



Case Study

**SOIL MOISTURE SENSORS
AND SOLAR PUMPS BUILD
ORCHARD RESILIENCE**



**South
West
NRM**

Property Profile

Grower: John Hearman
Enterprise: Commercial Fruit Orchard
Location: Charley Creek, Donnybrook WA
Soil Classification: Heavy clay profile
Water Source: On-farm catchment dams and groundwater bore
Technology: Multi-depth soil moisture probes and mobile telemetry (Supplied by Farm Link Rural)



Introduction

In one of the South West's fruit-growing regions, Charley Creek orchardist John Hearman is shifting the paradigm of traditional irrigation. Faced with growing concerns over long-term regional water security, John recognised that maintaining a resilient orchard required a clearer picture of what was happening beneath his soil.

John manages a 9.5 hectare apple, pear and nectarine orchard along with a 4 hectare nursery. By integrating multi-depth soil moisture probes with mobile telemetry, John has transitioned from visual estimation to a precise, data-driven approach.

At the same time, he's saving diesel costs by pumping water uphill while the sun shines and using gravity to feed his dripper system.

This case study explores how real-time insights into soil hydrology combined with the use of renewable energy are helping a local grower build drought resilience, optimise water-use efficiency, reduce emissions and capture substantial energy savings.



Navigating a drying climate

For permanent tree crops in the South West, irrigation is a high-stakes balancing act. Data compiled by the Department of Primary Industries and Regional Development (DPIRD) highlights a steady decline in winter rainfall and rising summer evaporation rates across the Donnybrook area, putting immense pressure on surface water storage and groundwater recharge (Bateman, 2024).

Research indicates that soil moisture extremes carry heavy penalties in apple and stone fruit systems. Under-irrigation during critical cell division stages can permanently stunt fruit sizing, while over-irrigation in heavy soils often leads to anaerobic conditions, root rot, and nutrient leaching (Bateman, 2024). For John, the move to high-tech monitoring was driven by the need to secure his business against this volatility while streamlining his daily operations.



Real-time hydro-data

To gain visibility into his soil's behaviour, John worked with Dylan Starkie at Farm Link Rural to install eight multi-depth capacitance probes to a depth of 80 centimetres in late 2025. With one probe in each of his eight orchard blocks strategically located to aid decision-making, these sensors measure volumetric water content every 10 centimetres down the profile, transmitting data via cellular telemetry directly to a smartphone.

The technology was demonstrated at John's property when Leschenault Catchment Council, in collaboration with South West NRM, hosted a Water Security Farm Walk. The event highlighted how this tech allows landholders to track the exact depth of their active root zone. Rather than applying infrequent, large volumes of water that risk draining past the roots, growers can use this data to apply targeted "pulse" allocations that match the crop's actual daily transpiration rates (Bateman, 2024).

What the data revealed

When the data began streaming in, it immediately shattered a common assumption about the property's heavy clay soil.

"The biggest surprise was how fast the water moved," John says. "Even though we are working with a heavy clay profile, the data showed the water was traveling very rapidly through the soil."

Discovering this rapid movement altered John's daily strategy. He pivoted to a "pulse" management approach—executing multiple short waterings per day to keep moisture tightly contained within the primary root zone.

"John's experience is a perfect example of why we encourage probes even in 'known' soil types," says Dylan from Farm Link Rural. "Growers often assume clay will hold water forever, but the data often shows rapid drainage through macropores or cracks."

By seeing that movement live on his phone, John could pivot his strategy immediately rather than waiting for the trees to show stress."

The operational payoff is significant. "Watering is considerably easier now, and I can manage it from any location through my phone," John notes.



System integration

True to the reality of ag-tech, the journey hasn't been without hurdles. John is currently keeping the system on manual control while the newly installed sensors settle into the clay to ensure accurate calibration. This can take 12 months, and until that time is up, John is wary of potential inaccuracies.

While the probes provide a "simple graph that's easy to see if levels are going up or down", the key for farmers is to understand how much irrigation is enough. John is becoming clearer on how to make that decision by speaking with other farmers using probes. Also, experiencing a full season with the probes will help.

"I think I'll learn more as winter progresses and I can watch how the moisture levels change."



The solar “battery”

John believes he is using less water, suggesting a modest reduction in pumping costs. But he has gone much further to reduce these costs.

“We don’t have electricity, so irrigation was running on diesel. With Donnybrook being a hilly place, I put in a lined 3 megalitre dam on a hill and installed a solar pump to move water up from lower in the landscape so that we can gravity feed from the top dam.

“On the solar side of things, there were many problems getting the design and capacity right to do the job properly,” John shares.

“The solar pump operates whenever the sun is shining and the dam operates like a battery. So, if we want to water at night or when it’s cloudy, we can.”

The dam is elevated 30 m above the orchard, providing 30 PSI of pressure into the drippers.

The financial impact of the system has been substantial. By transitioning from diesel to solar power, John estimates an annual fuel saving of between \$15,000–\$20,000.

But it’s never plain sailing with the uptake of new technology. It took the full summer to dial in the solar capacity required to power the system’s pumps for the necessary cycles.

Conclusion

John Hearman’s experience at Charley Creek underscores that climate resilience and fiscal efficiency go hand-in-hand. By letting data challenge his assumptions about soil behaviour, John is securing his property’s water future while cutting overhead costs.

Findings from regional monitoring projects suggest that the key to success with this tech is patience during the setup phase (Bateman, 2024). As Dylan notes:

“The tech is only as good as the installation. Taking the time to let probes settle and ensuring your power supply—especially solar—is matched to your pumping needs is what makes the difference between a headache and a \$20,000 saving.”



References

- Bateman, B. (2024). Modern Soil Moisture Monitoring for Drought Resilience. Department of Primary Industries and Regional Development (DPIRD), Western Australia. Supported by the South-West WA Drought Resilience Adoption and Innovation Hub / Grower Group Alliance (GGA). Available at: <https://hub.gga.org.au/wp-content/uploads/2024/03/Modern-Soil-Moisture-Monitoring-report.pdf>

South West NRM’s FEaST2030 project is supported by the Australian Government through funding from Natural Heritage Trust under the Climate Smart Agriculture Program. This case study was developed by Leschenault Catchment Council and South West NRM.