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Lockyer Valley & Somerset Water Security Scheme

Detailed Business Case

November 2020

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Somerset Regional Council

Lockyer Valley Growers

LOCKYER Chamber of Commerce & Industry — Engaging Our Region

Queensland Urban Utilities

LWUF lockyer water users forum

Water for the Lockyer Detailed Business Case

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1D	25 November 2020	Final Report	Luke Curtain, Chris Hewitt, Tom Vanderbyl	Angus MacDonald	Matt Bradbury	Matt Bradbury

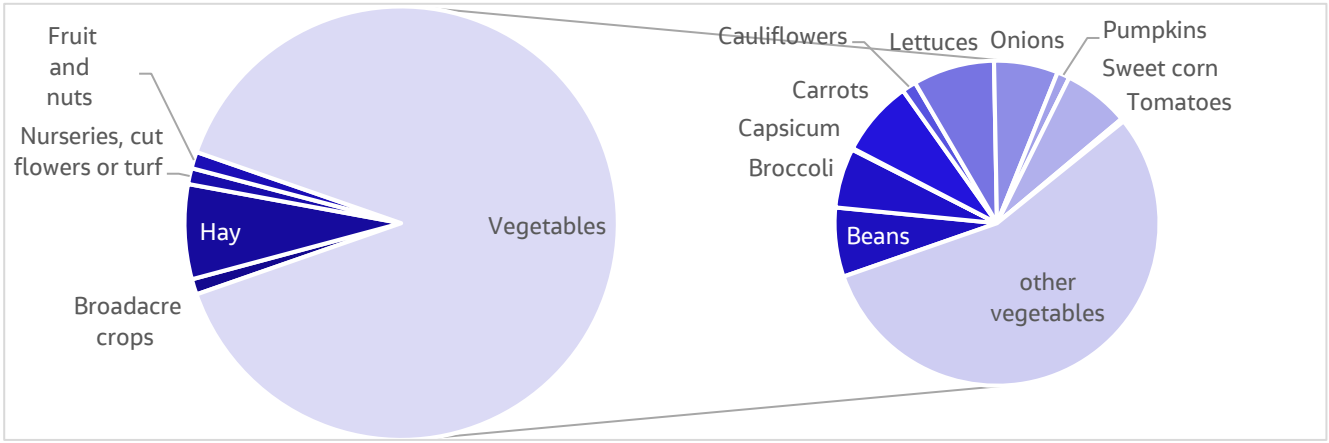
Contents

Executive Summary

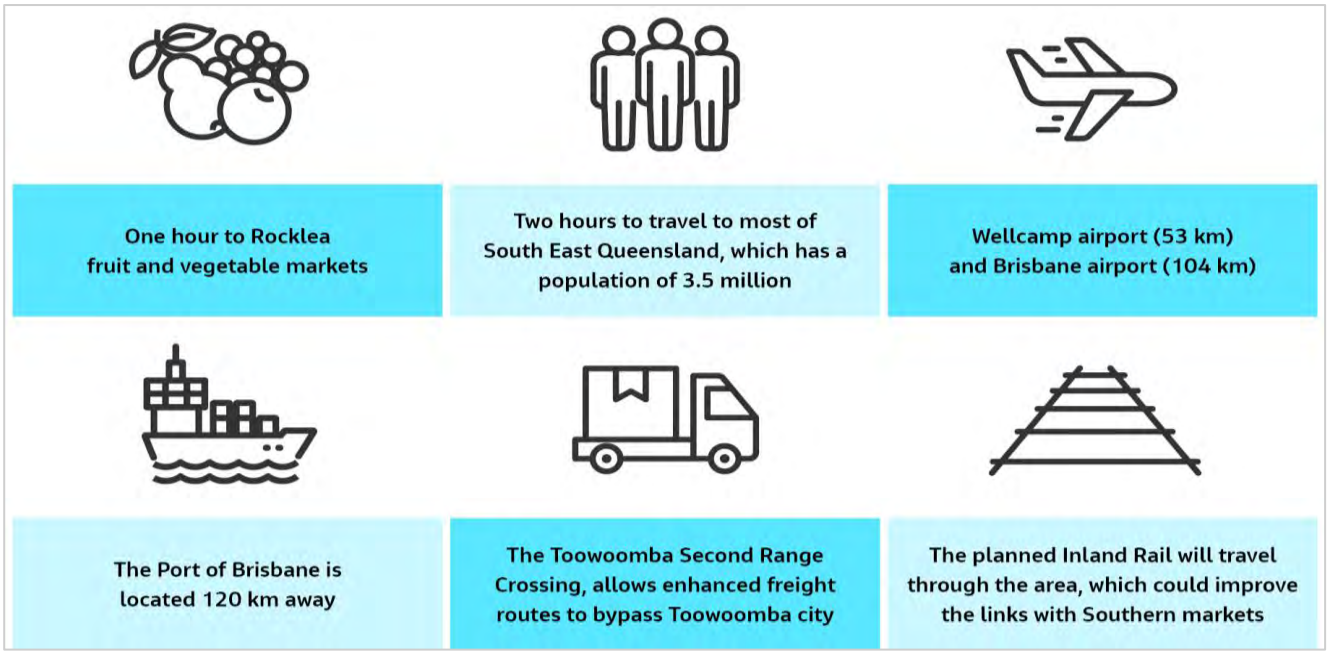
The Lockyer Valley in South East Queensland, located 90 km west of Brisbane, is a highly productive agricultural area. This business case defines the Lockyer Valley as including both the Lockyer Valley Regional Council and Somerset Regional Council local government areas. In recognition of Lockyer Valley's potential to increase its agricultural production significantly, this detailed business case investigates an option for making more water available for irrigation and other high value uses throughout the valley. More water availability and security will deliver major benefits to the region.

The detailed business case provides support supplementing the existing poor performing water supplies and demonstrates that the economic benefits of doing so outweigh the costs. It recommends a project that consists of 297 km of new pipeline to deliver 34,000 ML of Wivenhoe Dam water. This will create an additional $210 million of annual agricultural production and 2,000 extra ongoing jobs. **The Benefit Cost ratio is 1.2.**

The value of crops produced in 2018-19 was $351 million. Vegetable production dominates the Lockyer Valley including beans, carrots, tomatoes and broccoli; however, the crop mix is dynamic and responds to changing market conditions. Export is a feature and can expand.

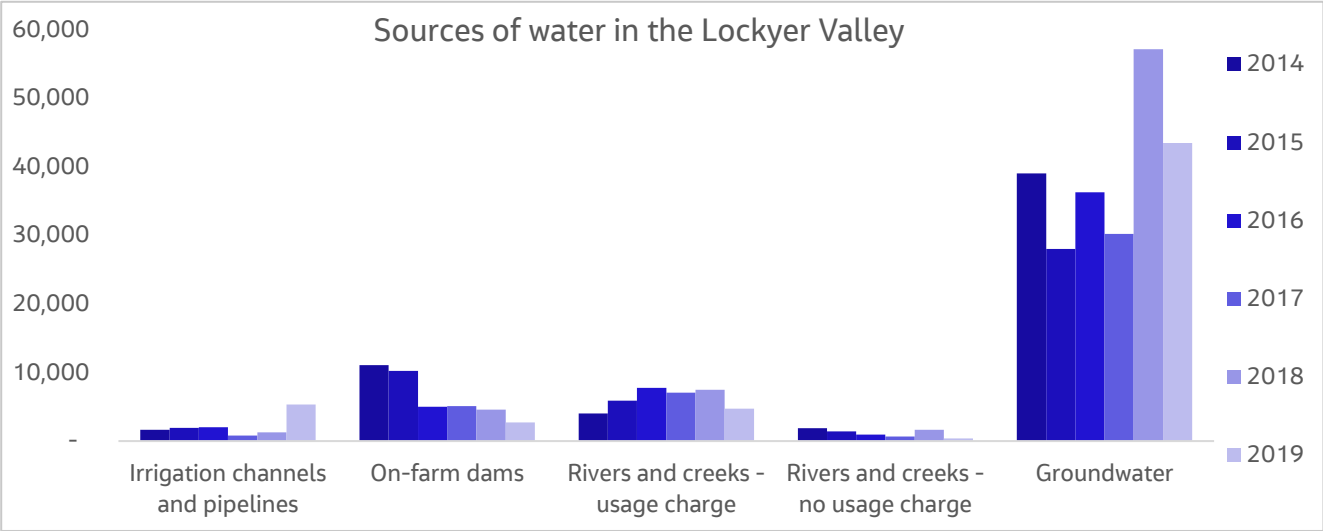


Significant industry opportunities continue to emerge in the region, including specialist food processing, food packaging, transport, and storage and new agritourism developments. The Lockyer Valley is strategically located in terms of transport with significant markets and transport links within easy access.



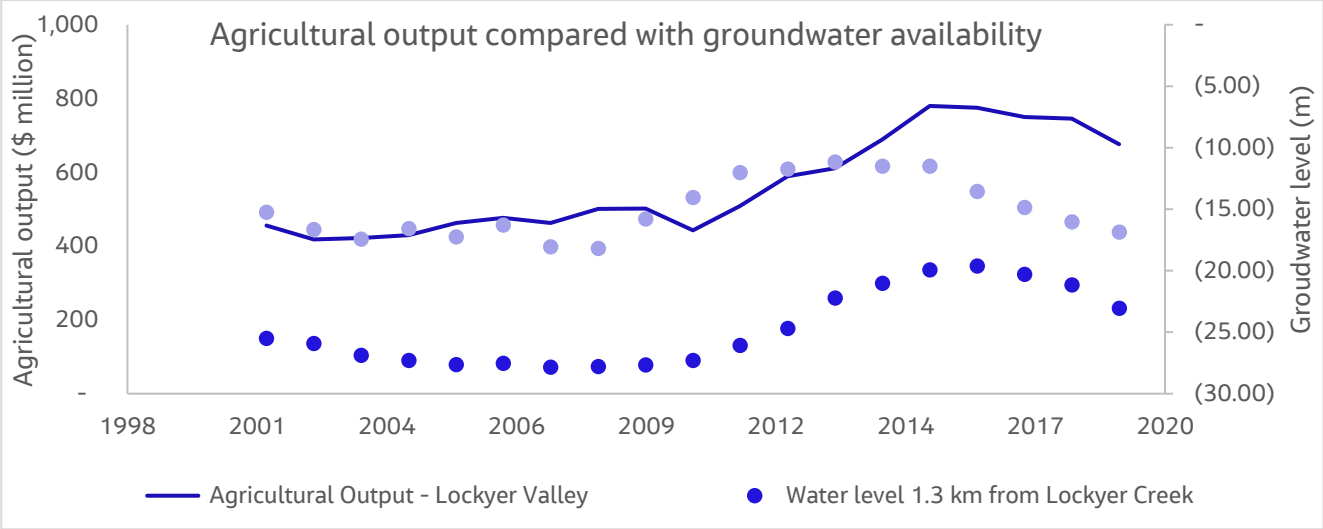
Existing water sources

Groundwater is the dominant water source in the region and is accessed through a series of private bores located on individual farms. The limiting factor to increasing agricultural growth and export is the availability of water.



There is a strong relationship between the water available in bores and agricultural production levels in the area. When water is available, production increases. When water availability decreases, production decreases.

Recent wet years, including the flood events in 2011 and 2013, resulted in a major recharge of the groundwater system, which was followed by a significant uplift in total agricultural production.



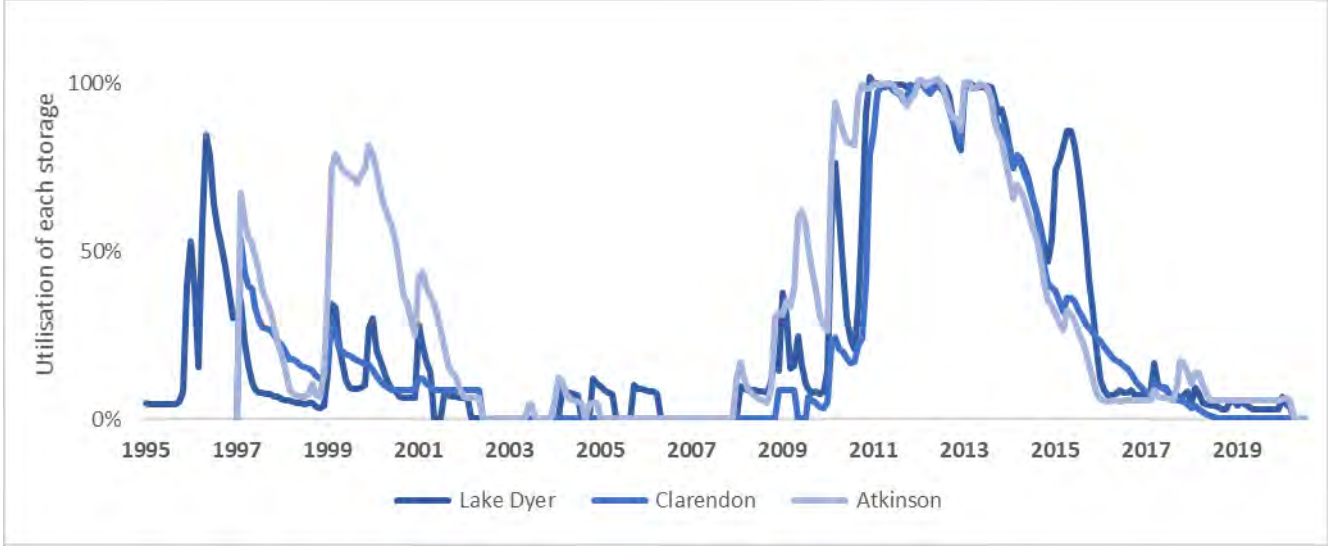
The figure above shows that as the groundwater near the creek is recharged (2009 to 2013), agricultural production increases. As the groundwater is recharged further from the creek (2010 to 2016), agricultural production continues to increase. In recent years, the drop in groundwater has resulted in a decrease in agricultural output. The impact of water availability is to increase total agricultural production from $400 million (2001 to 2010) to $800 million (2015).[1]

This relationship between groundwater availability and production is much stronger than the relationship between rainfall and production. This is likely because groundwater can be applied as it is needed and the

[1] Total agricultural production includes the value from all production sources, including cropping, livestock and value-added production.

availability of groundwater allows for planting to occur, with growers having confidence that the water needed to finish the crop is available. There is a strong benefit to be had, therefore, from increasing water security.

Seqwater owns and operates the Lower Lockyer and Central Lockyer Water Supply Schemes which include three off-stream dams. Since 1997, the dams have been 26% full on average, with prolonged periods of no water availability. There was very little water available between 2002 and 2008, and also since 2017.



These fluctuations result in variations in medium priority announced allocations. For example, in the Lower Lockyer water supply scheme (Atkinson Dam), since the last major drought, during the past 10 years, the announced allocation has averaged 52 per cent. Four years have started with a zero per cent announced allocation, while four years started with a 100 per cent allocation. The last four years have seen very limited water availability for local irrigators / Seqwater's customers.

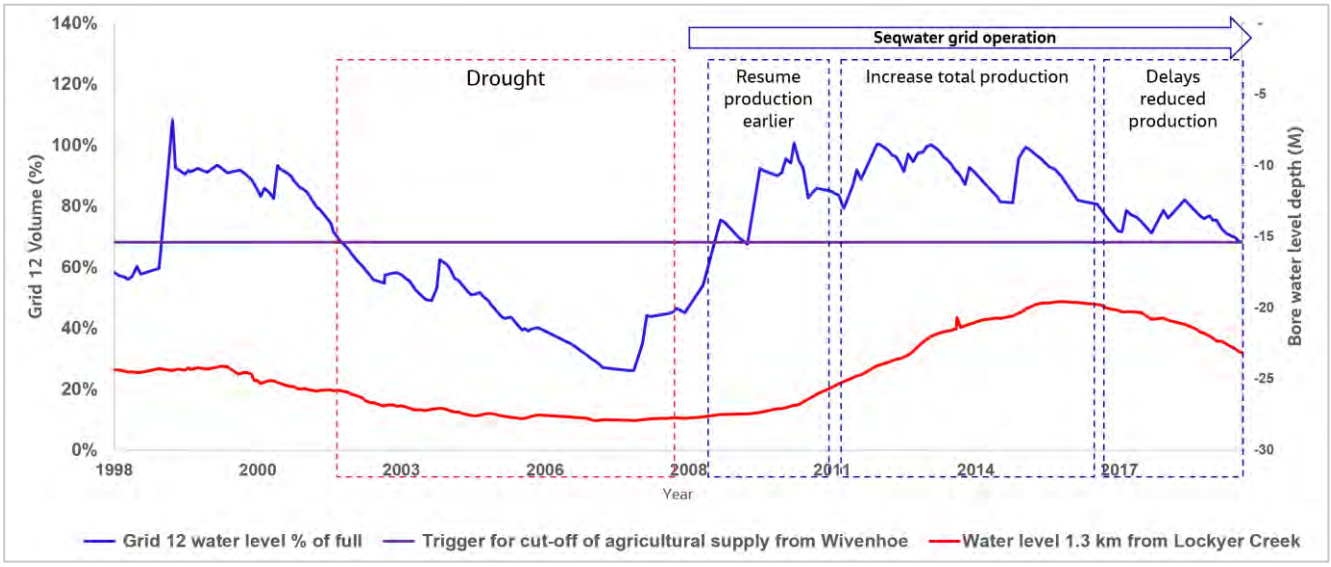
Benefits of additional water

The key benefit of this project is to supplement the existing water sources and to add to or complement the portfolio of water products. Water that is secure and reliable will allow irrigators to plan and plant with confidence and provides the greatest returns. It also enables intensive production and investment including in plant nurseries, turf farms, meat production and processing, quarrying and education and research.

As groundwater is the dominant water source, feedback from irrigators indicated that new water would be most valued if it were available when existing water sources were restricted or not available.

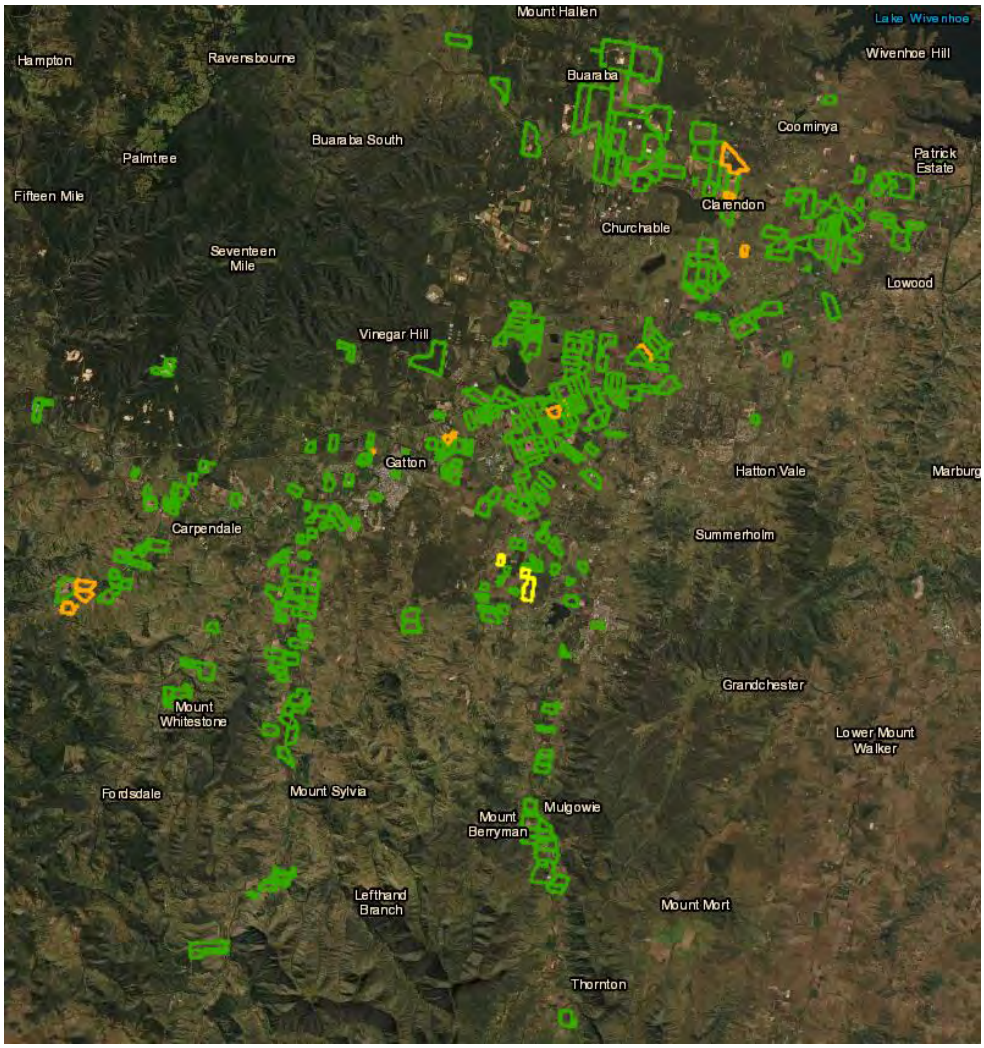
A review of the past 20 years shows when new water would be available from the project. There are four phases that would be experienced by customers, which are described here and depicted in the figure below:

- Drought – during the 2002 to 2008 millennium drought, groundwater levels were low. The South East Queensland Grid's 12 storages were also below 70 per cent. This means that water would not have been available for irrigators from the Seqwater storages. The project would not assist in deep drought.
- Production is resumed earlier – when the drought broke in 2009, the Seqwater dams filled much more quickly than the groundwater recharges. The new water will become available more quickly than the groundwater after a drought breaks and production can resume more rapidly after a drought. The benefit is for about two years of extra production, significantly helping the community to get back on its feet.
- Total production is increased – during a wet period, total production may opportunistically increase as the additional water can be used in addition with existing sources. This is the stacking impact of more water.
- Reduced production is delayed – when a new dry period starts, and groundwater levels decrease and salinity increases, water will still be available from Seqwater storages. This will allow additional groundwater use as the new water can be used to dilute the groundwater as salinity increases. This will allow irrigators to delay the impacts of a new drought and shorten its length. This benefit period lasts one or more years.



Demand for additional water

Jacobs ran a demand assessment process in two stages. This was necessary as the first-round tested demand at a wide range of prices. A design and costing processes were then undertaken to match demand and develop more accurate costs and prices. The second round of demand tested demand at a single capital price point and identified 34,000 ML of likely demand. These were mapped to individual blocks to inform scheme design.



Additional water security

The project will source water directly from Wivenhoe Dam, via a pump and pipeline network.

The project will also be connected to the three Lockyer storages (Lake Clarendon, Atkinson dam and Lake Dyer) to temporarily store any water that is taken from Wivenhoe but not immediately used by the project's customers. Any water stored in the airspace of the three Lockyer Valley storages will be accounted separately to, and not change (improve or diminish) hydrologic performance of, the water supplies of existing water entitlements in the Lower Lockyer and Central Lockyer Water supply schemes.

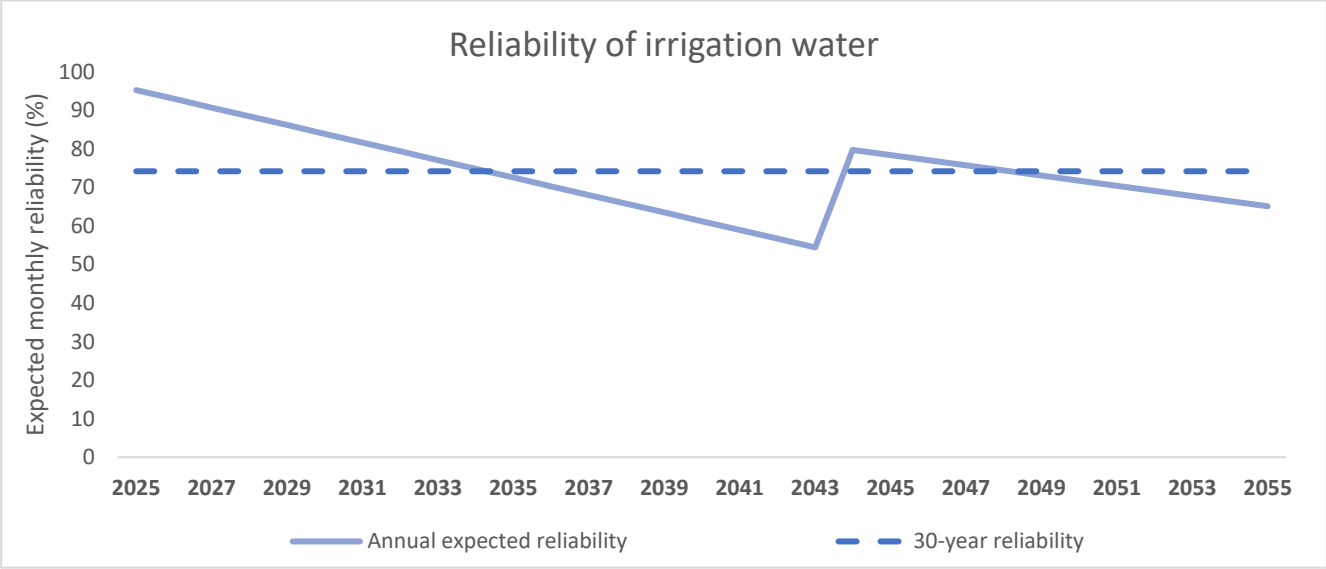
This detailed business case has undertaken modelling to confirm that taking water for irrigation from Wivenhoe Dam will not have an impact on South East Queensland's urban water security. This is done by increasing the triggers for when the manufactured water products are utilised to supplement South-East Queensland's urban water supply. The additional costs of the manufactured water will be paid for by irrigators.

Jacobs worked with Seqwater to understand hydrologic modelling (using WATHNET) that was commissioned by Seqwater and undertaken by WREMA to explore the average hydrologic performance of the project over time. This modelling also examined potential implications of the project's operations on the average hydrologic performance of South East Queensland's bulk water supply system over the long term.

For the proposed project, when the combined South East Queensland water storage volume (as represented by the water grid storage level) falls below a defined 'trigger level' then the manufactured water plants (i.e. the Tugun / Gold Coast desalination plant and the Western Corridor Recycled Water pipeline are assumed to be turned on at which time irrigation transfers from Wivenhoe Dam to the Lockyer Valley will reduce or cease.

This means that water supply for the Lockyer will be interrupted to prioritise urban water security.

The new water will have a long-term average monthly reliability of 75 per cent. However, this is expected to vary over time as shown below.



The underlying average hydrologic performance of the project is not static but instead fluctuates over time. As the existing assets need to continue to provide priority and water supply security to urban users, the growth in urban demand (due to population growth) will reduce the reliability for irrigation.

Seqwater is charged with meeting the urban water security objectives specified by the Queensland Government. Even without the addition of the project, as population and urban water demand increases over time, Seqwater will need to increase the capacity of South-East Queensland's bulk water supply system. For the purpose of this modelling exercise, this is assumed to occur in 2043.

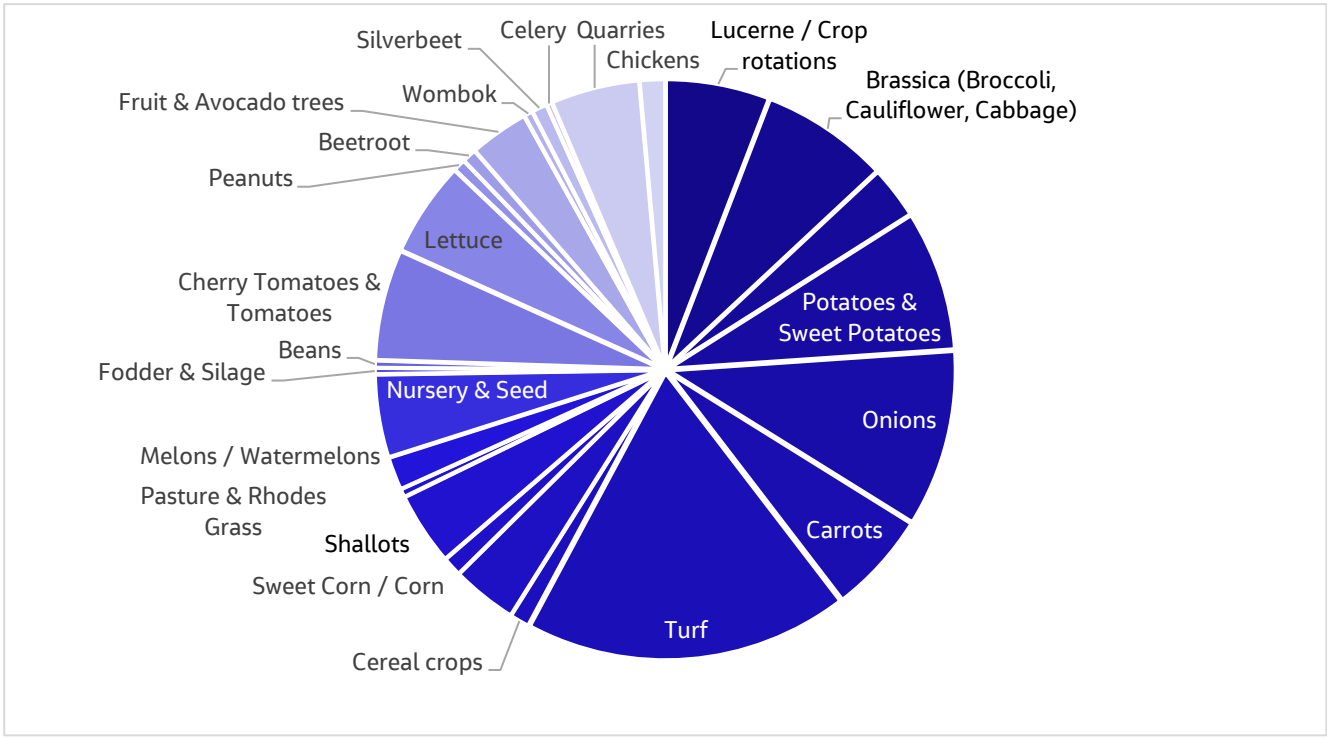
Consequently, the availability of water to Lockyer irrigators will decrease slowly over time until the urban capacity is increased in 2043. Once this occurs, reliability for irrigators is assumed to also increase. We have modelled a 30-year period; however, this pattern of irrigation reliability is assumed to vary between 55 per cent and 80 per cent beyond this period.

Additional economic benefits

This additional water will increase total agricultural production by **$210 million per year**. We have forecast the likely future crop mix based on:

- stated customer preference
- domestic market capacity
- export opportunities
- net margin.

This results in a broad crop mix as shown in the figure below.

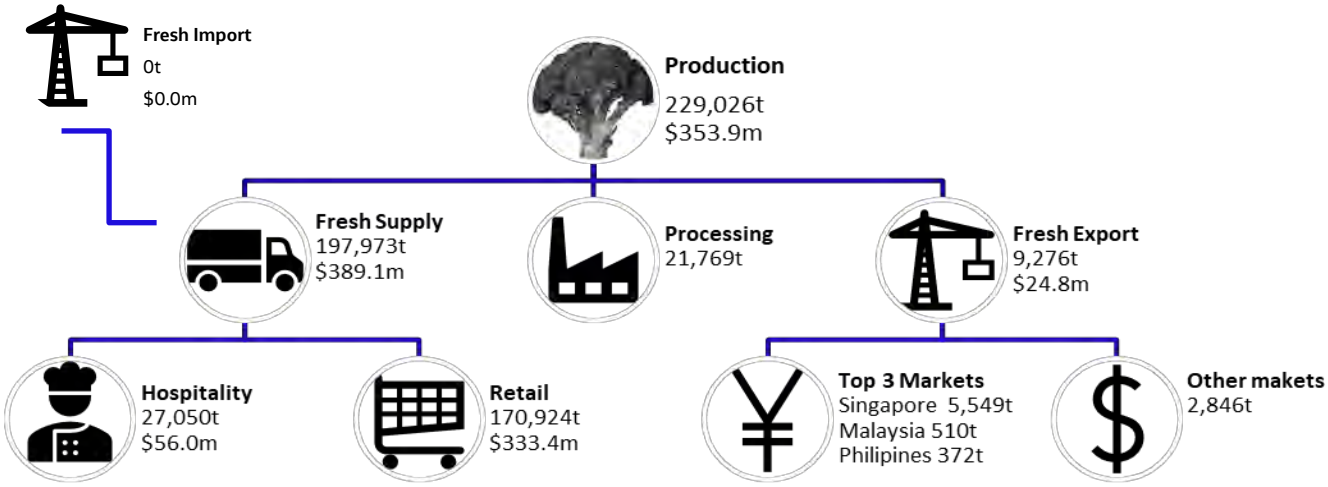


Economic benefits presented in this detailed business case are driven by net margins per ML of irrigation water applied, based on the production data collected during round-one of the demand assessment. The data informed likely future use (crop mix) for the new water. Net margins are driven by farm gate prices and in some cases an increase in production volumes (due to new water) can negatively impact those prices, particularly in our relatively small domestic market. To ensure the estimated economic benefits are realistic – and do not fail to materialise in the real world – Jacobs assessed all 24 enterprises (mainly crops) that will use the new water. After a multi-criteria assessment we identified the 15 crops with the most material impact on economic benefits. The results strongly support and were integrated with our crop mix and economic benefits assessment. The following is an example of this work (15 are available in the report).

Brassica exports – a case study

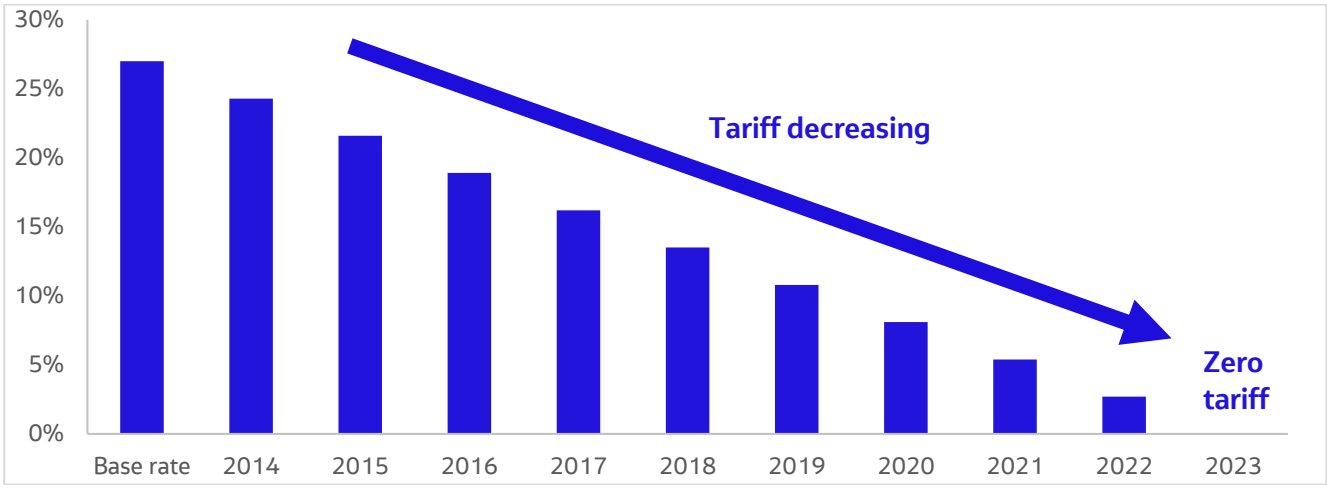
The additional agricultural production will allow for a substantial increase in exports. The brassica is a collective term for broccoli, broccolini, cabbage and cauliflower. In FY2019, about 229,026 tonnes of brassica were grown across Australia – with approximately 25 per cent grown in Queensland.

The Australia brassica market is dominated by retail trade, with over 75 % sold in retail supermarkets. Australian production volume of brassicas has grown by 6 % since 2017, while the value has increased by 34%. The following figure sets out Australia's brassica market supply chain and production characteristics in FY2019.[2]



It is estimated, that the project will increase production of brassica by 16,960 tonnes, which is 7.4 per cent of existing national production. Currently, only 4 per cent of brassicas are exported. However, there is potential for this to grow. The global market for brassica is $1.62 billion, and Australia only holds 1.34 per cent of that market. Australian exports of brassicas has increased by 14.8 per cent since 2017. Key markets include:

- Singapore: Australia exported 4,660 tonnes of brassica to Singapore in 2019, which has increased by 11per cent since 2017. Singapore was the 10th largest importer of brassica in the world in 2018, with $42.5 million of imports in that year. Australia has a good opportunity to increase its brassica exports to Singapore, as Australia is not subject to any import tariffs in Singapore under the Comprehensive and Progressive Agreement for Trans-Pacific Partnership.
- Malaysia: Australia exported 409 tonnes of brassica to Malaysia in 2019, which was a 94 per cent increase since 2017. Malaysia was the fifth largest importer of brassica in the world in 2018, with $89.2 million of imports in that year. Australia has a good opportunity to increase its brassica exports to Malaysia. Australian brassica is not subject to any import tariffs in Malaysia under the Malaysia-Australia Free Trade Agreement.
- South Korea: In 2018, Australia began exporting brassica to South Korea, a growing market for imported brassica. Under the Korea Australia Free Trade Agreement (KAFTA), the tariffs on Australian brassica in South Korea have reduced from 27 per cent in 2014 to 8 per cent in 2020. Tariffs on Australian brassica will reduce to zero at the beginning of 2023, giving a significant competitive advantage to Australian produce.



[2] The value of processed brassica cannot be accurately identified here due to the way the domestic and international data is collected and reported.

Jobs

This project will create a significant number of local jobs – both during construction and during operation. The project can be constructed using local contractors and local labour.

	Direct	Indirect	Total
Agricultural jobs (FTE)	584	1,339	**1,923**
Construction jobs (FTE)	109	264	**373**

Recreational benefits

Using the irrigation dams to store water will increase the utilisation of these storages, and therefore these storages will have more water in them. This will increase the opportunity for additional recreational activities (camping, fishing, boating, BBQ areas).

A storage with water in it is much more likely to attract visitors than an empty one and these lakes are expected to be significant regional tourism hub. Other regional dams have high visitor numbers and creates economic activity. For example, Moogerah Dam hosts a number of boating activities, when it is full. The local economic benefits include additional overnight stays, and increased spending at local businesses such as petrol, restaurants and take-away businesses.

Accordingly, we forecast that a further 5,500 visitors will visit annually, across Atkinson, Clarendon Dams and Lake Dyer. The increased visitors across three locations means that the benefits will be spread across the region. It is forecast that these visitors will inject a further $500,000 into the local economy each year.

What is needed to achieve these benefits?

To achieve the benefits of an additional 34,000 ML of supply, a pipe and pump network is required.

Lockyer Valley irrigation project snapshot	
Project volume	34,000 ML per annum
Delivery period	Project will operate 11 months of the year, with capacity to delivery all demand over 9 months
Number of customers	152
Number of properties connected	251
Length of pipeline	297 km
Number of pump stations	10
Total costs (P90)	**$186 million**

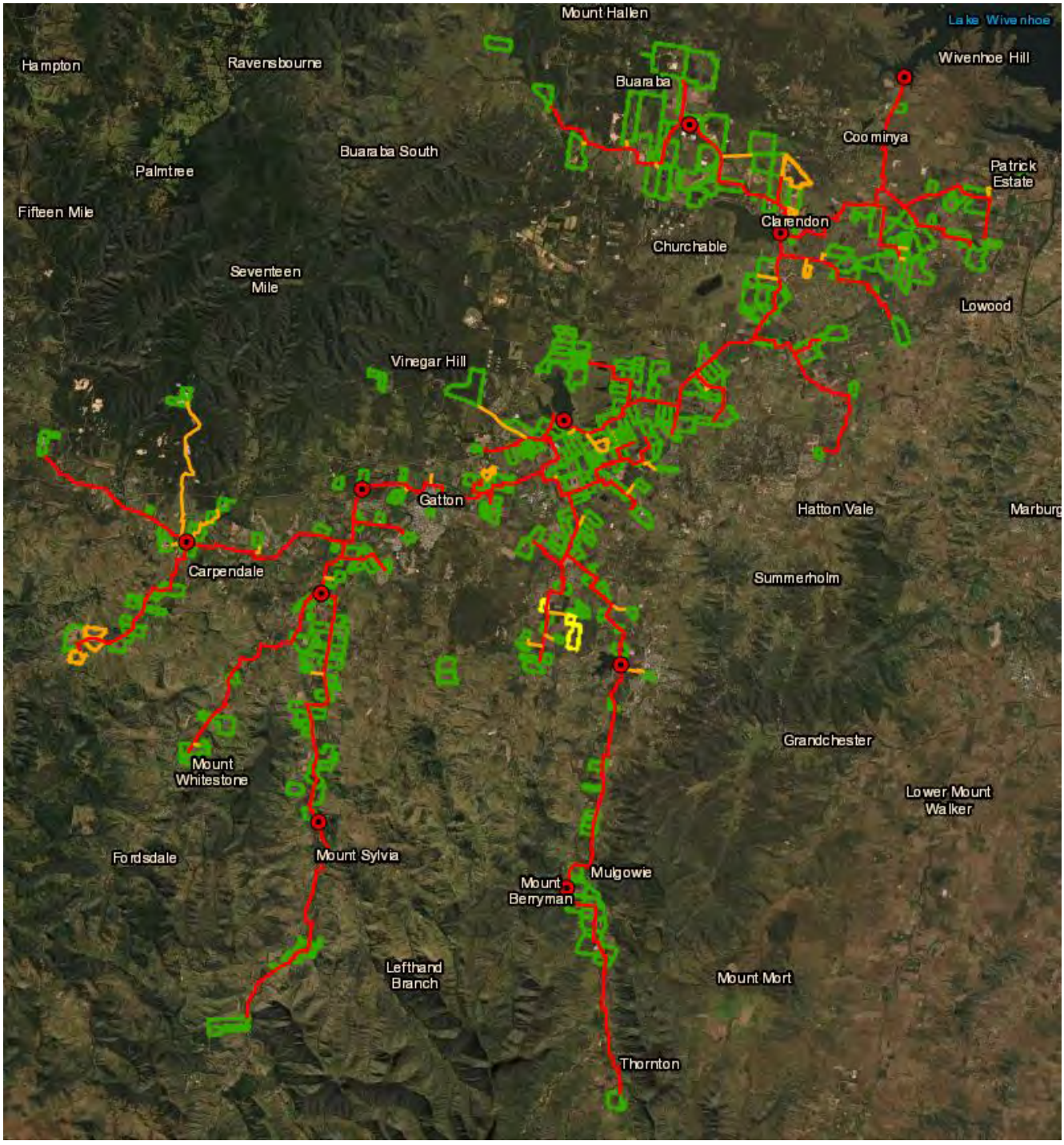
The core scheme design include 7MW of solar generation to power the pumping station during daylight hours. This reduces the ongoing prices for irrigators. During the two rounds of demand assessment, strong feedback was received regarding the sensitivity of ongoing annual charges.

Additional solar opportunity

To further reduce the ongoing or annual water charges paid by customers of the new scheme, an option considered was to increase the amount of solar generation up to a total project P90 capital cost cap of $200 million. This additional expenditure will double the amount of solar generation and reduce ongoing annual fixed prices by 20 per cent. This would help ensure against future cost increases, noting that the P90 of $186 million was robust and incorporated learnings from other projects (including the current Granite Belt post DBC phase).

Engineering design

Based on the 34,000 ML of likely demand identified during round-two demand assessment, the updated proposed pipeline route and the pump stations are shown below directly connecting all but three of the properties that expressed non-binding demand. Those that are not yet directly connected are working with the project team on cost-effective solutions and are supportive of the design. The scheme will be a 270-day scheme with water available 330-days of the year. This is a modest increase in flow rates from the 330-day scheme presented in Round 2. Substantial data collected from 90 irrigators after round-two demand assessment suggest that the increased flow rates could have increased likely demand to 35,000 ML, but this is uncertain.



Even if demand had been 35,000 ML, experience in other jurisdictions in the past ten years has shown that at round-three binding water sales, demand may fall (relative to non-binding demand).

A rule of thumb is:

- Up to 10% reduction in likely demand if confidence is high
- Up to 20% reduction in likely demand if confidence is moderate
- Up to 30% reduction in likely demand if confidence is low.

To mitigate the risk of demand falling, government may consider increased funding to enable the capital charge to be $1,500/ML (rather than $1,600/ML) and increase the investment in solar, resulting in lower annual charges. Such considerations are a matter for discussion between the Collaborative and the relevant levels of government.

Summary of economic outcomes

All scenarios result in a benefit cost ratio above one (1). There is a core scenario and an extra solar scenario.

Item	Core – 7MW solar	Additional solar – 14MW
Total benefits ($m)	304.5	304.5
Total costs – P90 ($m)	244.5	257.5
Net benefits NPV ($m)	**60.1**	**47.0**
BCR	**1.25**	**1.18**

The water product

Customers will pay upfront to purchase a right to take water. This is forecast to be $1,500 per ML. Customers will be a shareholder of the locally managed entity. Key aspects of the water product include:

- This is not a water allocation. Rather, it is a 25- or 30-year supply contract with an option to extend.
- The water product will be tradeable.
- The minimum guaranteed pressure is 5 meters of head or 50kpa (7psi) at the outlet.
- The water will be available over 24 hours a day, 7 days a week for 11 months (one month for shutdown). The capacity of the scheme is designed to allow irrigators to take all of their water over nine months, which aligns with optimal irrigation practices.

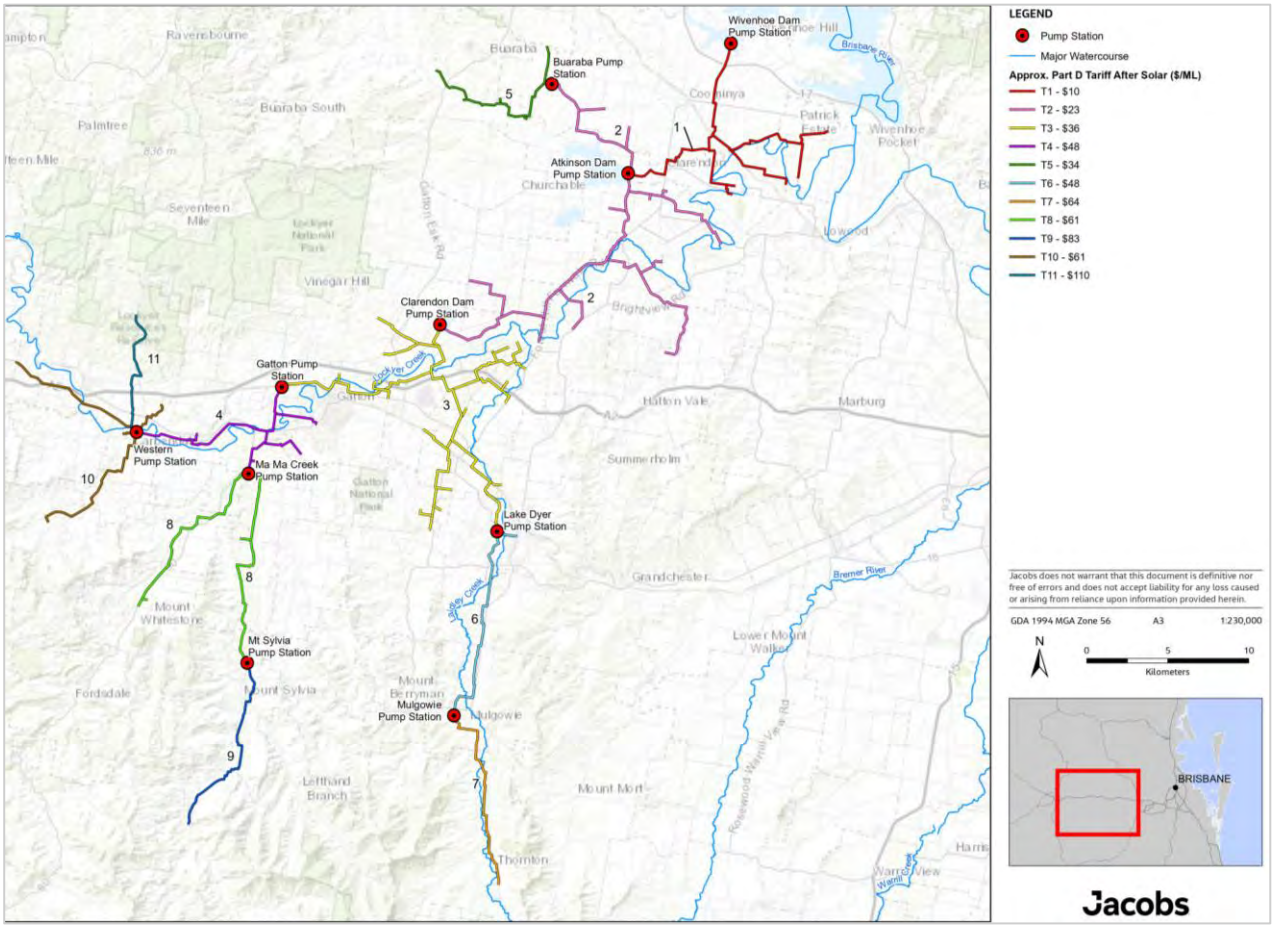
Financial contributions

To realise these substantial economic and wider benefits, there will need to be a contribution from irrigators, the Commonwealth and State Governments. Irrigators will fund all of the ongoing operating costs and the costs of replacing and renewal the asset over time.

A significant ongoing cost is for electricity to the 10 pumping stations. The inclusion of solar will reduce the grid energy required, and a significant amount of energy will be exported, benefitting the South East Queensland network.

The geography of the project means that some customers require a significant lift and water is pumped up to six times. Given the range of energy and cost requirements, the variable pumping charge will be differentiated according to the location of the customers' offtake.

The variable tariffs depend on the location of the outlet, as shown below.



Part of the ongoing costs relate to paying Seqwater for access to water from Wivenhoe Dam, based on the additional costs of producing more manufactured water. Jacobs has engaged with Seqwater to understand and model the costs; however, these prices have not been endorsed by Seqwater and will be considered by Seqwater in response to the full detailed business cases amongst all of the issues raised, including an assessment of any additional risk and how it is managed. These details can be negotiated between Seqwater and a company formed to build and run the project on behalf of irrigators.

Best practice is to align the costs with the recovery of that cost through prices. However, as water for irrigators are turned off when the manufactured water is being produced (and costs are incurred), there is misalignment between irrigation water use and Seqwater incurring costs. Therefore, a number of scenarios have been developed. Seqwater has not expressed a preference of any scenario at this stage. Irrigators have a strong preference for scenario 2 or scenario 3, as it aligns the cost with water use, and therefore revenue. This matter will need to be resolved subsequent to the conclusion of the business case.

	Scenario 1 (Seqwater charge all fixed)	Scenario 2 (Seqwater charge all variable)	Scenario 3 (Seqwater charge fixed and variable)
Part A (Seqwater bulk charge)	$210		$100
Part B (Seqwater variable charge)		$287	$161
Part C (fixed distribution costs) *	$65	$65	$65
Part D (variable distribution network electricity costs)	$10–$110 (weighted average is $39)	$10–$110 (weighted average is $39)	$10–$83 (weighted average is $39)

**Note: Part C costs reduce to $54 when 14 MW of solar is included. These costs have changed since round 2 demand assessment, reflecting the change in overall demand from 50,000 ML to 34,000 ML. This has resulted in fixed costs been recovered from a smaller volume of water, which has resulted in an increase to the Part C charge.*

Irrigators will also make a substantial contribution to the upfront capital cost of the project. However, the full costs will need to be shared between customers and government.

Party	Contribution for core project	Contribution for additional solar project (preferred)
Irrigators	$51 million	$51 million
State Government	$42 million	$49 million
Commonwealth Government	$93 million	$100 million
Total	**$186 million**	**$200 million**

Recommendations

The detailed business case makes the following four recommendations, subject to the Queensland Government deciding to recommission the Western Corridor Recycled Water Scheme to supplement urban water supplies:

Recommendation 1: Form a business entity and commence negotiations with Seqwater

It is recommended that an irrigation entity be established. This entity can negotiate with Seqwater the supply arrangements including:

- delivery regime and supply conditions, including triggers, which provides binding legal and operational protections that prioritise Seqwater's mandate to provide and protect urban water supply security in South-East Queensland.
- price and other contractual conditions that provide appropriate compensation for costs and risks incurred by Seqwater in the provision of water to the locally managed entity.

Recommendation 2: Commence pre-construction activities

It is recommended that the established irrigation entity commence pre-construction activities for the development of the preferred project model, including procuring an environmental assessment, undertaking formal water sales and all management, design, engineering and approvals required to prepare the project for construction.

Recommendation 3: Commonwealth and State governments provide in-principle financial support

It is recommended that the Commonwealth and State governments provide in-principle financial support subject to:

- Binding water sales
- Successful negotiation with Seqwater to contract for the supply of water
- Receiving the necessary permits and authorisations.

The Commonwealth should provide $100 million during the construction of the project. The State Government should provide $50 million, including an initial $10 million to fund pre-construction activities to become rapidly shovel-ready.

Recommendation 4: Proceed with construction of direct pipeline and irrigation network

It is recommended that the locally managed entity proceed with financing and construction of the preferred project model of purchasing water from Seqwater to be supplied from Wivenhoe Dam via a new trunk main and distribution network that utilises existing irrigation dams.

Next steps

Once the Australian and Queensland governments have approved this detailed business case and provided funding for the project there are several preconditions that must be met prior to construction commencing.

The pre-construction activities are likely to take between 15 and 24 months. The recommended implementation plan is outlined in Chapter 20. Due to the complexity and large volume of work required to manage the pre-construction activities, a qualified and experienced owner's engineer be engaged to oversee the activities, prepare necessary documentation and undertake key activities, such as binding water sales and various Government approvals. An EIS or IAR will be required and steps should be taken early in pre-construction as this is the activity that will take the longest time.

The WCWRS requires a decision by the Queensland Government in order to re-commission. While construction would not occur until the WCWRS is being re-commissioned, these negotiations should proceed. Negotiations between the LME and Seqwater are critical to the project and should be prioritised during pre-construction.

Binding water sales between the LME and water customers require careful management and stakeholder communication to maximise the value and efficiency of the water sales.

Acknowledgements

It is acknowledged the substantial knowledge, time and enthusiasm that has been contributed to the Detailed Business case by the Lockyer Valley and Somerset Water Collaborative (LV&SWC).

The LV&SWC membership consists of the Lockyer Valley Regional Council, Somerset Regional Council, Queensland Urban Utilities, Lockyer Valley Growers group and Lockyer Water Users Forum. In 2018, the LV&SWC appointed Mr Stephen Robertson as the independent Chair who has provided strategic guidance.

The representatives from each group on the LV&SWC are:

- Lockyer Valley Regional Council – Mayor Cr Milligan, Cr Michael Hagan, CEO Ian Church and Coordinator Special Projects Jason Harm
- Somerset Regional Council - Mayor Cr Graeme Lehmann, CEO Andrew Johnson and former CEO Bob Bain
- Queensland Urban Utilities – David Brooker and formerly Paul Belz
- Lockyer Growers Group Inc – Brock Sutton
- Lockyer Water Users Forum – Gordon Van Der Est and Greg Banff
- Lockyer Chamber of Commerce and Industry – Paul Emmerson and Alan McLucas

Throughout the development of the DBC the Collaborative received the invaluable support from LVRC's Stephen Hart and Helen McCraw.

The strength and success of the working collaborative is evident by its representation of over 300 potential irrigators, over 4000 businesses and two regional communities of Lockyer Valley & Somerset with a population base more than 50,000 residents. This group has collectively been driving the delivery of this project over the past two years for the greater benefit of their regions, Queensland and Australia through enabling better water and food security.

The extraordinary commitment to the project working group by Brock Sutton, Greg Banff and Gordon Van Der Est deserve special acknowledgement. They represented the interests of their individual organisations and contributed their vast local knowledge. Their commitment to the project enabled a true justification of the methodology, process used and the outcomes and recommendations contained in this Detailed Business case.

The Queensland Government contributed to the development of this business case through the Maturing the Infrastructure Pipeline Program.