Wai Nui Farms Reuse and Best Practice Surface Irrigation system

AGRICULTURE VICTORIA

Macalister Irrigation District Irrigation Incentives Program

AT A GLANCE

Project:	Best Practice Surface Irrigation (BPSI) and Reuse System
Farm area:	530 ha
Soils:	Low permeability
Water Source:	Modernised Southern Rural Water (SRW) outlet
Flow rates:	Previous: 7 ML/ha Upgraded: 14 ML/ha
Watering Time:	67% faster
Labour:	Halved
Water saved:	0.2ML/ha/irrigation (34%)
Total area for BPSI:	50 ha
BPSI Project Cost:	$207,130
BPSI Rebate:	$5,720
BPSI cost:	$4,143/ha

Area draining to reuse: 105 ha

Reuse Project Cost:	$84,925
Reuse Rebate:	$42,000
Reuse cost:	$809/ha

"Now with the 10ML reuse system we get an extra irrigation from the water caught," Zane Carnachan.

Zane and Bernie in front of their new reuse system.

THE FARM

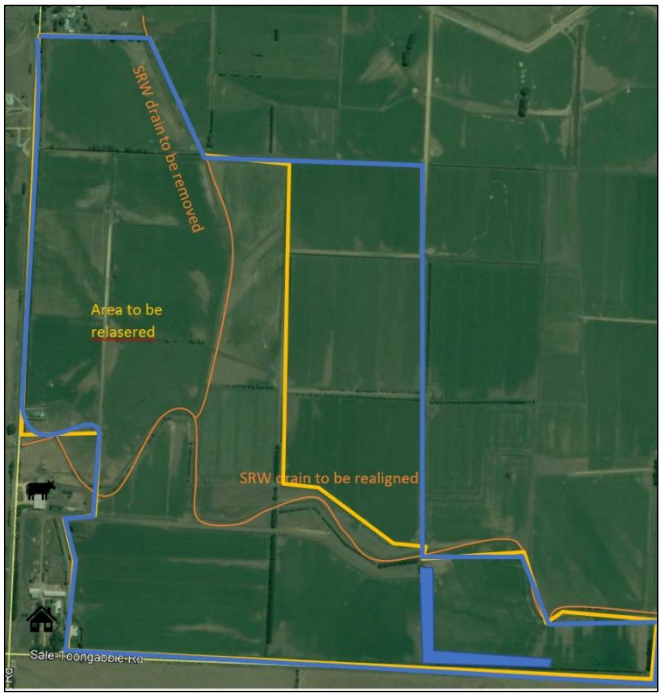
Bernie and Zane Carnachan have been upgrading their on-farm irrigation infrastructure since taking on their 600 ha dairy farm, of which 530 ha is irrigated.

They've been upgrading the irrigation system in stages to grow more grass for their 1,200-cow herd and to reduce labour.

Economic Development, Jobs, Transport and Resources

West Gippsland Catchment Management Authority

EFS Agricultural



Map of the area to be upgraded.

Previous Irrigation System

Previously, the farm's irrigation system was the old-style flood irrigation, with small flow rates, clay pipe outlets and many small bays. The maximum flow rate across the farm was 7ML/ha, supplied via 6 wheels. This meant that it took a long time to irrigate the whole farm and the watering of bays was slow. Irrigating a paddock took 25-30 hours previously, as it was split into multiple small bays and the internal farm channels were too small to handle large volumes of water. Not all paddocks on the farm could be irrigated efficiently, which meant that during the summer months those areas often weren't irrigated. This caused a reduction in potential grass grown.

The farm layout meant that there was no uniformity and small bays would run in different directions. Labour was required to be constantly around the farm because of the small bays, as the water needed to be changed from bay to bay. Therefore, the cost of irrigating the farm previously would have been $1,750 per irrigation. All runoff from irrigation also went into the roadside drain, which resulted in no water or nutrient capture on the farm.

New Irrigation System

Before Wai Nui Farms started to redevelop their farm, they updated the irrigation farm plan to detail how they wanted to set up their new irrigation system. There was a focus on bringing in as much irrigation area as possible.

The plan showed the potential to rationalise their SRW supply outlets in return for a modernised slip meter. This in turn gave them consistently high flow rates and led to them upgrading 50 hectares of their flood irrigation to best practice surface irrigation.

Having the farm plan has also meant that the irrigation redevelopment has been able to be completed in stages.

It began with a reuse system being constructed to catch all runoff from 105 ha in a large 10ML dam. The reuse system can be currently reused over 16 hectares, but once the next stage is completed (estimated Oct 2018) then the reuse system will be able to be used over 50 hectares. This ensures that tail water and nutrients are reused on farm instead of being lost down the drain. It will also allow for flexibility in irrigation timing and provides an opportunity to irrigate over winter.

The upgrade has significantly changed the irrigation and drainage that occurs on the farm. The opportunity to reset the irrigation layout has provided many options for Wai Nui Farms. Due to the rationalisation of the farm outlets, they were able to convert an old SRW spur channel into a farm channel and they were able to take over some of the SRW drain that cut the area. They were also able to realign the major SRW drain to straighten it up. Redesigning the irrigation bays completely allowed for the inclusion of the hard to irrigate areas – increasing the area irrigated by 21 hectares.

The area is now supplied by a 20ML/day farm channel, which can supply 14ML/day flow rates on to the bays. All bays have been set up with good slopes and drainage that runs to the reuse system. The bay outlets installed can be automated.

The higher flow rates have resulted in a labour saving. It now takes 6-7 hours to irrigate a paddock or 1-2hours to irrigate a bay and there is no need to irrigate at night. The cost is now only $575 per irrigation for the same area which costed significantly more prior to the upgrades.

In the future there is an aim to include automation to further reduce the time spent irrigating and continue to update the other areas of flood irrigation in sections.

Map of the area that has been upgraded.

"Prior to the upgrades there were areas we dried off on farm as we couldn't water them well enough. Now we can water them all through the season which helps with carrying more young stock at home," Zane Carnachan.

KEY BENEFITS

	Previously	Now	Difference
Area Irrigated (ha)	90	111	+ 21
Irrigation length (hrs)	60-70	23	- 42
Flow rate (ML/day)	7	14	+ 7
Water use/irrigation (ML)	20	13	- 7
Area irrigated from reuse	0	16 (50)	+ 16 (+ 50)
ML/ha/irrigation	0.66	0.44	- 0.22
Number of irrigations/season	9	15	+ 6
ML/ha/season	6	4	- 2

Table 1: Benefits of irrigation upgrades before and after development.

Irrigation practices

The upgraded flood irrigation system is beneficial in terms of time management, irrigation practices and improved flowrates.

The flow rate on to bays has doubled from 7ML/day to 14ML/day, which has resulted in the time taken to irrigate the area from 70 hours down to 23 hours.

The irrigation bays now only take 1-2 hours to irrigate which reduced the time the paddock is water logged.

Over the irrigation season the farm used more water than it used to, but that is due to the increase in area that is able to be irrigated and the ability to match plant water requirements.

Increase in area irrigated

Redesigning the flood irrigation layout meant that an additional 21 hectares of land is now able to be irrigated.

Areas that were previously dried off over the summer period due to difficulty watering and low performance are now irrigated throughout the whole season.

Labour and time management

"The labour unit has better than halved since the upgrades, and the actual time spent irrigating has also halved."

The labour costs post upgrade has reduced significantly because of these upgrades.

The old system required 60-70 hours to irrigate, now it only takes 23 hours for the same area. This reduction has reduced the labour cost to irrigate by $11,100 for the season, based on the average of 10.3 irrigations per season and average hourly cost for labour.

The new bay outlets are less of an OH&S issue for staff, with the manual labour required reduced significantly.

Water savings

The increase in flow rates and the improved 'water on, water off' time has meant that the amount of water used per irrigation has decreased by 33%. A 33% saving is quite significant - assuming during an average irrigation season Wai Nui irrigates 10 times a year, this could potentially save 110ML over the 50 hectares that has been upgraded.

Water use per irrigation has decreased by 7ML/irrigation. If as mentioned above, the estimated irrigations in a season are 10, there is a potential to save 70ML per season. Based on a rate of $100/ML for temporary water, that would amount to a saving of $7,000 a year.

"With the 10ML reuse system we get extra irrigations from water caught in the reuse system. Previously all this water was lost or our neighbors would benefit from it, but now we get to keep it all," Zane Carnachan.

Nutrients on farm

After installing the reuse system, all nutrients applied to the 105 ha is being retained on-farm.

The 10ML reuse system.

Pastures

Laser grading provided the opportunity to fully renovate the pasture and work out how to better manage the areas. The current pasture has not yet shown the anticipated improvement due to the timing of sowing.

There is potential for improved pasture production as a result of quicker water on/off times. This will lead to reduced waterlogging issues and an improvement in pasture species.

Lifestyle

Prior to the upgrades, the time spent on irrigating the farm contributed to increased fatigue during the irrigation season. With faster watering times and larger bays, the labour taken to irrigate the new area has been significantly reduced from 70 hours down to 23 hours. Someone had to be present on farm, continuously thinking about water for those 70 hours. Now it can be done in under a day or split so there is no watering overnight.

With consistent bay sizes, there is also less monitoring of the irrigation required, which means less time checking how far the water has gone down the bay. The benefit of knowing that all water is captured effectively in the reuse system ensures a less stressful irrigation and provides flexibility to their lifestyle.

Farm management

The new layout of the irrigation bays has made the areas easier to manage. There has been an improvement in cow flow due to the removal of the SRW drain and straightening up of paddocks and bays.

Key lessons learnt

The key lesson learnt was that large projects like this can cost more thn estimated, even with quotes. The initial costs and quotations were significantly lower than the final costings resulting in a much greater spend than anticipated which has resulted in a negative experience.

"With the job done, the farm is obviously in a better position, but at a capital improvement cost of around $3000/acre, we certainly haven't lifted our farm value by anywhere near that amount."

"I'm sure there has been an improvement in water use – but it is too early to tell at this stage. With many changes occurring on farm it is hard to tell for sure where the improved milk production has come from," Zane Carnachan.

FUTURE CONSIDERATIONS

Although the project has been a costly one, it will be repeated in the future in a different economic climate.

Further flood irrigation upgrades will be done when there are less other cost pressures.

Automation of the bay outlets will occur in the future, however not until the final stages of irrigation upgrades occur.

ACKNOWLEDGMENTS

A big thank you to Wai Nui Farms for sharing their story.

This fact sheet was created with the use of information from Liz Shotter from EFS Agricultural and compiled by Agriculture Victoria.


The 600ha Wai Nui Farm boundary outlined in white