Government of South Australia
Department for Environment and Water

SOUTH AUSTRALIA - ADDITIONAL EFFICIENCY MEASURES CRITERIA ASSESSMENT OUTCOME

Project Reference No:	555488
Outcome:	Compliant with the Efficiency Measures assessment
Date recommended to proceed to public comment	7 April 2021
Date recommended to proceed to the Australian Government's detailed assessment stage	31 May 2021

Overview

The applicant is seeking to undertake integrated off and on-farm irrigation upgrades to a 36.0ha (average annual production area) centre pivot irrigated growing enterprise located near Langhorne Creek in South Australia.

The works will address existing inefficiencies in irrigation management through increasing the supply of water to the property and the irrigation area through the installation of an additional mainline, a 12.4ML on-farm storage and the activation of a recharge bore that will be used for Managed Aquifer Recharge (MAR) practices. Post project irrigation water will be able to be pumped from the new on-farm storage dam (fed by supply from both the mainline and recharge bore) at a much higher flow rate than is available through the existing sources of water supply.

All works will be delivered through local contractors meaning program investment will remain in the local community and provide direct economic stimulus. The project will contribute to the business significantly boosting the efficiency and productivity of on-farm water use which will secure existing employment at the property and also along the supply chain. The ability to store water via MAR will also mean the business is less exposed to spikes in water prices.

Environmental outcomes will be achieved through the facilitation of best practice irrigation management which will minimise drainage accessions beyond the crop root-zone. The works will also generate real and lasting water savings and a share of the water saving will be transferred to the Australian Government for environmental purposes.

A conservative water return of 20.3ML or 0.56ML/ha is nominated for the proposal.

Part 1 - State Assessment - Efficiency Measures criteria

Assessment Approach

This State Assessment is reliant on the information provided by the applicant. The comments provide a summary of the information provided by the applicant which is deemed relevant by the assessor to demonstrate that the Efficiency Measures – Agreed Criteria have been met.

Water Savings Substantiation

The water savings expected to be achieved by the project have been verified by an Independent Approved Irrigation Professional.

The water savings substantiation is provided at Attachment A.

The project is expected to return a conservative 20.3 ML to the environment, with the applicant retaining 11.7 ML of water savings.

Water Saving Component	Area ha	Water Saving (ML/ha)	Estimated Water Saving (ML)	Total volume of Eligible Water Rights offered for transfer (ML)
Increased System Capacity	36	0.89	32.0	20.3
Total Water Saving			**32.0**	

Efficiency Measures Criteria	Project Responses to Efficiency Measures Criteria	Adequate Response Y/N	State Assessment
Evidence of engagement with community, industry and government agencies during project design (Criteria 9, 6a, 6b)	6a. N/A - Private Diverter 6b. The Delivery Partner was engaged by the Australian Government in December 2018. Since this time the Delivery Partner has undertaken extensive consultation on the Water Efficiency Program with key stakeholders. Direct engagement with industry and commodity groups, irrigation infrastructure operators, Local Government, Regional Development organisations has occurred on the program. The works proposed through this project are consistent with regional plans, priorities and strategies on sustainable land and water management practices and building resilience and adaptability into the irrigated agriculture sector. 9a. Please refer to 6b. 9b. Please refer to 5b.	Y	The application has demonstrated that the delivery partner has consulted with relevant industry bodies, relevant Irrigation Infrastructure Operators, local governments and regional development organisations on a strategic regional approach to developing projects under the Water Efficiency Program. The proposed project is not located within an irrigation network, so the application is not required to provide evidence that the relevant network operator or water corporation is involved in or aware of the project.
Potential Direct Water Market Impacts (Criteria 7a, 7b, 7c, 7d)	7a. The proponent has nominated a water entitlement that they are the current legal owner of. The proposal has been independently reviewed and assessed and the volume of	Y	The application has demonstrated that: • The water rights to be transferred as part of the project have been independently verified as a conservative estimate of the water savings that can be generated and that the project will not

	water that is nominated for transfer has been confirmed to be highly conservative relative to the total potential water saving. 7b. Attachment B sourced from the SA Water Licensing System confirm that the nominated water entitlement has been held for a minimum of 3 years. 7c. As with all other projects submitted by the Delivery Partner the proposed works will result in a reduction in annual irrigation demand (by 25.0-32.0ML) however the proponent is only seeking to return a conservative volume (20.3ML) of the assessed saving so the net impact is positive post project works from a water demand/supply context. 7d. At the local irrigation district level alone the water volume that is nominated for return through this proposal represents less than 0.1% of the River Murray water entitlements on issue. A recent report released by ABARES also confirms that seasonal conditions remain the biggest driver of allocation prices across the MDB system. This project is focused on reducing annual demand and creating additional supply via retained savings and therefore will not directly increase the price of water.		transfer more water than the project will save. • The water entitlements to be transferred have been held for a minimum of 3 years at the time of application. The project will generate water savings above the volume returned to the environment and will effectively increase the water available for productive uses in the consumptive pool. The increase in available water will have no direct impact on reliability, and may put downward pressure on water market prices.
Contribution to Proponent Businesses and Irrigation District Viability	4a. The Angas Bremer irrigation area is quite	Y	The application has demonstrated that:

(Criteria 4a, 4b, 4c)	unique in that it has a number of different water sources including watercourse water from the River Murray/Lake Alexandrina and the Angas & Bremer Rivers and groundwater which is extracted from the local aquifer. Being located at the downstream end of the MDB system water security has and continues to be a key issue. The future financial viability of the region and the individual irrigation dependent businesses within it is reliant on having well adapted enterprises that optimise the efficiency and productivity of on-farm water use. 4b. Water is delivered to the property via private diversions and the works are focused on improving the existing delivery infrastructure so that existing water entitlements can then be used more efficiently on-farm. The project represents a longer-term investment in the region by modernising existing infrastructure. 4c. An irrigation code of practice operates in the Angas Bremer region and provides accreditation to growers who are successfully improving their irrigation management. To comply with the code, growers must complete Irrigation Annual Reports, maintain water use efficiency, and plant and maintain deep-rooted, winter-active vegetation. The Code of Practice is also recognised in both the River Murray and Eastern Mt Lofty		• The project will contribute to the longer term sustainability of the business and the irrigation district more generally. • The project is focused on modernising existing inefficient irrigation systems, which will position the business to capitalise on returns for agricultural production in the region. • The project will contribute to the longer term viability of the property, which will provide benefits across the irrigation district. The project is not located within an irrigation network, so the application is not required to take account of relevant irrigation business' strategies or plans.

	Ranges Water Allocation Plans. The works being proposed through this project are consistent with the objectives and goals of the irrigation code of practice.		
Support for Regional Economies (Criteria 5a, 5b, 5c, 5d, 6c)	5a. All works that will be undertaken through this project will be completed by local service providers. This will mean program level investment will provide a direct economic stimulus for the broader region. Irrigated agriculture underpins the local community and therefore any works that contribute to the longer-term sustainability and viability of local food producers provides a benefit at the local, regional, State and even National scale. 5b. Water is delivered to the property via private pipelines and the focus of this project is to increase the capacity of supply as this will have significant benefits for on-farm water management. The project works will add flexibility and adaptability into the enterprise through innovative water delivery and storage solutions which will deliver benefits across multiple irrigation seasons. 5c. The works proposed through this project are focused on maintaining and enhancing the productive capacity of the region. The works will contribute improved water security for the enterprise which will ensure	Y	The application has demonstrated that the project will: • Support the irrigated agriculture industry, which is an important sector of the regional and SA economy. • Maintain and potentially increase employment through engaging local contractors during the redevelopment and construction phase. • Generate benefits for the broader region and not just the applicant through sourcing of local farm input supplies and generating regional employment. • Increase regional and Basin wide productivity through increasing the volume of water available for consumptive uses on the water market.

	consistency of production and hence support direct and in-direct employment. 5d. As outlined in 5c. above the project works are aimed at building increased water security into the business which as an enterprise producing an annual crop is critical for maintaining markets and hence employment both directly on-farm and along the supply chain. 6c. While the project will deliver positive benefits to the proponent these benefits will extend beyond the farm gate through investment in the local community both for the project works and in the longer term. The works will ensure the enterprise remains viable and sustainable into the future and can continue to support jobs both directly and indirectly along the supply and distribution chains. The project will also generate retained savings for the proponent which will assist to increase water supply at a local, regional and Basin scale.		
Social and Environmental Benefits (Criteria 2a, 2b, 2c,)	2a. This project is located in the Angas Bremer Irrigation Management Zone which has had a long history of supporting irrigated production. While the region has been faced with considerable challenges throughout its history it has shown itself to be innovative	Y	The application has: • Described the expected socio-economic and environmental benefits of their proposed project, which include: ○ Increased productivity in terms of return per megalitre for the business and region.

	and adaptive. This project is an example of that by adopting new practices that improve the productivity of water use while at the same time delivering increased resilience into the farm enterprise. Irrigated primary production under-pins the local community and therefore investment that ensures the on-going viability of irrigation dependent businesses delivers benefits at multiple scales. Being located at the downstream end of the MDB there is an acute awareness of the importance that a healthy, working River Murray provides and this project will contribute to that objective by transferring water to the environment and facilitating best practice irrigation management. 2b. N/A 2c. N/A		○ Improving the business's long term resilience and viability, which will have flow on benefits to the local, regional and State economies. ○ Sourcing of goods and services for the project from local companies, which will add further economic stimulus to the regional community. ○ Increased regional and Basin wide productivity through increasing the volume of water available for consumptive uses on the water market. • The proposed works are on-farm and will not affect the amenity value to local communities of weirs, storages and parks. • The project is below the $4 million threshold for large projects and is not required to address criteria 2c.
Comply with all relevant laws including work health and safety laws. (Criteria 2d)	2d. The Delivery Partner has well established WHS management procedures in place which have been specifically tailored to the implementation of Australian Government irrigation efficiency programs. The proponent will be required to complete a Risk Assessment specific to the project activities and demonstrate that all required insurance is in place and current, prior to the	Y	The application has demonstrated that the applicant and delivery partner have an understanding of all relevant legislation and/or regulation that will require approval prior to works commencing and that they will comply with all relevant laws including work health and safety laws.

	project works commencing and any funds being paid.		
Business Resilience, including Drought and Climate Change Impacts (Criteria 10a, 13a, 12)	10a. Please refer to 5b. 12a. As described in 7a. the project has been independently assessed and conservative volume of the assessed saving is nominated to be transferred under the program. The project works budget has been based on formal quotations from service providers and these costs have been reviewed as part of the independent assessment process. 13a. The project will reduce irrigation demand on an annual basis however one of the single biggest benefits of the works will be the ability to irrigate the production area in a single irrigation shift compared to the current practice of having three irrigation shifts to cover the property. With extreme heat projected to be more common in the future being able to mitigate and manage these conditions is vital for sustaining the enterprise moving forward. The project works will also provide flexibility as to when and in what volumes the property takes delivery of its irrigation entitlements due to activating additional on-farm storage. This will provide both production and financial benefits for the proponent.	Y	The application has demonstrated that the project will: • Modernise existing inefficient irrigation systems, which will position the business to capitalise on returns for agricultural production in the region. • Generate additional water savings that will be retained by the applicant to improve their capacity to better manage periods of reduced water availability. • Provide the enterprise with an increased ability to endure and adapt to future climate variability and water availability by generating productivity improvements and improving profitability.
Cultural Benefits (Criteria 8a, 8b, 8c)	8a. The Angas Bremer irrigation region has been the subject of many studies over a long	Y	The application has described the expected cultural benefits of the proposed project, including the

	period of time due to the success of the community driven approach to sustainable land and water management in the region. The region has faced very significant challenges to its ongoing viability since the irrigation area was established however they have managed to navigate these challenges and continue to prosper. Projects such as this one are about building adaptability and flexibility into existing enterprises recognising that business conditions are always changing and throwing up new challenges. 8b. During implementation the project will contribute direct economic stimulus through engaging local service providers and the works will assist with securing employment within the local community. The water recovered through the project will also be used to underpin the longer-term health of the Murray-Darling Basin including priority local floodplain and wetland assets which are critical for the tourism sector. 8c. N/A		strategy for increasing the cultural benefit to participants and their communities through local sourcing of goods, services and labour. The total project value is below $3 million and is not required to identify cultural heritage sites and manage any impacts in accordance with relevant Commonwealth and State laws.

In-Principle Recommendation

The application has adequately addressed the Efficiency Measures – Agreed Criteria and demonstrated that the project will have neutral or positive socio-economic impacts and not have negative third party impacts on irrigation systems, water markets or regional communities. Accordingly, the South Australian Government provides in-principle approval for the project and recommends that the application proceed to the **public comment stage**.

Part 2 - State Response – Public Comments

Relevant Public Comments to be responded to	Response to Relevant Public Comments
It is clear this project will have negative socio-economic impacts at a broader regional level as there will simply be less water available for agriculture. Any project that decreases the total pool available to food production results in negative outcomes. On-farm projects reduce the total amount of water available to agriculture. While this proponent claims they will become more efficient with their water use, agriculture as a whole in the Basin will be worse off as there is simply less for agriculture to use. South Australia remains the only State not adhering to the agreed socio-economic criteria.	The South Australian Government prefers efficiency measures to recover water for the environment, as they provide real and positive outcomes to irrigation businesses, while supporting communities that would otherwise be hard hit by the reduction in regional productivity or the closure of businesses through water leaving the consumptive pool through buybacks. Unlike water buybacks that remove water from the consumptive pool, efficiency measures increase the volume of water available. Properly constructed efficiency measures projects recover water that is effectively "lost" through evaporation, leaky infrastructure and inefficient irrigation systems or overwatering and is unavailable for use until projects are completed. The water savings for all South Australian on-farm projects have been independently verified as a conservative estimated of water savings. Those water savings were not previously available to the consumptive pool. Additionally, all proponents of on farm projects in South Australia under the efficiency measures program have retained a portion of the water savings generated from their projects. This is increasing supply and putting downward pressure on water market prices. Accordingly, South Australian projects are increasing the water available for consumptive uses across the southern connected Murray-Darling Basin and have not reduced the amount of water available for agricultural use. South Australia continues to encourage participation in on-farm efficiency measures projects to generate positive outcomes for irrigators and regional communities, and is assessing all applications in full accordance with the Murray-Darling Basin Ministerial Council agreed socio-economic criteria.
Evidence suggests that those who participate in on-farm projects do require additional water and do enter the	Both the ABARE and Aither reports have acknowledged that it is difficult to separate the

water market, thus driving up the price. There is no guarantee that this project will not enter the market.	impact of water recovery from other major trends such as climate change and the significant growth in industries and as such the findings should be treated with caution. The ABARE report draws heavily on a recent study undertaken by ABARES, available at https://onlinelibrary.wiley.com/doi/full/10.1111/1467-8462.12396?af=R This study found that some on-farm program participants subsequently purchased water to increase their irrigated production. The study did not however directly link this to participation in the program and noted that many other demographic and economic factors are likely to influence business decisions. In fact, it is specifically stated that the study did not attempt to define or separately quantify direct and indirect effects of on-farm efficiency measures projects on water prices. The ABARES study also evaluated many projects that would not meet the criteria agreed by the MDB Ministerial Council and as a result, no conclusions can be drawn between the findings of this study and on-farm efficiency measures projects that have been submitted since these criteria were agreed. The Aither report appears to treat water recovered through on-farm efficiency measures the same as buybacks. This fails to recognise that on-farm efficiency measures are reducing demand by the same amount and in most cases more than the corresponding reduction in supply. Accordingly, it would be incorrect to infer that South Australian on-farm projects are directly attributable to increased water use and higher water market prices when they are consistently reducing water demand and increasing supply. Any expansion of irrigated area and hence water use that occurs post on-farm project is an indirect effect of the program and is likely to be driven by many other complex and interrelated economic and social factors. These indirect impacts are not considered as part of the socio economic assessment.

Final Recommendation

The application has adequately addressed the Efficiency Measures – Agreed Criteria and demonstrated that the project will have neutral or positive socio-economic impacts and not have negative third party impacts on irrigation systems, water markets or regional communities. Accordingly, it is recommended that the application proceed to the Australian Government's detailed assessment stage.

Water Savings Substantiation – Water Efficiency Program (WEP) Technical Assessment

Project ID: [redacted]

Crop Type: [redacted]

Project Summary:

The applicant is seeking to enhance the capacity of water delivery to their [redacted] growing properties located near [redacted] in the lower Murray region of South Australia. The proposal is seeking to install a new supply pipeline which will be integrated with on-farm storage via both a turkey nest dam and managed aquifer recharge bore.

A conservative water saving of 20.3ML, or 0.55ML/ha is nominated for the proposal.

Water Saving Methodology:

Presently the property produces 36.0ha of [redacted] on an annual basis which are grown under centre pivot irrigation and depending on seasonal conditions require between 250-320ML of irrigation water.

The supply of water to the property is limited by the available flow rate via the irrigation water provider (Creeks Pipeline Company) which is currently ~19l/s. At this flow rate 1.6ML/day can be supplied noting the current practice is to deliver water directly to the centre pivots with no ability to store water on-farm.

Based on locally sourced evapotranspiration data and published crop coefficients for [redacted] peak daily crop water demand can be up to ~10.00-11.00mm/day during the growing season in the region. At the nearby Strathalbyn BoM automatic weather station there have been 3 days during November 2020 that have recorded daily evapotranspiration figures of >10mm (Source: http://www.bom.gov.au/watl/eto/)

The existing water supply constraints create significant challenges with respect to irrigation scheduling as conscious over-watering occurs ahead of forecast peak water demand periods knowing that the return time for the irrigation system is currently several days.

With [redacted] being a relatively shallow rooted crop and with the existing limitations of the irrigation system soil water deficits can be created, especially during peak water demand periods. This means that there are components of subsequent irrigation applications that are required to return the soil profile to the readily available water range but are effectively unavailable to the crop. This concept is often referred to the 'green drought' and contributes to significant inefficiencies both in terms of water use and production. By increasing the capacity of water supply future irrigation management will be such that optimal, within readily available soil water ranges can be maintained thereby removing the unproductive components of current water use.

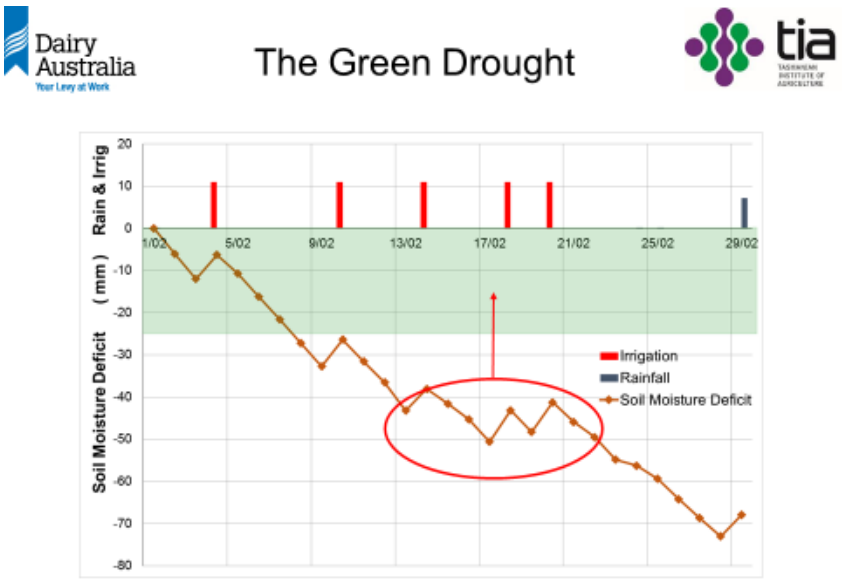

Figure 1: The Green drought: *http://www.utas.edu.au/tia-2017/centres/irrigation/irrigation-news2/irrigation-newsfeed/news-for-tia-irrigation/the-green-drought*

Similarly when rainfall is forecast it is often too risky to delay, or not proceed with irrigation as the ability to recover soil water depletions is limited especially during peak water demand periods. This means that the benefit of rainfall inputs to the crop to offset irrigation water use are currently under-utilised essentially due to the inflexibility of the existing irrigation system. While rainfall inputs during the growing season are not significant in the [redacted] region the long term effective rainfall for the November – March period inclusive is 66.0mm or 0.66ML/ha (Source: *Understanding the Water Allocation Plan for the River Murray*).

As part of the proposed project works increasing the supply of water to the property will be achieved through connecting into an existing pipeline that currently terminates to the south of the property. The enhanced supply together with the existing sources of water supply will be pumped to a to be constructed 12.4ML plastic lined, on-farm turkey nest dam and also to a recharge bore that will be used to store water via managed aquifer recharge (MAR).

The recharge bore will also provide flexibility with the timing of when water is accessed to utilise periods when it is more cost effective both within and across multiple irrigation seasons and the recharge bore will also increase the supply capacity to the to be constructed on-farm storage. A water supply capacity of 45l/s, or 3.88ML/day will be achieved post project with irrigation water that is re-lifted from the new on-farm storage.

While assigning a ML/ha water saving figure to this project is challenging as outlined above the proposed works will facilitate significantly improved flexibility and adaptability with future irrigation management compared with the existing system. Post project the system will be capable of irrigating 3 x centre pivots simultaneously compared to the existing system which can only service a single pivot. This means that the existing return time is almost 3 days which leaves crops exposed especially during extreme heat periods which are expected to become more frequent into the future.

A water saving of 10% of annual water use equates to a water saving range of 0.55 – 0.89ML/ha which we feel represents a conservative water saving when compared to other irrigation efficiency technologies that are known to yield similar levels of water saving.

Water Saving Activity	Area (ha)	Water Saving (ML/ha) /%	Total Water Saving (ML)	Conservative Water Saving (ML)	Conservative Water Saving (ML/ha)
Increased System Capacity	36.0	10%	25.0-32.0^	**20.3**	**0.55**
			TOTAL		

^ 250-320ML x 0.1 = 25-32ML

Project Budget:

Project costs have been based quotes provided by [redacted]

Irrigation Design:

Irrigation designs have been completed by a certified designer and copies have been included as an attachment to the application.

Approvals/Environmental:

Development Approval from the Alexandrina Council and Recharge Bore approval from the Department for Environment and Water will be obtained prior to these components of the project works commencing. The work are occurring on private property and the activities will not have an adverse environmental impact on the property or surrounds.

The specific irrigation efficiency improvements will contribute to reducing deep drainage beyond the crop root zone and hence improved salinity outcomes for the River Murray.

[redacted]

1 PROJECT DETAILS:

CID Name:	[redacted]	**Date:**	15/12/2020
CID No:	[redacted]	**Client Name:**	[redacted]
Project Name:	[redacted]	**Project No:**	[redacted]
Submitted By:	[redacted]	**Contractors:**	[redacted]

2 PREAMBLE AND PROJECT SCOPE:

The above project was assessed on the below mentioned scope and is limited to project data supplied, including any documentation and designs as being true and correct in every respect.

I declare, as an Independent Approved Irrigation Professional agreed to under the Deed, that:

a) I have carried out the technical and practical feasibility assessment for the Works; and
b) I have had no previous involvement in preparing this Project Proposal.

I certify that the Project Works are technically and practically feasible, including that:

a) the projected water savings they will generate are reasonable and realistic, including being appropriate to the crops, soils, climates, water delivery system and topography of the Eligible Irrigator's Property;
b) the rationale for the water savings assessment is clearly explained;
c) the projected water savings can be achieved while maintaining the agricultural production potential of the Property on which the Works would be completed as part of a Project;
d) the engineering solutions they entail are achievable and appropriate to the needs of the Eligible Irrigator and the Property;
e) the projected costs are reasonable and realistic, and within the expected range for that type of infrastructure and scale of installation; and
f) the projected water savings they will generate represent the conservative or minimum feasible volume that could be derived from completing the Works.

[redacted]

[redacted]

[redacted]
Certified Irrigation Designer

[redacted]