Government of South Australia
Department for Environment and Water

SOUTH AUSTRALIA - ADDITIONAL EFFICIENCY MEASURES CRITERIA ASSESSMENT OUTCOME

Project Reference No:	91035
Outcome:	Compliant with the Efficiency Measures assessment
Date recommended to proceed to public comment	14 September 2020
Date recommended to proceed to the Australian Government's detailed assessment stage	18 December 2020

Overview

The project involves the replacement of an existing internal mainline that is currently under capacity and creating inefficiencies in water management at an 80.0ha wine grape property located at Loxton North in the SA Riverland.

Currently due to the age, layout and capacity of the existing mainline there is a variation in pressure and flow across the property with areas of the vineyard, predominantly those at the rear of the property operating outside of design specifications. As a result a number of irrigation shifts are run longer than is necessary to supply the required water to the driest areas and the situation is further exacerbated in peak irrigation demand periods when the system struggles to meet daily vine water demand. Areas of higher pressure and older pipe also result in regular blow outs.

Due to the present operational inefficiencies it is projected that yields (t/ha) from the vineyard are approximately 20% below potential. By addressing the system inefficiencies and maximising the potential yield the profitability of the vineyard will increase significantly and this will generate additional income both on-farm and within the community via harvesting, winery processing and distribution networks. The upgrades will also provide much more flexibility in the general operation of the irrigation system meaning that irrigation scheduling can be based on vine water requirements rather than trying to best manage known system limitations.

All project works are internal to the property and within the existing irrigated footprint so no negative environmental impacts will be generated through the project. The property is located within the high impact salinity zone and therefore the proposed improvements in irrigation efficiency will provide a direct benefit to minimising irrigation induced impacts on the River Murray and the operation of local salinity management infrastructure.

A conservative water saving of 11.4ML or 0.15ML/ha is nominated for the proposal.

Part 1 - State Assessment - Efficiency Measures criteria

Assessment Approach
This 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 surface drip irrigation system has an application rate ranging from 1.14mm/hr through to 1.26mm/hr and currently five irrigation shifts are required to cover the full planted area. While some of the planted area is still not at maturity during peak water demand periods it can still take over 24 hours to cover the entire property which is a product of the current limitations in the capacity of the mainline. This also means there is no redundancy in the system and often irrigation scheduling during peak demand periods is less than optimal to best manage the known limitations.

Increasing the mainline capacity will reduce the required irrigation shifts from five back to three and enable the property to be covered in 20 hours based on a peak water demand of 8.0mm day at the range of application rates described above. This will provide much more flexibility and the increased capacity will also mean less watering during the peak electricity tariff periods.

The project is expected to return a conservative 11.4 ML to the environment, with the applicant retaining 6.2 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)
Mainline Upgrade (200mm – 375mm)	16	1.1	17.6	**11.4**
Total Water Saving			**17.6**	

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 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 within the SA MDB region. 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 and strategies on sustainable land and water management practices and building resilience and adaptability into the irrigated agriculture sector. 9a. Please refer to response to 6b. 9b. Please refer to response to 5b.	Y	The application has demonstrated that the delivery partner has consulted with relevant industry bodies, 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 proposal has been independently reviewed and the assessment confirms that only a conservative volume of the total assessed water saving is nominated for return through the program.	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

	The project budget has been verified through a formal quotation supplied by an irrigation service providers. 7b. The proposal verifies that the nominated water entitlements have been held for a minimum of 3 years. 7c. The project works result in a conservative reduction in annual irrigation demand (17.6ML) however the proponent is only seeking to return a conservative volume (11.4ML) of the assessed saving meaning the net impact is positive post project works from a water demand/supply context. The volume of water to be recovered through this project is also only small and based on best projections of future water recovery potential would represent less than 0.01% of the SDL in the southern connected MDB. 7d. This project will generate a net increase in water available for consumptive use and will only return a small amount of water. Hence the project will not directly increase the price of water.		can be generated and that the project will not 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 will put downward pressure on water market prices.
Contribution to Proponent Businesses and Irrigation District Viability (Criteria 4a, 4b, 4c)	4a.This property involved in this project has a private diversion from the River Murray and is not within an irrigation network. 4b. As addressed in 4a, the property is a private diversion, the upgrade works are essential for servicing the property both	Y	The application has demonstrated that: • The project will contribute to the future viability and sustainability of the business by improving the productivity and efficiency of on-farm water use. • The project is focused on modernising existing

	presently and into the future. 4c. While the property is not located within an irrigation network the works are consistent with the Loxton, Media, Rilli and Sherwood Land and Water Management Plan. The works are also very well aligned with irrigation efficiency objectives of the River Murray Water Allocation Plan and the SA River Murray Salinity Management policies.		inefficient irrigation systems which will underpin irrigation management into the future and will not upgrade water supply infrastructure where the system, or parts of the system, are not going to be used in the future. 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.
Support for Regional Economies (Criteria 5, 6c)	5a. As described in 2a, all materials and labour for this project will be supplied through local irrigation businesses and contractors. The wine grape industry is the primary economic driver of the Riverland region and therefore proposals that invest in under-pinning the continuing viability of irrigated businesses ensures that this contribution will be sustained. 5b. This proposal is well aligned with local and regional strategies with respect to sustainable water use and supporting viable and adaptive irrigation enterprises. Failure to upgrade the existing irrigation infrastructure would result in the property not maximising its potential productivity making it more exposed into the future. 5c. This proposal is not located within an irrigation district however the works will deliver a direct increase in the productive	Y	The application has demonstrated that the project will: • Generate benefits for the broader region and not just the applicant through sourcing of local farm input supplies by the participating business and generating regional employment. • The project will contribute to the longer term sustainability of the business and the irrigation district more generally. • Increase regional and Basin wide productivity through increasing the volume of water available for consumptive uses on the water market.

	capacity of the property and therefore by extension to the local region. 5d. The proposal will under-pin existing direct employment and also ensure employment along the supply chain via harvesting, processing and distribution of wine grapes is maintained and potentially enhanced. 6c. While the project will deliver significant positive socio-economic outcomes for the participant these benefits will extend beyond the farm gate as a result of direct program investment in the local community and increased productivity which will provide a broader regional and State level benefit. The proposal will also generate retained water savings for the applicant which will increase the volume of water available in the consumptive pool which will deliver benefits at the broader sMDB scale.		
Social and Environmental Benefits (Criteria 2a, 2b, 2c)	2a. This project involves works on a family owned and operated wine grape property located at Loxton North in the SA Riverland. Currently the existing mainline is under-capacity to meet the water requirements of the existing wine grapes which is leading to pressure variation and inefficiencies in water application. The existing inefficiencies in the system is meaning that irrigation water is not being utilised as productively as it potentially could be which is impacting on fruit production and	Y	The application has: • demonstrated that the project will: ○ Support the winegrape industry which is an important sector of the Riverland and SA State economy. ○ Improve the profitability and resilience of the business and ensure that the economic contribution can be sustained over time. ○ Generate benefits for the broader region

	the overall performance of the vineyard. All works involved in the project will be undertaken by local contractors so investment will remain the local economy and benefit local service providers. The works will also set the vineyard up for the future and ensure it remains financially viable and continues to support both on-farm employment and other agriculture dependent businesses both locally and across the region. The project will deliver direct benefits at the farm scale through the improved productivity of water use which will then have flow on benefits to the region's broader wine industry sector and the State through economic contributions. 2b. As this project only involved on-farm works it is not expected to add amenity to community assets such as weirs, storages and parks. 2c. N/A		and not just the applicant through sourcing of local farm input supplies by the participating business and generating regional employment. ○ Increase regional and Basin wide productivity through increasing the volume of water available for consumptive uses on the water market. • Not identified any social values including the amenity to local communities of weirs, storages and parks that may be affected by the project. The proposal is also well aligned to a number of the key themes within Riverland Wine's Strategic Plan (2014-2019) including Competitiveness, Market Growth & Profitability & Sustainability. The project is below the $4 million threshold for large projects and is not required to address criteria 2c.
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	Y	The application has demonstrated that the applicant and delivery partner have an understanding of all relevant legislation 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.

	insurance is in place and current prior to the project works commencing and any funds being paid.		
Business Resilience, including Drought and Climate Change Impacts (Criteria 10a, 12, 13a,)	10a. Please refer to response to 5b. 12a. As described in 7a, the project proposal has been independently assessed and this assessment confirms that a conservative volume of the total water saving is nominated for return. The project works budget has also been substantiated through formal quotations. 13a. Currently one of the key challenges for the proponent is the limited delivery capacity in the properties mainline. This means that the system currently struggles to supply daily vine irrigation requirements and this situation is very likely to be exacerbated under a warming climate and increased incidence of heat waves. This project will directly address this issue through increasing capacity and providing some flexibility with water use and an improved ability to meet vine water demand. The works will also deliver water savings which will assist with managing water into the future through reducing on-farm demand and generating a net increase in water supply.	Y	The application has demonstrated that the project will: • Address under-performing irrigation areas which will allow water to be used as efficiently as possible while maximising output (yield). • Generate additional water savings that will be retained by the applicant to improve the capacity of the proponent 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. As has been outlined in the responses to previous criteria the project is expected to generate positive outcomes at a local and	Y	The application has described the expected cultural benefits of the proposed project, including the

	regional community scale. The project works will ensure an existing irrigated business remains viable and sustainable into the future which is very important given the Riverland region of SA is heavily reliant on a prosperous irrigated agriculture sector. 8b. The project will engage local contractors to deliver all works which will provide a direct economic stimulus within the local community. As the wine industry is a critical driver of the regional and State economy the proposed works will ensure that the economic contribution of the industry continues. This will assist with securing local and regional employment and ensure local community based sporting clubs and groups can continue to prosper into the future. 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
While the amount of water to be recovered is relatively small, it is the cumulative impact of additional water recoveries that amount to significant third party impacts.	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, proponents of all on farm projects in South Australia under the efficiency measures program have retained a portion (ranging from 12 percent to 89 percent) of the water savings with this 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.
Any project that decreases the total pool available to food production results in negative outcomes as there will simply be less water available for agriculture.	
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.	

Relevant Public Comments to be responded to	Response to Relevant Public Comments
On-farm efficiency measures are creating upward pressure on water prices as reported in independent research completed by ABARES and Aither and do not meet principle 7d – Projects must not directly increase the price of water.	Both the ABARE and Aither reports have acknowledged that it is difficult to separate the 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.
Independent research over a number of years, most recently from the University of Adelaide, has demonstrated that irrigators who participate in on-farm projects are highly likely to purchase additional water following the implementation of the project and the resulting increase in enterprise profitability.	

Relevant Public Comments to be responded to	Response to Relevant Public Comments
The application does not provide details of how it will impact the irrigation network, nor does it provide details of the local and regional plans for the area and how the project aligns with relevant objectives.	These criteria have been addressed in various places in the application and the proponent has demonstrated that their proposed project will: • Increase productivity in terms of return per ML for the business and region. • Improve the business's long term resilience and viability which will have flow on benefits to the local, regional and State economies. • Source goods and services for the project from local companies which will add further economic stimulus to the Riverland community. • Increased regional and Basin wide productivity through increasing the volume of water available for consumptive uses on the water market. The applicant is a private diverter and is not located within an irrigation network, so the application is not required to take account of relevant irrigation business' strategies or plans.

Final Recommendation

The application has adequately <addressed the Efficiency Measures – Agreed Criteria and demonstrated that the project will have insert 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.

Declaration by Independent Approved Irrigation Professional

A: Project details

Assessor Name: [redacted] **Date:** 6/7/20

CID No: [redacted] **Client name:** [redacted]

Project Name: [redacted] **Project No.** [redacted]

Submitted by: [redacted] **Irrigation Design by:** [redacted]

B: Project Scope

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:

i. 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;

   a. *Comment: The project proposal is to replace approx. 1158m of old, leaking and undersized 200mm irrigation mainline with a new 375 mm main and associated offtake fittings. The total area affected by the project is approx. 80Ha*

   b. *The projected water savings of 11.4ML (0.19ML/ha) from irrigation mainline upgrade is considered appropriate and realistic and suitable for the wine grapes crop grown in Riverland area.*

ii. the rationale for the water savings assessment is clearly explained;

   a. *Yes, described in Attachment to application. I agree with the methodology used to calculate the water savings. The water savings that should be achieved from the installation of new irrigation mainline, are considered realistic and achievable.*

   b. *The existing 200mm mainline is undersized for the 80Ha property that requires a total flow rate of approx. 315L/s for a single irrigation event. The mainline limitations requires this flow to be split, currently into 5 shifts of approx. 63 L/s. This creates operational issues and water wastage:*

      i. *Flow rate of 63 L/s exceeds normal design criteria of water velocity in pipes at 2.0M/s and incurs a friction (pressure) loss of 150 kPa over the length of pipe. This produces pressure variation in the system resulting in areas on over and under irrigation. This is the primary cause of water loss.*

      ii. *5 shifts per day only allows for a water requirement of approx. 5.7 mm/d, that barely meets average daily crop requirements during peak season and insufficient to meet peak demands of up to 8mm/d.*

      iii. *24 hour per day pumping operation also exceeds accepted design criteria.*

      iv. *An increase in evaporative losses also occurs as a result of 24 hour pumping.*

   c. *By comparison the new 375mm mainline allows the system to operate in 3 shifts of 7 hours per day. At a flow rate of 110 L/s pressure loss in the pipe is only 20 kPa at a velocity of 0.9m/s. This allows the operator the flexibility to more closely*

match water needs of the crop resulting in more efficient water use and less water wastage.

iii. the projected water savings will be achieved while maintaining the agricultural production potential of the Property on which the Works would be completed as part of a Project;

   a. *The property currently uses 560ML per year for irrigation (stated in application). It has a water licence for 58 ML and site use approval of 981ML.*

   b. *The resultant 46.6 ML (58ML -11.4ML return) is insufficient to service plantings on the 80 Ha property, leaving a shortfall of approx. 515 ML. This shortfall will need to made up by purchasing/lease water on the open market.*

iv. the engineering solutions they entail are achievable and appropriate to the needs of the Eligible Irrigator and the Property/s;

   a. *The irrigation mainline upgrade is achievable and appropriate to meet the needs of the owner building in greater operating flexibility, reducing operating pressures and therefore operating costs and more suitably meet wine grape crop water requirements at the peak of seasonal demands.*

   b. *Design work was carried out by an independent certified irrigation designer, PDB irrigation solutions and is of a high standard.*

v. the projected costs are reasonable and realistic, and within the expected range for that type of infrastructure and scale of installation; and

   a. *Yes, costs are within the range expected for the new mainline and associated equipment to complete the project.*

Signed as the Independent Approved Irrigation Professional for this Project

[redacted]

Name

[redacted]

Signature

6/7/20

Date

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

Project ID: [redacted]

Crop Type: Wine Grapes

Project Summary:

The project is installing a new section of 375mm internal mainline to replace an existing section of 200mm mainline at an 80.0ha winegrape property located near Loxton in the SA Riverland. The project will also enable some of the existing mainline to be rationalised which was installed many decades ago when the property was irrigated with centre pivots.

The works are stage two of a complete irrigation system upgrade which will improve the overall efficiency of water use at the property with stage one completed several years ago which consisted of upgrading the primary pumping and filtration infrastructure at the River Murray extraction point.

A water saving of 11.4ML is nominated for the proposal.

Water Saving Methodology:

Currently due to the age, layout and capacity of the existing mainline there is a lack of even pressure and flow across the property with areas of the vineyard, predominantly those at the rear of the property operating outside of design specifications. As a result some of the irrigation shifts are run longer than is necessary to supply the required water to the driest areas and the situation is further exacerbated in peak irrigation demand periods when the system struggles to meet the daily vine water demand.

The upgrade at the pump station in stage 1 has assisted to increase pressure to the system however this also led to problems within the existing mainline in the form of leaks around pipeline joins and spur line offtakes.

The surface drip irrigation system has an application rate ranging from 1.14mm/hr through to 1.26mm/hr and currently five irrigation shifts are required to cover the full planted area. While some of the planted area is still not at maturity during peak water demand periods it can still take over 24 hours to cover the entire property which is a product of the current limitations in the capacity of the mainline. This also means there is no redundancy in the system and often irrigation scheduling during peak demand periods is less than optimal to best manage the known limitations.

Increasing the mainline capacity will reduce the required irrigation shifts from five back to three and enable the property to be covered in 20 hours based on a peak water demand of 8.0mm day at the range of application rates described above. This will provide much more flexibility and the increased capacity will also mean less watering during the peak electricity tariff periods.

In order to quantify the potential conservative water savings the following assumptions have been made:

- Annual Vine Water Requirement = 7ML/ha (700mm)
- Average Irrigation System Application Rate = 1.2mm/hr (1.14 – 1.26mm/hr)
- Peak Water Demand Period (Dec – Feb) = ~90 days
- Area of Vineyard Subject to Over-Irrigation = 20% (16ha)
- Additional Irrigation Hours = 1hr/day (compensation for watering to driest areas)
- Additional Irrigation Hours = 90 (90 days x 1.0hr/day)
- Additional Irrigation Volume = 108mm (90.0hrs x 1.2mm)
- Additional Irrigation Volume = 1.1ML/ha
- Additional Irrigation Volume = 17.6ML (1.1ML/ha x 16.0ha)

It is expected that the above calculation is quite conservative given that the increased capacity will reduce the irrigation that is applied during the peak of the day when evaporation rates from the soil surface are much higher. Additionally without increasing the capacity of the mainline the current issues will only be exacerbated when the vines all reach maturity and flexibility with irrigation management is even further reduced. The new mainline will also enable the property to be fully irrigated in less than 24 hours and ensure that there is a greater ability to respond to weather events e.g. rainfall and the upgrade will build some contingency into the system should downtime occur.

It is also projected that the targeted yield (25t/ha) is not being achieved so the upgrades will significantly improve the productivity of water use ($/ML) and increase the overall profitability of the vineyard. The new system will also provide an additional buffer against future climate variability and increased instances of heat waves which are predicted to occur in the SA Riverland.

Water Saving Activity	Area (ha)	Water Saving (ML/ha)	Total Water Saving (ML)	Conservative Water Saving (ML)	Conservative Water Saving (ML/ha)
Mainline Upgrade (200mm – 375mm)	16.0 (80.0)*	1.1	17.6	**11.4**	**0.15***

*Refer calculation above

Project Budget:

Project costs have been based quotes provided [redacted].

Irrigation Design:

An Irrigation Design has been completed by a certified designer for the irrigation system and has been included as an attachment to the application.

Approvals/Environmental:

No approvals are required to conduct the works as they 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.