GROWER CASE STUDY

"LYNBRAE", MORAGO NSW

IRRIGATION CONVERSION:
Rice border check to beds in bays

AgEcon RESEARCH, DEVELOPMENT & EXTENSION SERVICES

CASE STUDY JANUARY 2025

BACKGROUND:
THE LAY OF THE LAND

- Growers:
  - Chris and Dan Liphuyzen, "Lynbrae", Morago NSW
- Converted bankless irrigation area under analysis:
  - 70 Ha
- Farm irrigation area:
  - 1,400 Ha
- Irrigation conversion:
  - Rice border check to beds in bays
- Water Source:
  - Murray Irrigation Ltd

MOTIVATION

To implement a more productive irrigation system and enable greater crop flexibility during both winter and summer cropping programs.

OVERVIEW OF SYSTEM

» **Before**

The traditional border check design had been the original layout from the irrigation development at "Lynbrae." Like many in the Deniliquin district, the current design has been set up for rice production.

The lack of slope has been a limiting factor in converting their land to a more efficient layout. Creating a constant slope by land forming was not only cost-prohibitive but was also limited by the existing paddock length, as a lot of soil had to be carted from the bottom of the paddock to the top, resulting in long-haul cut and fill. A suite of bankless designs such as rollover and rooftop were considered, the beds in bays seemed the best fit for the heavy clay soils and ease of implementation on very flat ground.

Overhead spray irrigation also exists on "Lynbrae" and while there are "a lot of moving parts and things that can go wrong," Chris and Dan chose to experiment with converting to row cropping beds in bays - on a small scale initially.

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» **After**

One of the concurrent projects the Liphuyzen's have been working on is to improve water management on the farm and build their internal capacity to receive and reticulate among summer cropping fields to enhance system labour and efficiencies.

The shift away from border check and independent V-layout rice field designs towards beds in bays is a work-in-progress and Chris keeps learning new and better ways to develop land more cost-effectively.

The beds-in-bay conversion is efficient to apply water evenly in a timely manner which is a key design feature. Summer row crops such as cotton are protected by beds, reducing the incidence of waterlogging that can occur during intense rain events any time of year.

Due to the location of the Liphuyzen's farm, contract seed canola production can be a lucrative winter cropping rotation option not otherwise afforded to those farms planting on rice layouts – as waterlogging from storm events can wipe out whole fields due to ponding and poorer drainage.

Therefore, a transition to a beds-in-bays bankless system offers tangible commercial benefits in the form of risk mitigation aside from efficient irrigation of summer crops.

BENEFITS: FLEXIBILITY AND RISK MANAGEMENT IN CROPPING SYSTEMS

A bankless system enables summer row crops to be grown that offer higher per hectare and ML returns than rice or pasture. In addition, growing winter crops on border check rice systems can see crops inundated with equally dire consequences and in extreme cases, whole crops have been lost.

Therefore, the new design offers far greater flexibility among crop choice and ensures those planted have improved resilience to intense rainfall events through better drainage.

The move to a more cotton-dominant summer cropping rotation has reduced water use from 14 ML/Ha applied to rice versus 8 ML/Ha on cotton and boosted the farms irrigation cropping area and overall earning capacity. The newly developed beds-in-bays bankless conversion from a border check rice system is not expected to deliver water or labour savings from a systems perspective.

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ANALYSIS OF COSTINGS

The Liphuyzen's have valued their capital conversion costs to beds-in-bays bankless using market retail rates for infrastructure purchases and wet hire (inc. labour at market) for all machinery tasks performed by excavators, earthmovers, and graders although Chris' own labour has not been quantified.

Figure 1 illustrates the cost area breakdown showing the largest cost line item being earthworks followed by concrete and leveling of the field, each between $500-$600 Ha. Other smaller cost line items include bay checks, wingwalls and drop boxes. No alterations to pump stations or supply channels were necessary. The total development cost for the 70 Ha field under analysis was calculated to be $1,960/Ha.

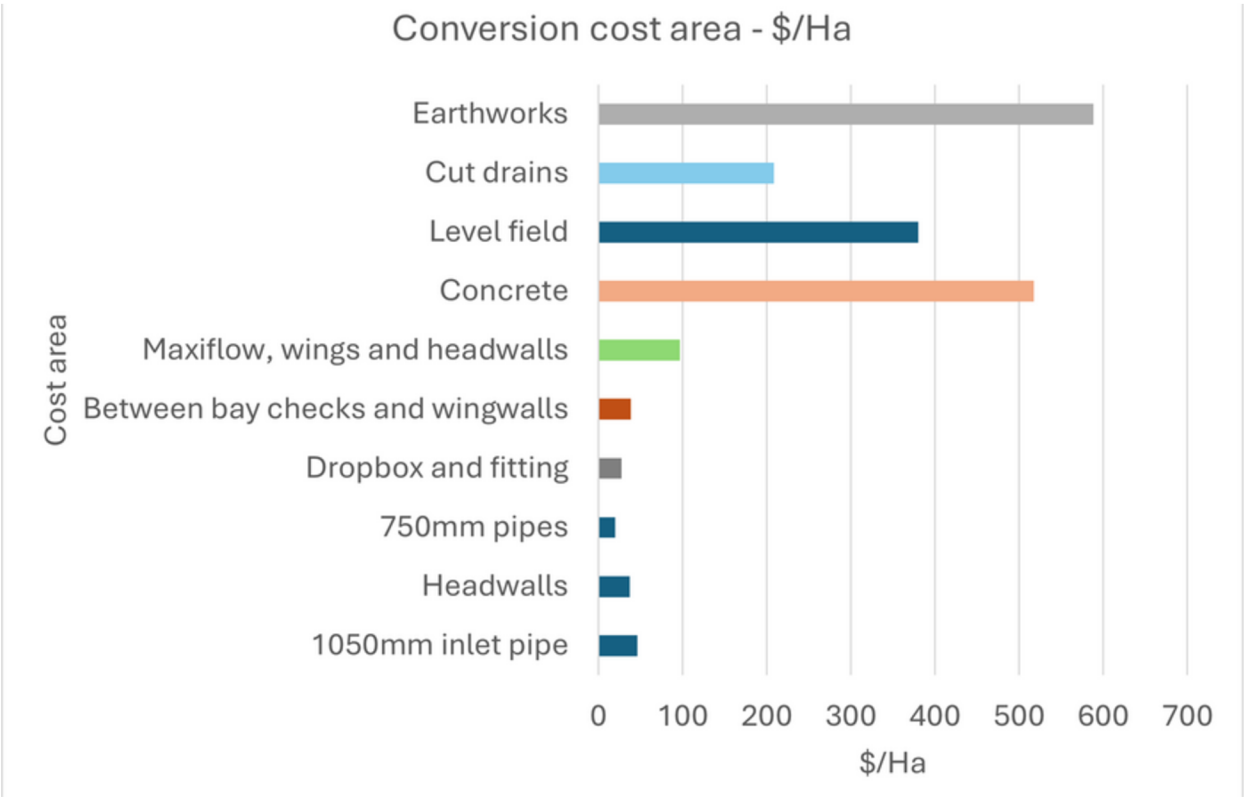

Figure 1 bankless conversion costings at "Lynbrae", Morago NSW

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PROJECT ECONOMICS

There were benefits and costs associated with a system change from border check irrigation to beds-in-bays bankless at “Lynbrae.”

The analysis focused on the system change from a business-as-usual scenario to one involving new row crop opportunities, in this case cotton. The major benefit from the system change was the lower per hectare water use and higher Gross Margin associated with growing cotton. A 20% winter crop yield benefit compared to baseline was attributed to the new system (assumed wheat for simplicity) three years in 10 during high intensity rain events which can inundate fields during La Nina years or random storm events. With minimal labour required in the rice border-check system there were no modelled labour savings under the conversion scenario.

A summary of key assumption is provided in Table 1. Gross Margin assumptions were drawn from the 2023-24 Cotton industry GM Budgets[1] and the 2024 Rice Industry GM Budgets[2].

Cotton yield – 9 bales/Ha	Rice yield – 12.5 t/Ha
Cotton water use – 8 ML/Ha	Rice water use – 14 ML/Ha
Discount rate – 7%	Water for both systems at cost - $62.5/ML[1]

Table 1 key assumptions used from converting a rice border check system to a beds-in-bays bankless system
[1] https://cottoninfo.com.au/publications/australian-cotton-industry-gross-margin-budgets
[2] https://agrifutures.com.au/rural-industries/rice/

The cost categories include all planning, equipment, and earthworks necessary to install the bankless system. There were no opportunity costs of foregone crops, with the works conducted during a planned crop fallow period.

A Discounted Cash Flow (DCF) analysis was used to measure the Net Present Value of the system change over 20 years to better account for periods of drought and low water availability. The crop rotation is irrigated cotton followed by wheat followed by fallow resulting in a one-in-two-year use of the bankless system in the fields in this analysis. It should be noted that premiums for seed canola contracts have not been included as a benefit of system change or Gross Margin included as a winter cropping alternative, nor any potential land valuation uplift or benefit that may occur from increased productivity.

A discount rate of 7% was used. The economic results of the analysis found a payback period of four years, although this would occur mid-way through the second cotton crop, or sooner if the following cereal crop were watered. The change to bankless row cropping revealed a solid Internal Rate of Return of 36%. The benefits and costs are illustrated in Figure 2 (overpage).

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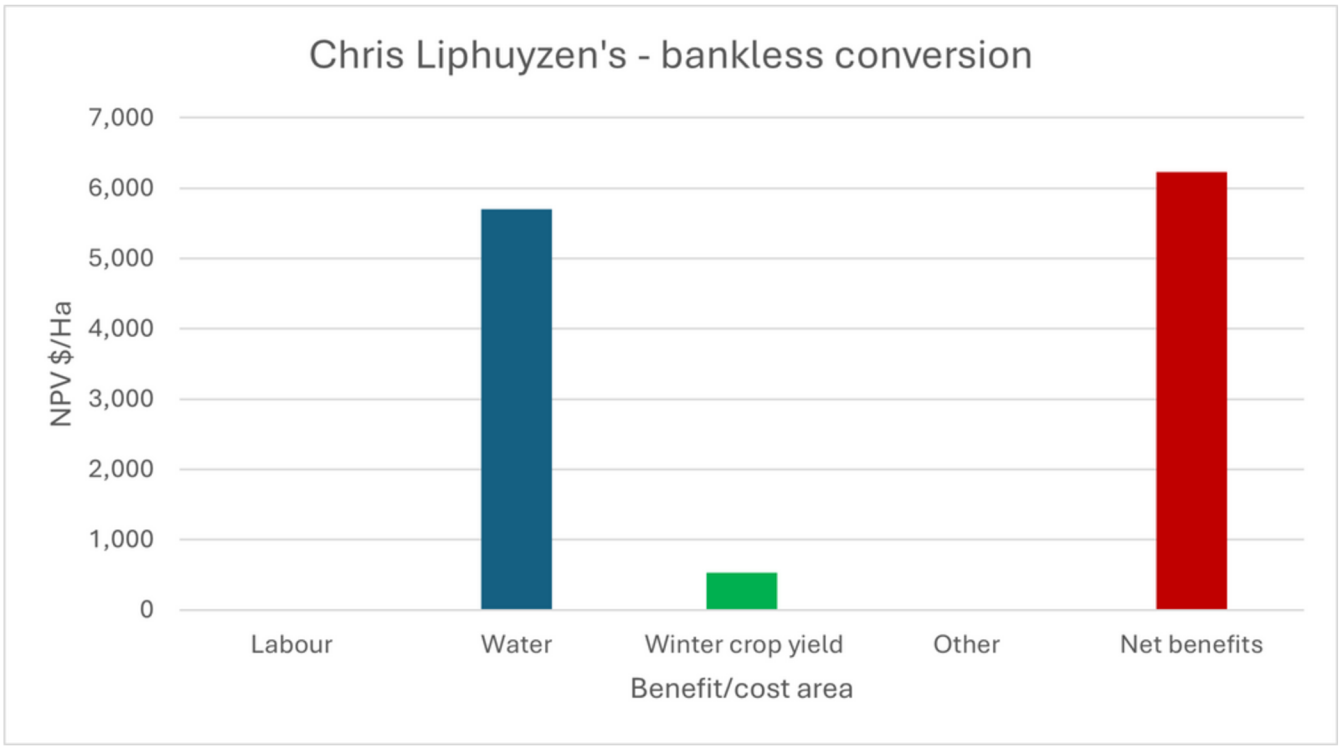

Figure 2 Present Value benefits and costs over 20 years on a bankless conversion at "Lynbrae", Morago

REFLECTIONS

After commencing a beds-in-bays bankless system two years ago the Liphuyzen's reflect on the improved field drainage across the fields through a number of years with intense storm events. The ability of these fields to recover from saturation adds a dimension of risk management which is difficult to capture in an economic study. Dan and Chris are also thinking of novel DIY ways to try and reduce conversion costs. These include making their own concrete structures that are one of the main line items.

Timeliness of earthworks, including deep ripping of fields is a key consideration in managing capital conversion costs and ensuring agronomic success in the new system – working fields that are too wet rip large, unmanageable dirt clods that can sometimes double the cost to form beds when compared with optimal timing of profile moisture in dry times. The system design change has future automation in mind for improved irrigation management and further labour savings, although there are no plans to automate immediately. The main focus is on future conversion development of around +100 ha again for 2025.

For further information:

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