Daley's Water Service Pty Ltd
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The Manager
Isis Canegrowers Ltd
48 Churchill Street
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To Whom It May Concern,

Re: Water Pricing Review: System Capacity and Capacity to Pay – Bundaberg Irrigation Scheme

I have been involved over 40 years providing irrigation consulting services to the irrigated agricultural industries of Queensland including the Bundaberg Irrigation Scheme coverage area. Many improved irrigation management practices have occurred during this time driven by the willingness of irrigators to investigate and implement water use efficiency measures.

Again, more recently I have been working with cane growers in the Isis-Bundaberg sugar growing region and have demonstrated the importance of irrigating to best match the crop's potential growth, which in this region is generally from November to March depending on the season. Experience highlights:-

> ***" Crop yield is pivotal to help dilute the cost of all other grower's inputs and is critically linked to water costs, water availability, Irrigation Water System (IWS) system capacities and farm irrigation system efficiencies".***

1. Irrigators in the Bundaberg Irrigation Scheme (BIS)

Irrigators in the BIS are confident that they have adequate water allocations to irrigate to best match crop requirement and I agree that the nominal allocation of 4 to 5 megalitres of irrigation per hectare if applied at the optimum time will achieve a district average yield result in an average rainfall year.

However, after conducting audits and performance reviews on local irrigation designs and managed system capacities, I have professional concerns about the growers' ability to achieve this result. Most systems fall well short of what the crop requires in the critical growth phase.

In some cases, more efficient irrigation systems that require large capital investments to install ie Centre Pivots, Lateral Moves and Trickle systems, have been put in place or are under consideration to better meet crop demands and improve application efficiencies. Unfortunately, this strategy has caused instances where increased irrigation equipment operating hours has resulted in incremental increases in energy and volumetric water use.

Where electricity tariffs that allow longer pumping hours have been implemented, this too has often resulted in higher input costs. Irrigators have limited control over these issues due to changes within the energy sector.

2. **Sunwater IWS System Capacity:**

The one thing a grower has little to no control over regarding system capacity is the Sun Water distribution network of IWS pipes and channels, and farm IWS access headworks. This factor has in some cases been identified as being a contributor to growers not always reaching maximum crop yield potentials. This is less relevant for those growers pumping from a river or underground resource, where the associated pumping energy costs are already much higher anyway.

It is my view gained through being involved in undertaking whole of farm system assessments throughout the region, that the delivery system, managed by Sun Water, has not been designed or maintained to cope with the current or projected water supply demand. Therefore, the Bundaberg Irrigation Scheme should be considered a supplementary system.

Buying additional IWS allocation or paying more for existing allocation entitlements makes little to no sense, if you cannot increase the instantaneous flow as required and take advantage of potential increases in productivity and profitability.

*The simple math of it all is, **"flow rate needs to match crop growth requirements over a cropping cycle"** this is not occurring in many of the systems assessed as shown in the example below.*

An example:

A 50-hectare crop that is transpiring *(using water)* at 7mm per day will need a flow rate of 40.5 L/Sec *(assuming pump operates over 24 hours without any infield losses and is matched to this demand)*.

In most cases a system like a Centre Pivot or a trickle system *(low pressure irrigation)* would operate for 22 hours taking the actual flow rate required to 44.2 L/Sec.

A travelling gun or winch *(high pressure irrigation)* would typically be operated for 12 hours which would require a flow rate of 81 L/Sec.

Note: Both examples show flow rate requirements well in excess of the system's capacity to both supply and deliver irrigation water.

3. **Irrigator's Capacity to Pay for increased water costs!**

The current set price of irrigation water and required energy to deliver that water to its source is already unsustainable for those irrigators that have no other option but to use high pressure systems on their farms. These options are often limited by farm layouts or design required to suit both landscape topography and or soil conservation requirements.

The current set price is also having huge impacts on the profitability and sustainability of other irrigators operating high capital cost irrigation systems.eg. Centre Pivot, trickle systems as further demonstrated below. If a grower such as those currently experiencing prolonged dry conditions decides to continue to irrigate, their capacity to pay for the water used is questionable even where those growers are using highly efficient irrigation systems.

Any further water resource or electricity price increases will undoubtedly result in growers having to reduce or cease irrigating due to their inability to cover water costs. In addition, they will be required to re-assess their ability to implement improvements to irrigation infrastructure due to extended Return on Investment ROI) timeframes ie a poor return on capital.

Aside from the economic and psychological stresses that this will cause to individual irrigators, another major concern, is the detrimental impact on the economic growth for the state and region as irrigated agriculture is the primary regional export.

3.1 Water Price Analysis Tool

The calculator, sensitivity analysis, output tables and graphs that accompany this report (Attachment 1b) were developed to help demonstrate the impacts to grower's profitability and sustainability of water and pumping cost variations for each of the common irrigation system types used in the Southern Cane growing regions of Bundaberg, Isis and Maryborough.

The calculator has several inputs to enable a sensitivity analysis including:

- water applied ML/ha,
- water cost $/ML,
- energy cost $/kWh,
- income from tonnes of sugar cane $/tonne
- and sugar crystals (CCS) $/tonne of sugar.

Assumptions and formula notes are as follows:

Assumptions are made with regards to the energy cost per kWh set at $0.25. (a lot of growers are now paying more than this).

The pumping cost used a unit rate of $0.25 per kWh is an average of all system types. Typically, the variables to this is associated with the water supply for example river or channel have a higher pumping cost then a pressurised outlet.

The application efficiency of each system is based on all industry averages apart from the system type management will vary this (this is a measurement of how much of each megalitre is used by the crop).

Pumping costs and system application efficiency assumptions as shown in the attached calculations and analysis tool and have been based on ten years of performance data collected under the Rural Water Use Efficiency programs.

Irrigation water use indices (IWUI) and crop water use information assumptions has been sourced from various Australian literature and is provided as averaged values.

The outputs presented are provided in gross dollars return for each system type. *(This excludes other farming cost and irrigation infrastructure cost; the calculator also does not include the impacts on yield of effective rainfall)*

3.2 Grower Scenarios

Three grower scenarios are tabled below using actual values for three irrigation system types that have previously been assessed and analysed in my professional capacity. A combination of actual measured inputs and outputs are used in each case.

Assumptions include:

- Pumping cost was known. (kWh per megalitre)
- Actual unit cost per kWh and energy provider service chargers were used.
- Water use was known. (Megalitre per hectare)
- Crop Yield was known. (Tonnes of cane per hectare)
- Current price for sugar crystals was used.

- Assumption of the application efficiency using the industry average against the effective rainfall for each growing period.
- The number of days between the crop being harvested is assumed to be 365 days.
- Industry calculator was used for tonnes of sugar crystals per tonne of cane biomass.

The growers involved are regarded as being above average irrigation managers and the information below provides a snapshot of the current capacity of these growers and their operating systems to pay for increased water costs.

The profit or loss is often influenced by the announced allocation as the fixed charges increase the cost of the remaining allocation. In each scenario using a reduced allocation of 50% (average) demonstrates the cost burden if the yield is maintained. These tables use a combination of actual values and hypothetical values of the reduced allocation where fixed charges are included for the unusable water while still maintaining the same yield

System 1: Travelling high pressure gun (winch)

A travelling high-pressure gun irrigator which is used extensively in the undulating land area close to the ISIS Sugar Mill. This grower achieved 10 tonnes per megalitre yield with a CCS of 14. The cane value was $35.00 per tonne and the CCS value was $440.00 per tonne.

5.2 megalitres of water was applied per hectare over the 20-hectare block. *A loss of $3,456.40 was calculated for irrigation water and pumping energy used using CCS value or $/tonne of sugar.*

Table 1 - HP Travelling Gun Irrigator Scenario

System Type	ML/ha	tonnes cane/ML	CCS	$/tonne Cane	$/tonne of sugar	Water and Energy Profit or Loss
HP travelling gun	5.2	10t/ML	14.0	$35/t	$440/t	-$3,456.40

Table 1a - Reduced allocation of 50%

System Type	ML/ha	tonnes cane/ML	CCS	$/tonne Cane	$/tonne of sugar	Water and Energy Profit or Loss
HP travelling gun	5.2	10t/ML	14.0	$35/t	$440/t	-$6,126.08

Note: This grower has very few options in terms of a system change due to the farm topography

System 2: Centre Pivot

A 33-hectare Centre Pivot on a slightly undulating field This grower achieved 8 tonnes per megalitre yield with a CCS of 14.7. The cane value was $35.00 per tonne and the CCS value was $440.00 per tonne.

3.675 megalitres of water was applied per hectare over the 33-hectare block. *A profit of $12,036.42 was calculated for irrigation water and pumping energy used using CCS value or $/tonne of sugar.*

Table 2 – Centre Pivot Irrigator Scenario

System Type	ML/ha	Tonnes cane/ML	CCS	$/tonne Cane	$/tonne of sugar	Water and Energy Profit or Loss
Centre Pivot	3.675	8t/ML	14.7	$35/t	$440/t	$12,036.42

Table 2a - Reduced allocation of 50%

System Type	ML/ha	Tonnes cane/ML	CCS	$/tonne Cane	$/tonne of sugar	Water and Energy Profit or Loss
Centre Pivot	3.675	8t/ML	14.7	$35/t	$440/t	$8,923.16

Note: This system is also restrained by the Sun Water outlet flow limit at 22 L/Sec

System 3: Furrow Flood

A 12-hectare Furrow Flood system that was originally designed for a travelling gun irrigator. This grower achieved 8.5 tonnes per megalitre yield with a CCS of 12.5. The cane value was $35.00 per tonne and the CCS value was $440.00 per tonne.

5.8 megalitres of water was applied per hectare over the 12-hectare block. *A loss of $3,190.32 was calculated for irrigation water and pumping energy used using CCS value or $/tonne of sugar.*

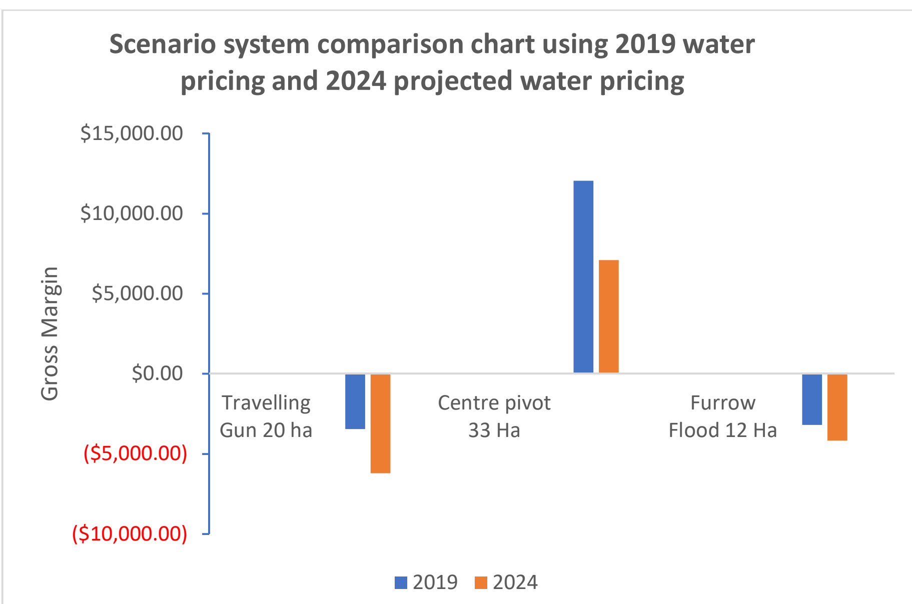
Table 3 – Furrow Flood Irrigation Scenario

System Type	ML/ha	Tonnes cane/ML	CCS	$/tonne Cane	$/tonne of sugar	Water and Energy Profit or Loss
Furrow Flood	5.8	8.5t/ML	12.5	$35/t	$440/t	-$3,192.32

Table 3a - Reduced allocation of 50%

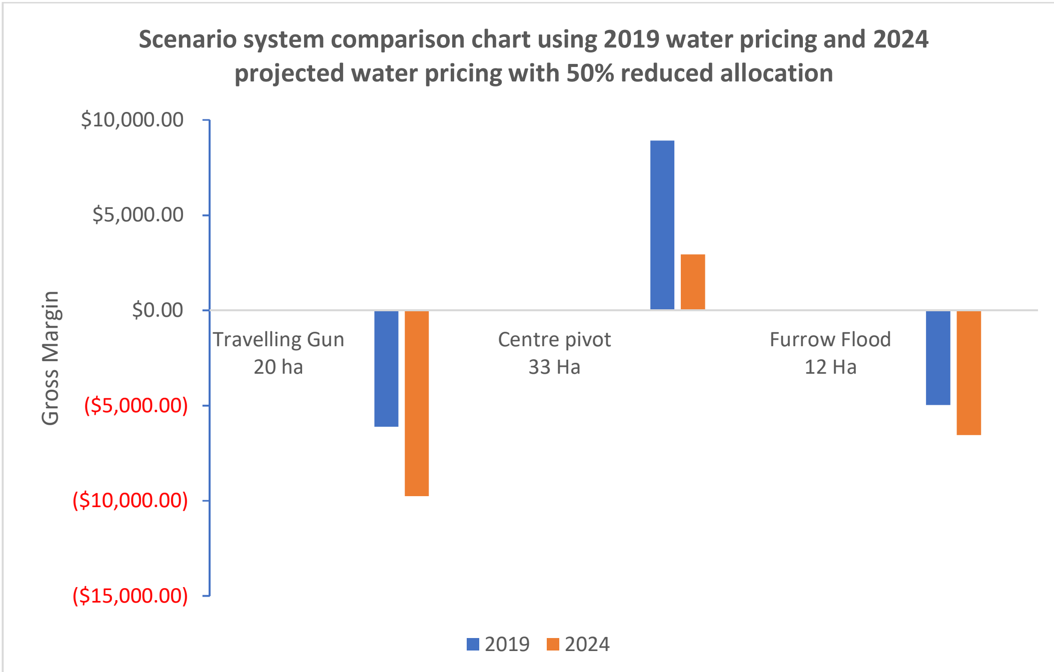
System Type	ML/ha	Tonnes cane/ML	CCS	$/tonne Cane	$/tonne of sugar	Water and Energy Profit or Loss
Furrow Flood	5.8	8.5t/ML	12.5	$35/t	$440/t	-$4,976.95

Note: (Application efficiency is above the average for this type of system and a loss is still shown as the grower still requires some pressure boost from a low KW pump)



Notes: *Although a positive gross value is shown for the Centre Pivot the return on investment is greatly reduced with the capital payback cost over 20 years at $8,500 per year plus interest and maintenance.*

Given other crop inputs are not included in the calculations it is likely that with the proposed price increases that many farms that have high debt levels will have stranded assets due to the inability to absorb these cost increases.



In conclusion, it is my professional view that irrigators are constrained by the following critical factors:

- capacity to convert water to crop yield which translates into productivity and profitability to help buffer escalating input costs the key ones being water and energy;
- labour input is increasing with rising energy costs forcing irrigators to use furrow irrigation methods which also reduces the application efficiency;
- IWS designed system capacity to be able to meet irrigation requirements. Flow rates on many farms is reducing the crop yield potential;
- Fixed charges when allocations are reduced;
- Climate variability effects in the Lower Burnett area has noticeably reduced the potential effective rainfall. This means the supplementary reliance of irrigation has increased – the BIS is now being treated as more than a supplementary scheme;
- Increased costs and decreasing crop value are preventing many growers from investing in more efficient irrigation systems; and
- Uncertainty of new power tariff cost, water cost and SunWaters ability to deliver allocations at consistent flows has made it difficult for growers to calculate return on investment on any proposed system upgrades.

Cheers

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DWS IRRIGATION