pivot and a flow meter on the effluent.
- Irrigator provider can do the flow tests.
- Completed a test on 2 pivot irrigators.
- Did the same time as the back flow preventor test – was cost effective to do.

1 mm of liquid is applied with 10 mm of irrigation. Based on effluent tests:

Nitrogen	6 kg/Ha
Phosphate	0.5 kg/Ha
Potash	7 kg/Ha

Where effluent tested 7 times in the past 10 years. Found the tests in weeping wall had a bit of range. Noted the two pond systems of our peers had more range – not sure why! Testing at Hill labs / Ravensdown.

Recording to date has been manual on paper, recorded in farmIQ. Aiming to spread across the farm.

To do this:

1. Confirm your flow rates + application rates of effluent.
2. Test your effluent.

Tile Monitoring

Flemington Farm had the ability to test a tile drain that drained a fodder beet paddock

Fodder beet, grazed April/May. Planted in grass in June.

June 2020	6.5	(Very dry autumn no great rainfall).
July 2020	6.7	
May 21	9.2	(after heavy rain event – in pasture).
April 22	7.98	

Highlights that it was a rainfall event that created the leaching. Please note – you cannot control the rainfall.



Stream Monitoring & Riparian Planting Impact

Water drain starts on our property but will include drainage from up country. Planting carex secta between the paddock and the drain. Planted 4 years ago. Well established, 1 meter high. Have been nitrate + periphyton + temperature + phosphate (tested once, not there). Have tested the drain monthly, as part of MHV (Mayfield Hinds Valletta Irrigation, in conjunction with Hinds Water Enhancement trust) project involving 150 sites. Were testing personally was doing four times a year. Early days for a trend, but the results look promising, we are noting a slight drop across the 100 m section planted.

Well Monitoring

Wells are 64 and 68 meters deep. Approx. 3 km apart. Both are irrigation well, and can feed the cowshed. Both wells in the same aquifer.

Pottle test being carried out 4 times per year. For past year every month as part of MHV/HHWet project. Have measured from 2011 to 2022.

Lessons learnt so far:

1. The wells vary. Can be up to 2 ppm difference between the wells at the extreme.

2. Levels		Well #1	Well#2
a.	2011 June	3.8	4.35
b.	2021 March	5.4	7.1
c.	2021 May	6.45	7.94
d.	2022 Jan	6.33	7.82
e.	2022 Mar	6.33	7.46
f.	2022 Apr	6.82	8.92

Average

Conclusions from water monitoring. Rainfall events of May 2021 and heavier rainfall mid Canterbury experienced December 2021 bumped up the nitrogen levels in the wells. The experts tell us that these increases will be with us for many years to come. Deep water 70 years for the transition across the Hinds plain aquifer. Shallow water 12 years.

Current plan change II requires 6.9 ppm by 2025. A concern when the trend in our wells is going up despite the management steps we have taken.

Soil Testing

Soil test 25 % of the paddocks every year, scattered through the farm. Increasing to of the 50% farm. Have been working 10 years to get sulphur levels up. (Fortified sulphur Fertiliser). Need to have monitoring soil tests.

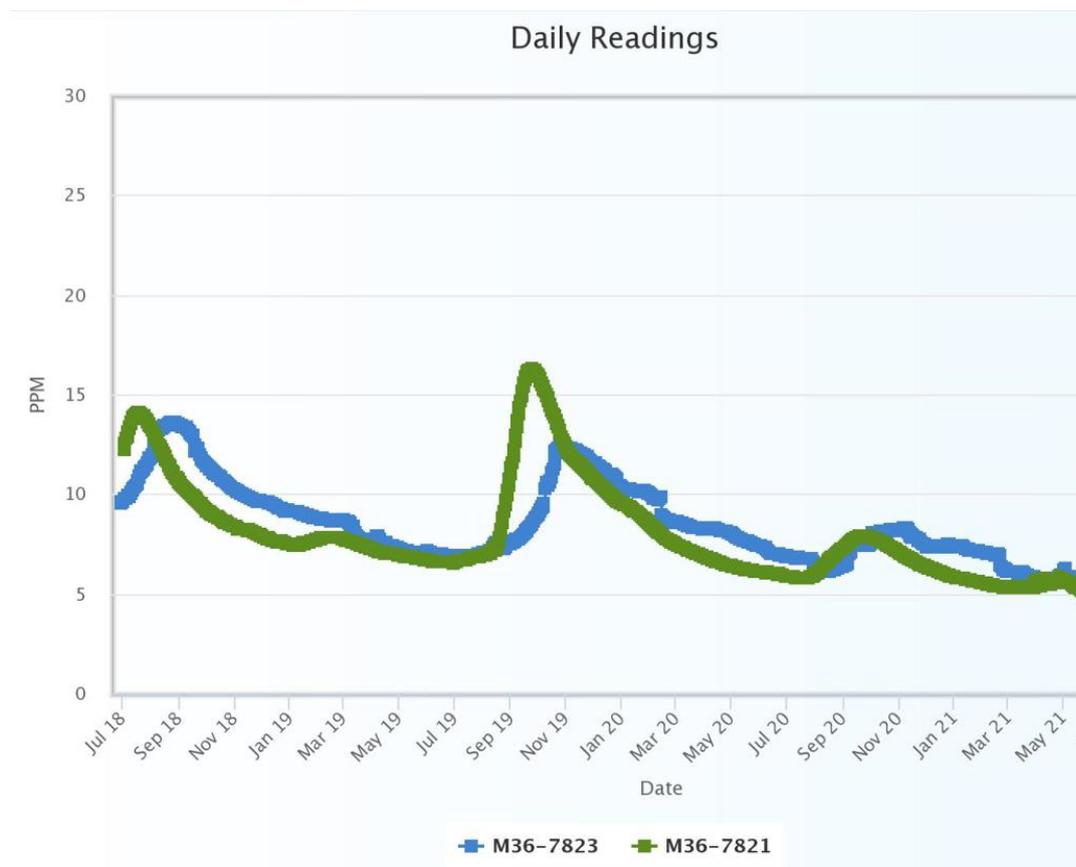
Herbage Test

Have done herbage testing to see the impact of lower nitrogen on feed parameters and doing dissections of pastures. Seasonal variation is having a big impact on clover performance. Cool damp this season helped the clover to perform this season – watch this space.



Water Monitoring – LUDF

Hydrometrics – Data. Monitors.



Green Well – 7821 – top of farm

BlGreen Well – 7821 – bottom of farm

LUDF has been monitoring nitrate levels using sensor equipment provided by Hydrometrics. These sensors can be installed in the wells, or in the plumbing at the top of the wells. As shown, the water quality in these wells (25-30 m) is reasonable most of the year. But spikes in Nitrates do occur after rainfall / leaching events. A similar trend noted on Flemington farm. Note in the very dry autumn of 2020 there was negligible leaching, the very wet autumn of 2022 had a big spike in leaching of 20+. From the data and graphs when analysed, it appears that LUDF only has a minimal effect in increasing N concentration as the water flows across the farm. Bear in mind, this will be accumulative as the water flows under the plains.