



Queensland
Government

Department of Local Government,
Water and Volunteers

Regional Water Assessment – Summary Report

Southern and Darling Downs



Acknowledgment of Country

The Department of Local Government, Water and Volunteers respectfully acknowledges the Traditional Custodians of Country. We recognise the ongoing spiritual and cultural connection Aboriginal peoples and Torres Strait Islander peoples have with land, water, sea and sky. We pay our deep respects to their Elders past and present, support future leaders, and acknowledge First Nations peoples' right to self-determination.

General acknowledgements

The Queensland Government would like to thank and acknowledge the Queenslanders who took part in the consultation process which was central to developing this document.

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Director-General's foreword

I am pleased to present the Southern and Darling Downs Regional Water Assessment Summary Report. This assessment was completed in early 2024 and is the culmination of extensive stakeholder engagement and technical investigation to identify ways to support economic growth in one of the state's main food production regions through investment in water.

Local knowledge and stakeholder engagement has been critical to the success of this assessment. We have learned that future water demand is expected to increase across all sectors in the region. Access to additional reliable water supplies will be key to driving future economic growth and the jobs that come with that.

The economic prosperity of the Southern and Darling Downs region is strongly linked to the agricultural industry. It is dependent on well-managed water supply and security that will continue to support agricultural development, as well as future urban and industrial sector growth.

In this context, the assessment lays out a series of water initiative considerations that are prioritised over the short, medium and longer terms.

I would like to thank all those who participated and contributed to the development of the Southern and Darling Downs Regional Water Assessment, including Goondiwindi Regional Council, Southern Downs Regional Council, Toowoomba Regional Council, Western Downs Regional Council, First Nations peoples through Traditional Owner and Native Title Holder representatives, industry and peak body representatives.

I would also like to acknowledge the Australian Government's funding contribution to this assessment which may inform any future joint investment decisions with Queensland.

Releasing the Southern and Darling Downs Regional Water Assessment Summary Report does not signify Queensland Government approval or funding for the assessment's recommendations—however, it will now help to inform the delivery of the Queensland Government's water agenda. This includes the development of a Water Security Plan for Queensland.

Moving ahead, regional water assessment findings will be further considered in the development of this overarching plan and pipeline of water security projects. Investment decisions about projects can then be considered at the right time and in the context of Queensland's full water portfolio setting.

The Queensland Government is committed to delivering water infrastructure that will secure supply and foster economic growth, with a focus on affordability.



Joshua Hannan

Acting Director-General

Department of Local Government, Water and Volunteers

Executive summary

The Queensland Government is developing regional water assessments across the state. The regional water assessment (RWA) program is taking a comprehensive view of future regional water needs. Potential sources of water supply are being considered across boundaries of local government areas and catchments to maximise benefits and increase the effective use of existing infrastructure.

RWAs set out how existing infrastructure, new infrastructure and non-infrastructure solutions can be used to maximise water supply to drive economic growth.

The Southern and Darling Downs RWA process has involved extensive consultation with local governments, industry and peak bodies, Sunwater, Seqwater and other relevant entities, along with local Traditional Owners and Native Title Holders. These stakeholders have helped to identify and carefully consider 121 potential water supply and security initiatives in the region.

Robust technical analysis and extensive stakeholder feedback reduced that list to the nine most viable options for further detailed assessment, which determined the best options that could support future economic growth.

Public consultation on a draft Southern and Darling Downs RWA was also undertaken. Local communities had the opportunity to provide feedback on the draft recommended options and findings. Public feedback helped to shape the final Southern and Darling Downs RWA.

The RWA identifies a range of opportunities to support future economic activity and growth across the region. These include new bulk water infrastructure, improvements to existing water assets and non-infrastructure initiatives.

Recommendations are prioritised for consideration in the short, medium, and long terms.

Key short-term recommendations are:

- › Initiate a detailed business case for the Warwick to Stanthorpe pipeline, subject to preconditions.
- › Explore opportunities to support local governments to expand non-potable recycled water networks.

Key medium-term recommendations are:

- › Initiate detailed assessment for the Glebe Weir off-stream storage and pipeline augmentation, subject to preconditions.
- › Collaborate with the New South Wales Government on ways to optimise water availability in the Border Rivers.

Key long-term recommendations are:

- › Deliver the Texas off-stream storage, subject to preconditions.
- › Collaborate with the New South Wales Government on future water plan reviews in the Border Rivers region.

The Southern and Darling Downs RWA will be used to inform the delivery of the Queensland Government's water agenda.



Context

About Regional Water Assessments

In late 2020, the Queensland Government committed \$9 million to deliver three regional water assessments (RWA) that would identify ways to support economic growth in three of the main food production regions of the state through investment in water initiatives.

These regions are:

- › Tablelands
- › Bundaberg and Burnett
- › Southern and Darling Downs.

Further RWAs have since been announced focusing on strategically important regions in the state.

Australian Government investment of \$1.5 million also supported the Southern and Darling Downs RWA to further evaluate the Granite Belt Irrigation Project as a water supply option. This followed advice from that project's private proponent that the estimated project cost had significantly increased.

The Department of Local Government, Water and Volunteers (DLGWV), formerly the Department of Regional Development, Manufacturing and Water (DRDMW), is responsible for administering the RWA program.

The RWAs expand on previous investigations into water supply, considering the specific water needs of each region, as well as identifying knowledge gaps and opportunities for improvement. The goal is to:

- › develop a comprehensive plan to meet the region's short, medium, and long-term water needs
- › identify a combination of infrastructure and non-infrastructure solutions that could help increase water supply or security
- › drive economic growth.

The RWA process considers potential sources of water supply and opportunities for growth across the boundary lines of local government areas (LGA) and water catchments and beyond the RWA boundary itself. This approach seeks to maximise benefits and minimise costs.

RWAs help to understand the most realistic future demands and uses of water and determine the optimal and environmentally responsible ways to develop water resources. Each RWA identifies priority actions for implementation to achieve strategic objectives.

A key driver of this work is the need to provide credible, strategic analysis and advice that informs Queensland and Australian government investment decisions about water infrastructure projects.

An important aim of RWAs is progressing high priority water infrastructure projects to a detailed business case by providing a robust analysis that maximises the potential for government funding commitments.

The RWA process is tailored from Queensland's Project Assessment Framework and the strategic assessment and options analysis stages of the Business Case Development Framework. RWA analysis is at an early project development phase.

In delivering the RWA program, DLGWV works in partnership with local councils, industry and peak bodies, Sunwater, Seqwater and other relevant stakeholders, and in consultation with local Traditional Owners and Native Title Holders.

Developing the Southern and Darling Downs Regional Water Assessment

The Southern and Darling Downs RWA has been developed with extensive stakeholder consultation through a stakeholder advisory group (SAG), working group (WG) and broader engagement with the community.

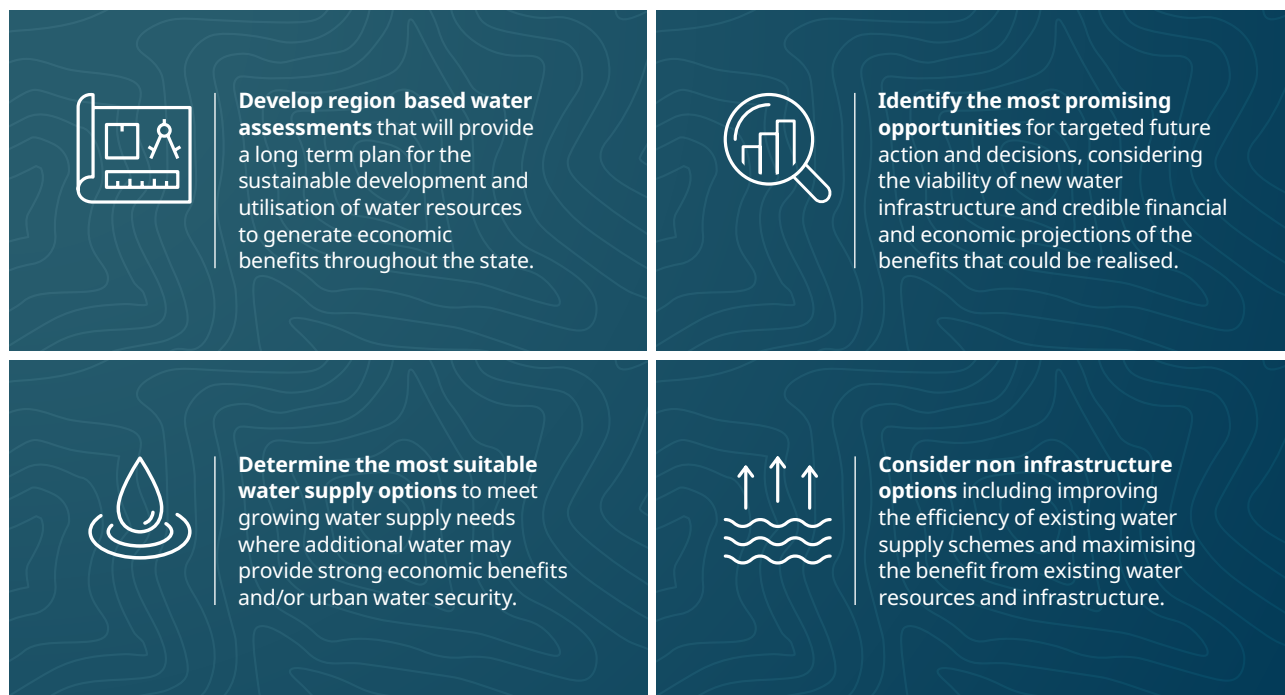
It presents the outcomes of substantial technical analyses and makes recommendations that seek to provide a foundation for maximising water supply and realising economic opportunities for the region.

The RWA program's strategic objectives are summarised in Figure 1.

Regional Water Assessment process

RWAs build upon previous water supply investigations in the region. They take a comprehensive view of local water needs and identify and fill knowledge gaps to establish how a range of options, including existing infrastructure, new infrastructure and non-infrastructure options could be used to maximise water supply to drive economic growth.

Figure 1: RWA program strategic objectives



Phase 1: Options identification and shortlisting

The RWA process has three phases. Phase 1 starts with extensive stakeholder engagement, a literature review, investment logic mapping workshops and a service needs assessment. This stage aims to understand the current service needs, future water needs and climate change risks of the region, and to identify potential initiatives to meet those needs.

The RWA process includes a review of previous water supply investigations in the region undertaken by state and local governments. It also considers private infrastructure proposals. Each initiative is initially examined with input from the SAG, TAP and, as necessary, a WG.

The assessment considered an initiative's:

- › ability to meet the region's water needs within the RWA timeframe
- › impact on cultural values of water
- › impact on ecological values and protected land
- › impact on community, public infrastructure, high value agricultural land and existing water entitlements
- › proximity to a nearby preferred or equivalent option (where multiple similar initiatives existed in close proximity, only a single initiative was taken forward).

Initiatives that are not considered suitable for further investigation are filtered out at this stage.

A long-list of options is identified. These options have the greatest potential and merit to progress to the next stage of assessment. They may include upgrading existing infrastructure, building new infrastructure or non-infrastructure options.

The long-list of options is further examined using a multi-criteria analysis (MCA) process. Each option is assessed and scored against key criteria. The four criteria used are:

- › economic
- › environmental and regulatory
- › social and community
- › technical and delivery risk.

Each criterion used several sub-criteria in the evaluation.

The MCA process results in a shortlist of options. These are considered the most viable options to maximise water supply and drive economic growth in the RWA area. These are also the options to undergo further analysis in phase 2 of the RWA process.

Phase 2: Options analysis

In phase 2, technical experts or contractors undertake a detailed options analysis, including technical investigation of shortlisted options in consultation with the stakeholder and technical advisory groups. Some options may be referred to other water planning processes to be progressed.

- › This stage considers:
- › regulatory matters
- › Native Title and cultural heritage matters
- › water plan compatibility
- › design
- › the environment
- › financial and economic conditions and implications.

The result of this is the identification of preferred options. This forms the basis of the draft RWA that is released for public consultation.

Phase 3: Finalisation

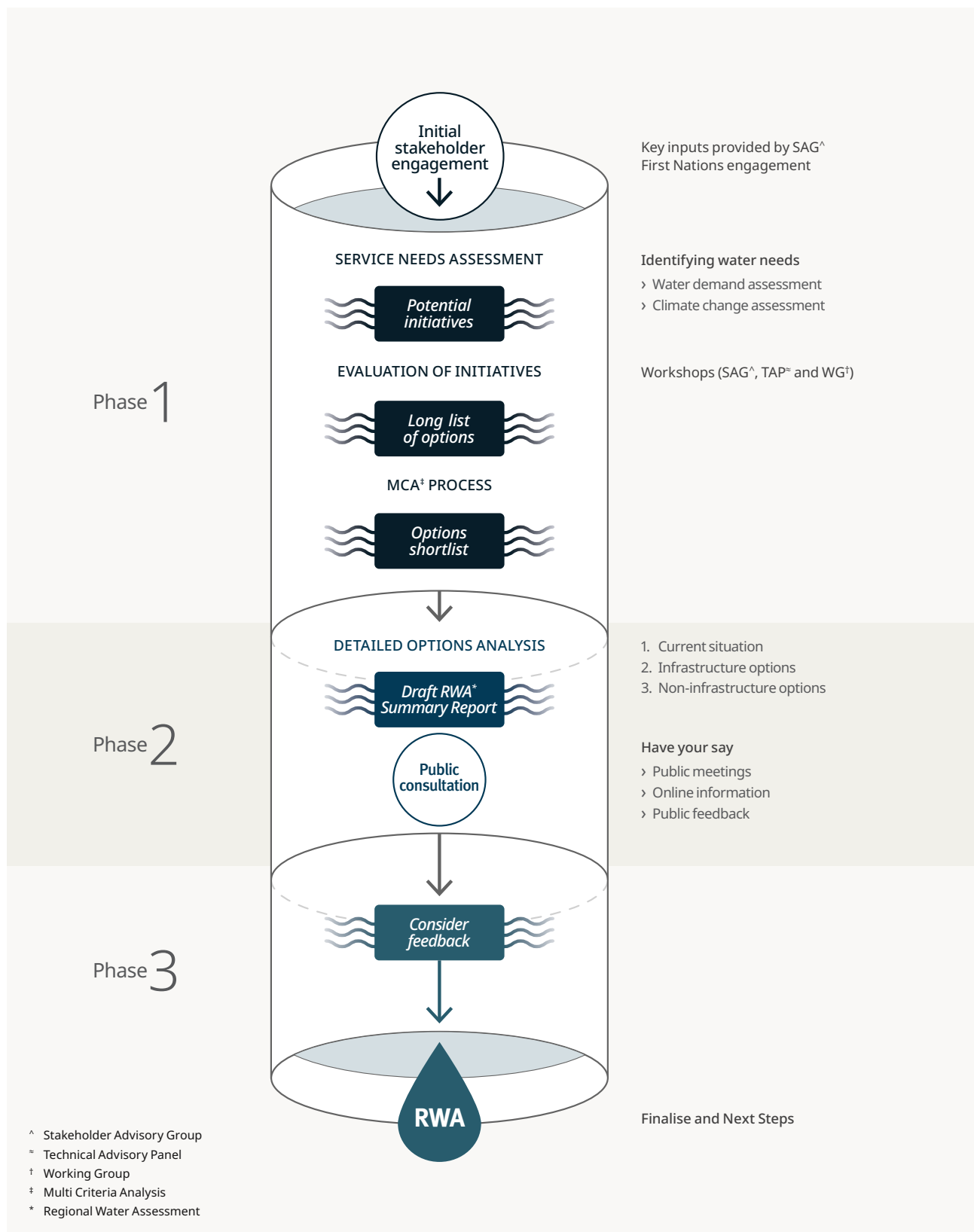
The final phase of the RWA process uses the feedback gathered during public consultation and further input from the SAG and TAP to finalise the RWA.

The final RWA details the findings of the assessment. It makes recommendations for potential delivery over the next 30 years (to the early 2050s) and clarifies any dependencies.

The final RWA will be used to inform the delivery of the Queensland Government's water agenda. Investment decisions about RWA recommendations can then be considered at the right time and in the context of Queensland's full water portfolio setting.

The RWA delivery process is illustrated in Figure 2.

Figure 2: RWA process



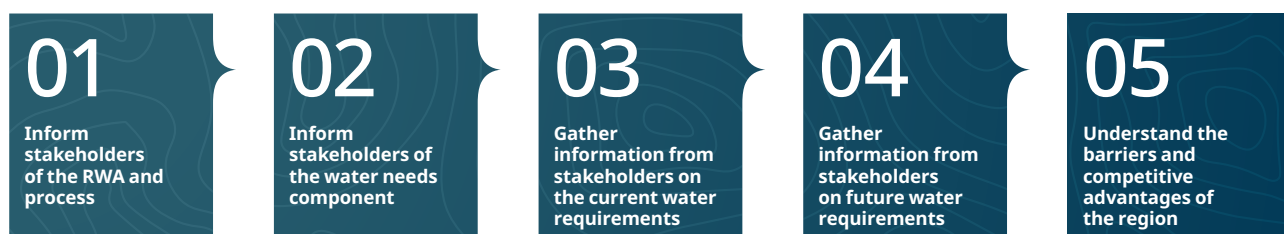
Stakeholder consultation

Incorporating local knowledge is essential in achieving the best economic outcomes for an RWA area.

Direct consultation was the primary form of stakeholder engagement when investigating the region's water needs. Important contributions from the wider Southern and Darling Downs community also helped to shape and assess future water needs and options.

The objectives of the stakeholder engagement for the assessment of future water needs are shown in Figure 3.

Figure 3: Stakeholder engagement process objectives



The Southern and Darling Downs RWA was supported by a SAG and WG consisting of local government, industry and peak body representatives, Sunwater and Seqwater representatives, and other relevant stakeholders.

Stakeholder representation in these groups is detailed in Table 1.

Each SAG and WG member represented the interests of their organisation and its representatives when providing input to the RWA process. The groups did not have a decision-making function.

The RWA process is also supported by a TAP comprised of Queensland Government agency, Sunwater and independent experts. This panel provides technical expertise and oversight to help ensure the best possible quality of analyses.

DLGWV consulted with Traditional Owner and Native Title Holder representatives to support the RWA's development.

Consultation occurred during phases 1 and 2 of the RWA process.

An interdepartmental committee provided awareness of RWA activities across government and enables wider strategic opportunities, risks and linkages to be identified and managed.

DLGWV undertook public consultation on the draft RWA for a period of 20 business days. Engagement activities included in-person drop-in sessions at key locations in the region, feedback forms (available online and in hardcopy) and meetings with stakeholders.

Table 1: Stakeholder representation

Entity	Stakeholder Advisory Group	Working Group
AgForce Queensland	✓	✓
Border Rivers Commission	✓	✓
Border Rivers Food and Fibre	✓	✓
Central Downs Irrigators Limited		✓
Cotton Australia (Queensland)	✓	
Goondiwindi Regional Council	✓	✓
Granite Belt Growers Association		✓
Growcom		✓
National Water Grid Authority	✓	
Queensland Farmers Federation	✓	✓
Queensland Fruit and Vegetable Growers	✓	
Regional Development Australia (Darling Downs and South West)	✓	✓
Seqwater	✓	✓
Southern Downs Regional Council	✓	✓
Stanthorpe and Granite Belt Chamber of Commerce		✓
Stanthorpe Community Reference Panel	✓	✓
Sunwater	✓	✓
Toowoomba Regional Council	✓	✓
Toowoomba Surat Basin Enterprise	✓	✓
Western Downs Regional Council	✓	✓

The wider water regulation, policy, and planning context

In addition to aligning with relevant water plans and the Murray Darling Basin Plan, the Southern and Darling Downs RWA has developed options which consider existing planning frameworks, including local government and regional planning schemes and other relevant instruments outlined in Table 2.

Table 1: Stakeholder representation

Strategy/policy/plan	Alignment with Southern and Darling Downs RWA
Regional council planning schemes	This RWA investigated areas for the improvement of water access, affordability and sustainability in the Southern and Darling Downs RWA area. This aligns with the regional council planning schemes for Goondiwindi (2018), Toowoomba (2022), Southern Downs (2018) and Western Downs (2019).
Toowoomba Region Water Vision 2071	Toowoomba Regional Council's Water Vision 2071 provides an integrated water security and wastewater servicing strategy for the next 50 years. Council was consulted throughout the RWA process and provided advice in the context of the Water Vision 2071.
Darling Downs Regional Plan 2013	The Darling Downs Regional Plan highlights the importance of a safe and reliable water supply in driving economic growth and development. It promotes the growth of the agriculture and resources industries which require water to provide certainty and investor confidence. The Southern and Darling Downs RWA aligns with these objectives by providing a long-term plan for the sustainable development and use of water resources to generate economic benefits with a focus on the agriculture sector.
DRDMW Strategic Plan 2022–26 (current at time of assessment)	This RWA supports the department's vision for sustainable water resources to drive economic growth and job opportunities for regional communities. It also contributes to the DLGWV objective of water infrastructure investment delivering maximum community benefit.
Queensland State Infrastructure Strategy 2022	This RWA aligns with the objectives of the strategy. It recommends utilising existing infrastructure and optimising its efficiency to support regional economic benefits. New infrastructure is considered where other more cost-effective options are not available to support regional economic benefits.
National Water Grid Investment Framework	This RWA supports the framework's objectives of improving water access and security, for the purpose of promoting the growth and sustainability of regional economies.
National Water Initiative (NWI)	This RWA aligns the NWI. It investigates and assesses possible opportunities for improvement in the water infrastructure of a regional area. This aligns with the NWI's stated goals regarding the effectiveness of water usage and the enhancement of water availability, among others. This RWA also considered underlying NWI water pricing principles.

Southern and Darling Downs RWA area summary

The Southern and Darling Downs RWA includes four local government areas of Southern Downs, Toowoomba, Goondiwindi and Western Downs.

The region has a rich history of agricultural production and this is the dominant form of water use. Of the region's 4.4 million hectares (ha), over 95% is under some form of agricultural land use (58% of this agricultural land use is under grazing native vegetation). Figure 4 provides a snapshot of the demographics of the RWA area including current and forecast population, a list of towns, agricultural land use, key industries and current water sources.

The extent of the Southern and Darling Downs RWA area is shown in Figure 5.

For assessment purposes and to assist in aligning water needs and opportunities, the Southern and Darling Downs RWA was generally considered on a local government area basis.

These areas were explored in more detail, as necessary, to develop the RWA, as evidenced by activity focussed on the Granite Belt region.

The Southern and Darling Downs RWA did not consider providing water outside of the RWA area boundary. It did investigate supply options from outside the RWA area to meet identified water need.

Some options located outside the RWA boundary may be relevant to the Southern and Darling Downs RWA. These could be considered in other regional scale assessments such as the Central Queensland RWA. Consideration of water demands in neighbouring regions may improve the viability or effectiveness of some infrastructure options considered in the Southern and Darling Downs RWA.

Figure 4: Snapshot of the demographics of the Southern and Darling Downs RWA area

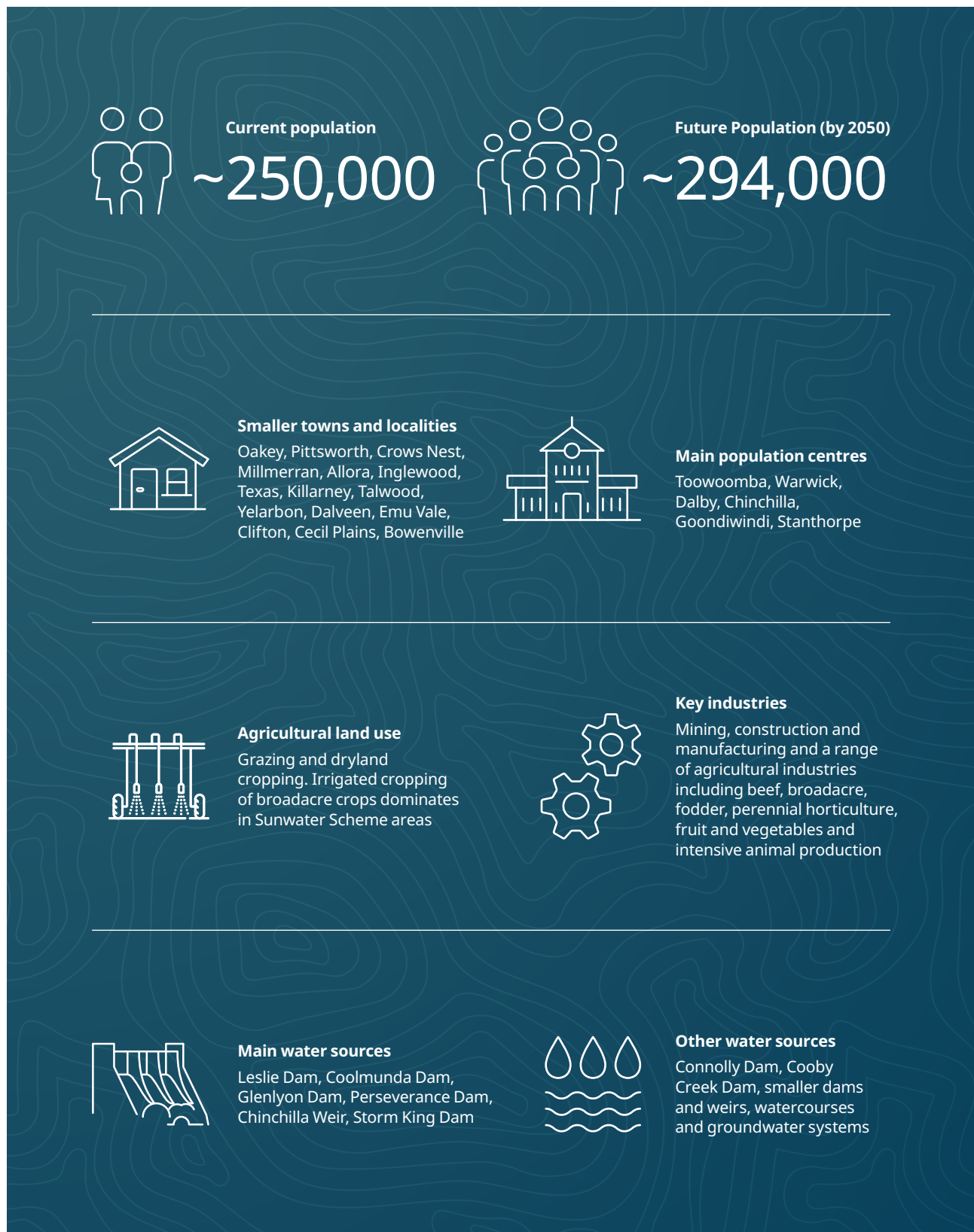
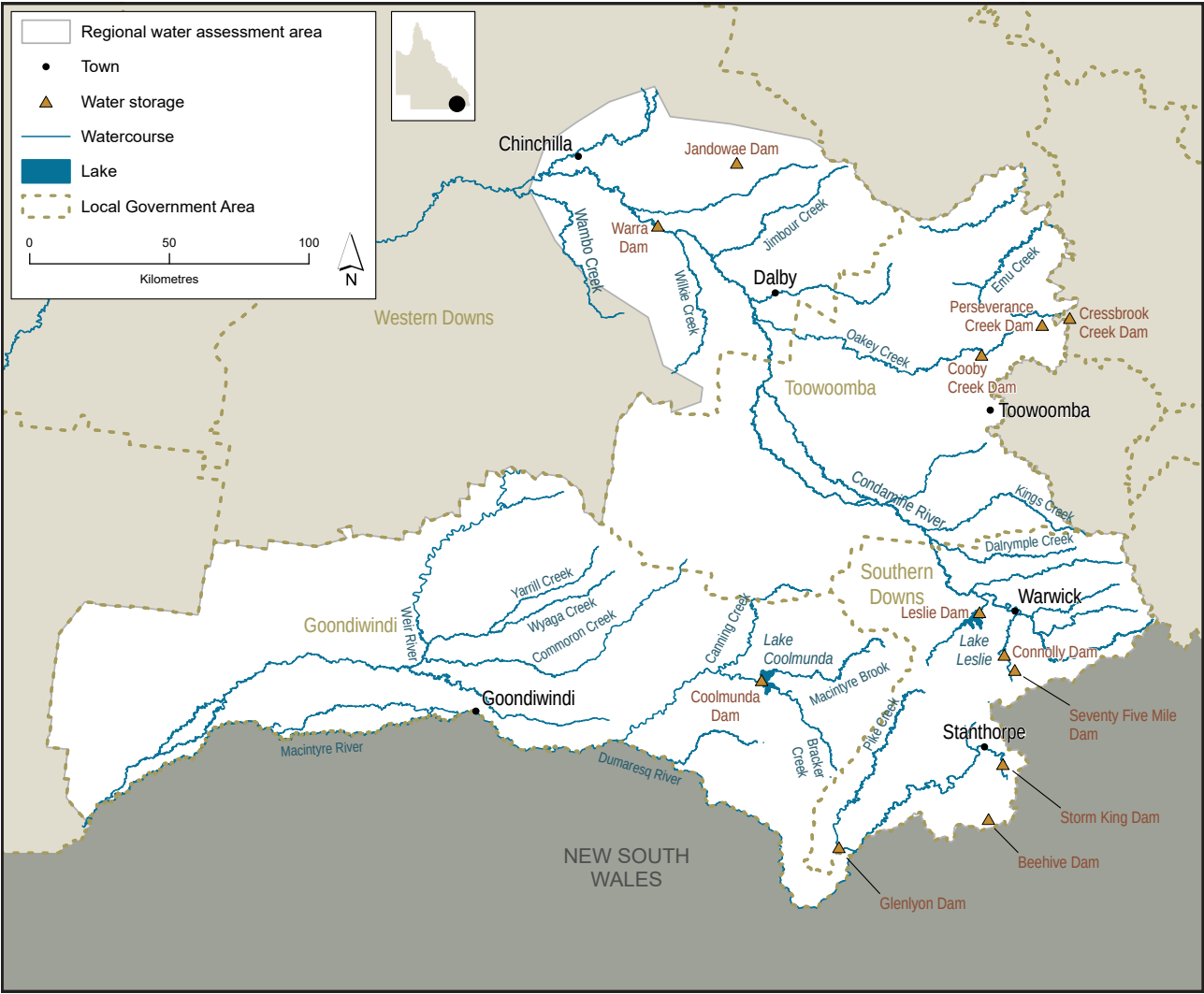


Figure 5: Southern and Darling Downs Regional Water Assessment area



Regional challenges and opportunities

Managing water resources

Water plans are developed under the *Water Act 2000* to sustainably manage and allocate water resources in Queensland. They consider historical rainfall and run-off information to help understand and manage risks to water security, communities and the environment.

Water plans also define the volume of unallocated water that can be made available for future supply without impacting existing water entitlement holders or key economic, environmental or cultural uses of water within a catchment.



 Accommodation Creek, Ballandean

Existing water resources

Queensland's statutory water plans define the amount and potential uses of water resources across water plan areas. The Southern and Darling Downs RWA area crosses these water plan areas:

- › *Water Plan (Border Rivers and Moonie) 2019*
- › *Water Plan (Condamine and Balonne) 2019*
- › *Water Plan (Moreton) 2007*
- › *Water Plan (Great Artesian Basin and Other Regional Aquifers) 2017.*

The Southern and Darling Downs RWA was developed in consideration of these water plans.

The Southern and Darling Downs RWA area is largely within the Queensland Murray Darling Basin (QMDB). The QMDB is subject to commitments from multiple levels of government to not increase the amount of water take.

The unallocated water reserves included in the relevant water plans, and further defined in the water management protocols, is outlined in Table 3.

Utilisation of water resources in the region (supplemented, unsupplemented, overland flow and groundwater resources) is high. Sunwater's water supply schemes are close to being fully allocated and generally have high utilisation, particularly in drier years. The amount of physically available water in the schemes tends to vary considerably over time. The ability to meet urban water needs is already under pressure in the region.

The reliance on overland flow and groundwater has constrained opportunities for scaling-up value-adding enterprises. The region is also becoming a major centre for high value horticulture crops such as medicinal cannabis and perennial tree crops such as olives and avocados, that may increase demand for available water supplies.

Table 3: Summary of unallocated water across the Southern and Darling Downs RWA area

Catchment area	Water management area/water unit	Coordinated project (megalitres [ML])	Town water supply (ML)	Aboriginal economic/social aspirations (ML)	Any purpose (ML)
Border Rivers	Stanthorpe Water Management Area	1,740	1,250	200	60
	Sediments above the Great Artesian Basin	0	0	620	5,580
	Border Rivers fractured rock	0	0	0	387
Moonie	Moonie Water Management Area	0	0	100	0
	Sediments above the Great Artesian Basin	0	0	480	4,320
Border Rivers and Moonie	Queensland Murray-Darling Basin deep unallocated water	0	0	0	500
Condamine Balonne	Sediments above the Great Artesian Basin	0	0	450	4,050
	Condamine fractured rock	0	0	0	660
Border Rivers and Moonie	Queensland Murray-Darling Basin deep unallocated water	0	0	0	500

Climate change risk

A climate change assessment was undertaken using hydrology models relevant to the Southern and Darling Downs RWA area. The methodology was in accordance with Department of Environment, Tourism, Science and Innovation's guidance for incorporating climate change in water resource modelling for Queensland's water plans¹. The modelling assumed that all water that is authorised and available for use was used. This enabled testing of water supply performance as provided for under the water plans.

Climate change risk has also been factored into the demand assessment, including consideration of water requirements and viability of current and future agriculture under increasing temperatures and variable rainfall.

Climate change modelling demonstrated the significant uncertainty and variability in current climate change science and in understanding the likely effects of climate change—although this science is rapidly improving. In this context, the assessment found:

- › Water supply scheme (supplemented water) customers are likely to be the most affected. Water supply is likely to be reduced due to climate change, with an average decline in annual supply of 5% by 2050.
- › Increased temperatures and evapotranspiration are likely to increase demand from existing users. This is due to the requirement for more cooling and irrigation and reduced efficiency of on-farm water storages due to evaporation.
- › Climate-dependent water supplies (such as dams) have a wide range of possible futures, as modelled. As water becomes scarcer, it is likely to become more concentrated to higher value uses. High value users requiring high reliability water may seek to hold additional water entitlements to help manage the risk of not being able to access a full allocation every year.

- › Lower runoff is estimated to negatively affect groundwater resources. This would impact multiple sectors of the region's local economies.
- › High value water uses, such as urban, industrial and intensive agriculture, are likely to seek water supply sources to address climate variability, tending to concentrate east of the Southern and Darling Downs RWA area.

Climate change risk is a challenge for the Southern and Darling Downs region. The production of high value annual and perennial horticultural crops is important to the region's economy and will continue to dominate water and land use. These water users typically require higher reliability water supplies. Production will fluctuate based on water availability, increasing fluctuation under climate change.

Climate change is anticipated to place downward pressure on the yield of existing water sources (including groundwater). Measures to enhance the reliability of water supplies are expected to become increasingly important in the future.



Macintyre River, Goondiwindi

¹ *Incorporation of climate change in water resource modelling for Queensland's water plans: Hydrological modelling document* – Queensland Hydrology (2022)

Water demand by sector

- › To determine current and future water demand, three key sectors were considered:
- › agricultural
- › industrial and commercial
- › urban.

Agricultural

The region is dominated by agricultural land use. Agriculture underpins major economic activity and employment in many areas, such as Stanthorpe. The RWA area has a competitive advantage for multiple commodities and markets, particularly for intensive livestock industries.

Water availability, both volume and reliability, is generally considered by SAG and WG members as a major constraint to future economic growth. The capacity to pay for new water infrastructure is limited, which may constrain the viability of potential major infrastructure options.

Where there are significant surface water sources, irrigated broadacre cropping is expected to continue to dominate water and land use, with fluctuations based on water availability. Small areas of horticulture are scattered across the region and while growers are likely to continue benefiting from regional competitive advantages, growth prospects may not be significant in absolute terms.

Intensive agriculture, dominant in the east, requires reliable, high quality water sources. Feedlots across the region predominantly rely on groundwater. These producers have a relatively high capacity to pay, particularly piggeries and poultry operations. Manufactured water and groundwater development are most likely to be attractive to these producers.

The estimated total current annual agricultural water requirement to meet all demand is 1,024,839ML. To cover 80% of all possible demand, the range of required water is between 826,292ML and 1,066,587ML annually. This estimate is based on unconstrained demand, which assumes any amount water can be made available (regardless of water availability). It is also indifferent to the water source and water supply.



📍 Cropping and chicken hatchery, Allora

Table 4 shows the estimated demand for the Southern and Darling Downs RWA area, both now and in 2052, under a range of hypothetical pricing scenarios. The analysis suggests that growth in demand is highly sensitive to the price of water service charges.

Table 5 shows the impact that water service charges have on agricultural water demand across sectors.

At water service charges greater than \$250/ML, demand growth by volume is primarily for horticulture and broadacre crops that supply intensive livestock. These users require highly reliable and high quality water.

At water service charges greater than \$500/ML, growth in demand is mostly for piggeries, poultry operations (meat and eggs) and intensive beef (feedlots). These users require both highly reliable and high quality water.

The Granite Belt region indicated growth in demand for water for agriculture, even with water service charges of up to \$4000/ML. There are likely to still be constraints on the capacity-to-pay for water service charges beyond \$2000/ML. Future growth in demand is not uniform across local government areas in the region.

Table 4: Summary of agricultural demand using hypothetical water service charge scenarios

Water service charge scenarios – new supply (\$/ML)	Estimated current demand (ML)	Estimated 2052 demand (ML)	Increase
\$500	1,024,839	1,331,526	30%
\$1,000	1,024,839	1,112,115	9%
\$2,500	1,024,839	1,081,590	6%

Table 5: Distribution of growth in demand by 2052 by primary industry use

Agriculture water demand growth by use (ML)	\$500/ML	\$1,000/ML	\$2000/ML
Piggeries	1,210ML	1,210ML	1,210ML
Poultry (meat and eggs)	2,872ML	2,872ML	2,872ML
Intensive beef (feedlots)	52,670 ML	52,670ML	52,670ML
Broadacre (driven by intensive livestock needs)	214,648ML	0	0
Annual horticulture	4,762ML	0	0
Perennial horticulture	30,525ML	30,525ML	0
Total	306,687ML	87,277ML	56,752ML

Industrial and commercial

Industrial and commercial businesses in the Southern and Darling Downs RWA area are mainly focused on energy production, value adding to agricultural commodities, with some manufacturing.

Intensive animal production is serviced by processing facilities. The growing horticulture industry is value adding with processing, packaging and manufacturing facilities. Future growth is likely to continue based on the region's competitive advantages in intensive agriculture. Other industrial and commercial uses are not mature enough industries to accurately estimate water demand growth.

Table 6 summarises the industrial and commercial water demand.

There is likely to be considerable growth in industrial water demand over the next 30 years. A potential increase of almost 20,000ML is estimated. The total volume of water required is still small relative to the agriculture sector. Industrial water users have a high capacity to pay for water and generally require high reliability and good water quality.

Urban

Urban water use in the region varies between seasons and year-on-year. It has historically grown with population increases. The region has a current population of approximately 250,000. While the population is expected to grow steadily over the next 30 years, water usage can vary by house type and household formation.

Aggregated water production estimates produced by council water businesses indicate that current urban water needs are around 26,000ML/a. Population growth rates by local government area (LGA) are used to estimate future urban water demands. Total urban demand is estimated to increase to around 34,800ML by 2052. This is a 34% increase in urban demand by 2052. The growth is not estimated to be equal across LGAs. Toowoomba's urban demand is estimated to increase by 46%.

Table 6: Current and forecast industrial and commercial water demand for the Southern and Darling Downs RWA area

Region	Estimated current demand (ML)	Estimated 2052 demand (ML)	Change (ML)	Change (%)
Southern and Darling Downs RWA area	17,726	37,231	19,505	110%



 Public pool, Texas

Water demand by local government area

Table 7 shows the current and 2052 estimates for urban water demand by local government area (LGA), including percentage change. Total urban water demand is expected to increase to around 34,800ML by 2052.

Toowoomba LGA accounts for over 85% of the regional growth in water demand with a potential increase of approximately 7,600ML.

Urban water users require highly reliable water supplies.

A breakdown of industrial and commercial water demand by LGA is not provided due to the commercial-in-confidence nature of the information and the considerable uncertainty of the future distribution of this water demand across the RWA area.

The current and future distribution of agricultural demand is not consistent across LGAs and is discussed in each section below.

Southern Downs LGA

The Southern Downs has a rich history of agricultural production. The dominant land and water uses are the diverse range of grazing, dryland cropping and irrigated cropping. Irrigated broadacre cropping is focused on areas with significant surface water sources, such as the Upper Condamine Water Supply Scheme (WSS). Groundwater is also heavily relied on to supply feedlots, dairies and intensive agriculture. Egg production has expanded in this area.

The Granite Belt region contains a diverse mix of high value horticultural production, including apples, strawberries and grapes. The producers benefit from local competitive advantages, such as favourable climatic conditions, that allow for counter-seasonal production.

There is an opportunity to grow the domestic market for apples, as exports have dropped significantly over the last 5 years. With no supply from bulk water infrastructure and limited access to groundwater, horticulture is supplied from small, on-farm dams capturing overland flows.

The highly variable water security has resulted in significant fluctuations in economic prospects and acts as an impediment to investment to generate further economic activity and employment.

Table 7: Current and forecast urban water demand in the Southern and Darling Downs RWA area by LGA

LGA	Estimated current demand (ML)	Estimated 2052 demand (ML)	Change (ML)	Change (%)
Southern Downs	2,224	2,477	253	11%
Toowoomba	16,774	24,463	7,689	46%
Goondiwindi	1,887	1,848	-39	-2%
Western Downs	4,996	5,993	997	20%
Southern and Darling Downs RWA area	25,881	34,782	8,901	34%

The SAG, WG and other stakeholders have identified water availability as the key impediment to future growth in agriculture.

Table 8 shows the estimate of current and future agricultural demand for water in the Southern Downs LGA under three different hypothetical water pricing scenarios.

Due to extreme drought, local water sources have not been able to meet urban water needs in recent years, requiring water restrictions and water carting to maintain water supplies. Stanthorpe required emergency water carting from Connolly Dam between September 2019 and April 2021. This was because Storm King Dam reached critically low levels due to extended drought conditions.

A significant proportion of residents in the Stanthorpe area are not connected to the reticulated network. In drought conditions, this population has historically sought to access the reticulated network via standpipes, further increasing pressure on water supplies.

Total regional demand for urban water is estimated to grow by approximately 11% over the next 30 years to 2,477ML per annum.

At the time this assessment was undertaken, the Queensland Government was already supporting the region's urban water security needs by delivering its Southern Downs Drought Resilience Package and the construction of the Toowoomba to Warwick Pipeline. The Toowoomba to Warwick pipeline could connect Southern Downs communities to the South East Queensland (SEQ) Water Grid and is designed to supply up to 7.3ML per day (up to 2,665ML per annum) from Wivenhoe Dam to the Southern Downs, including Warwick during drought periods.

The Southern Downs drought resilience package includes a range of additional measures to increase local water supplies, including groundwater bores, upgrading the Council's pumps at Leslie Dam and providing access to the dead storage, and upgrading the Warwick Water Treatment Plant.



Leslie Dam

Table 8: Agricultural water demand in the Southern Downs LGA using hypothetical water service charge scenarios

Price scenario (\$/ML)	Estimated current demand (ML)	Estimated 2052 demand (ML)	Increase (ML)	Increase (%)
\$500	82,821	144,221	61,400	74%
\$1,000	82,821	126,436	43,615	53%
\$2,000	82,821	105,522	22,701	27%

Toowoomba LGA

The city of Toowoomba is likely to see urban water demand continue to grow in line with population growth over the next 30 years, with a 46% increase to 24,463ML/a. This represents over 85% of the projected increase in urban water demand in the Southern and Darling Downs RWA area.

Toowoomba Regional Council (TRC) has identified a series of projects to ensure urban water security until the mid-2040s. Around then, Toowoomba is estimated to require an additional water supply source to maintain urban water security.

Most of the growth in industrial and commercial water demand within the RWA area is expected to be in the Toowoomba LGA. In addition to existing mining and energy demands, there are several industrial precincts under development to support new international freight services from Toowoomba Wellcamp Airport. Reliable, high quality water supplies are required to attract new enterprises to these precincts.

Most agricultural production in the LGA is cotton and other broadacre crops, though there is significant production of eggs, livestock and horticulture within the RWA area. Toowoomba is the largest egg producer in the region. Most water for these operations is sourced from opportunistic water harvesting, overland flow or groundwater. Some is sourced from either the Upper Condamine WSS or releases from the Wetalla Water Reclamation Facility (WRF).

Once complete, the Toowoomba to Warwick pipeline will also provide a permanent water supply to the Cambooya, Greenmount, Nobby and Clifton communities.

In 2010, a pipeline from Wivenhoe Dam to Lake Cressbrook was constructed to provide water from Southeast Queensland to the Toowoomba region, supported by a significant State funding contribution. While this asset is now owned and maintained by TRC, the Queensland Government has recently committed funding to upgrade and relocate the Wivenhoe Dam pump station to improve the council's pump capacity and the flood resilience of the infrastructure.

Table 9 shows the estimate of current and future agricultural demand in the Toowoomba LGA under three different hypothetical water pricing scenarios.

Table 9: Agricultural water demand in the Toowoomba LGA using hypothetical water service charge scenarios

Price scenario (\$/ML)	Estimated current demand (ML)	Estimated 2052 demand (ML)	Increase (ML)	Increase (%)
\$500	348,480	428,049	79,569	23%
\$1,000	348,480	358,044	358,044	3%
\$2,000	348,480	351,317	2,837	1%

Goondiwindi LGA

Coolmunda Dam and Glenlyon Dam provide urban and agricultural customers with supplemented water supplies within the Macintyre Brook and Border Rivers water supply schemes, respectively. There is also extensive overland flow and stream-flow water harvesting and groundwater extracted largely from the Great Artesian Basin.

The water supply schemes support the irrigation of a variety of crops including lucerne, cereals, stone fruit and olives. Overland flow and groundwater supplies cotton, other broadacre crops and livestock production.

Table 10 shows the estimate of current and future agricultural demand in the Goondiwindi LGA under three different hypothetical water pricing scenarios.

Urban water supplies for Goondiwindi are released from Glenlyon Dam via the Dumaresq River to Boggabilla Weir on the Macintyre River. Releases are made from Boggabilla Weir to maintain the water level in Goondiwindi Weir.

Urban water demand growth is minimal in Goondiwindi. This is consistent with population growth estimates. Water supplies are supplemented by two Great Artesian Basin groundwater bores that were installed in response to the 2019 drought.

Texas accesses water from a natural pondage in the Dumaresq River. Additional water is sourced from an alluvial bore constructed in 2019.

Inglewood is supplied under a high priority water allocation in the Macintyre Brook WSS, sourced from Coolmunda Dam.

Table 10: Agricultural water demand in the Goondiwindi LGA using hypothetical water service charge scenarios

Price scenario (\$/ML)	Estimated current demand (ML)	Estimated 2052 demand (ML)	Increase (ML)	Increase (%)
\$500	353,570	443,936	90,366	26%
\$1,000	353,570	364,701	11,131	3%
\$2,000	353,570	362,083	8,513	2%



Paul Hilton weir, Goondiwindi

Western Downs LGA

The Western Downs LGA includes beef and pork production and large areas of cultivated land supporting cotton and other broadacre cropping. With surface water supplies constrained in the Murray Darling Basin, irrigators rely on a combination of overland and stream-flow harvesting and groundwater sourced primarily from the Great Artesian Basin.

The Chinchilla Weir WSS provides 4,049ML of high and medium priority water allocations, supporting Chinchilla's town water security and irrigation of broadacre and horticultural crops, including melons. The WSS also uses treated coal seam gas (CSG) water from the Kenya water treatment plant, when available.

Australia generally has a competitive advantage in beef production, with exports and land constraints driving intensification of production towards feedlots. This is evidenced by a recent increase in feedlot applications, particularly for larger operations. In 2019, the LGA had 68 feedlots, with approval for 265,340 standard cattle units, and 23 piggeries, with approval for 229,179 standard pig units. This LGA has export protein market growth prospects.

Both Dalby and Chinchilla have experienced water security challenges in recent years. Due to the low reliability of surface water from the Loudoun Weir, Dalby's town water supply is heavily dependent on groundwater extracted from the Condamine Alluvium. In response, Western Downs Regional Council is progressing a range of upgrade works, including additional Great Artesian Basin bores accessing the Hutton and Precipice aquifers.

Chinchilla is supplied under a 1,160ML/a high priority water allocation. Water is sourced from Chinchilla Weir. This weir has reached low levels on several occasions. Chinchilla has a low likelihood of water supply failure before at least 2041, provided CSG water continues to supplement the system sufficiently.

Urban water demand is estimated to increase by 20% by 2052. Based on forecast demand, an additional supply source is not expected to be required until after 2041. However, this timing may be reduced if unacceptable water security risk emerges.

Table 11 shows the estimate of current and future agricultural demand in the Western Downs LGA under three different hypothetical water pricing scenarios.

Table 11: Agricultural water demand in the Western Downs LGA using hypothetical water service charge scenarios

Price scenario (\$/ML)	Estimated current demand (ML)	Estimated 2052 demand (ML)	Increase (ML)	Increase (%)
\$500	239,968	315,319	75,351	31%
\$1,000	239,968	262,934	22,966	10%
\$2,000	239,968	262,669	22,701	9%



Local stakeholders brought a 'best for the region' approach to support the development of this regional water assessment.

Options to support water security and economic growth

The assessment process identified the most suitable ways to support the region's water security and promote economic growth. It systematically examined all available options, with input from local stakeholders.

Developing the shortlisted options

A list of 121 potential initiatives was identified in phase 1 of the RWA process—91 infrastructure and 30 non-infrastructure initiatives. Over 140 reference reports were reviewed. These included water investigations from state and local governments and private water infrastructure proposals. The SAG and WG also provided input.

The stakeholder advisory and working groups participated in workshops to:

- › identify the current and future water demand for different industries and subareas in the RWA
- › review previous water supply investigations, proposals and reference reports from state and local governments and private sector proposals
- › assess the list of initiatives.

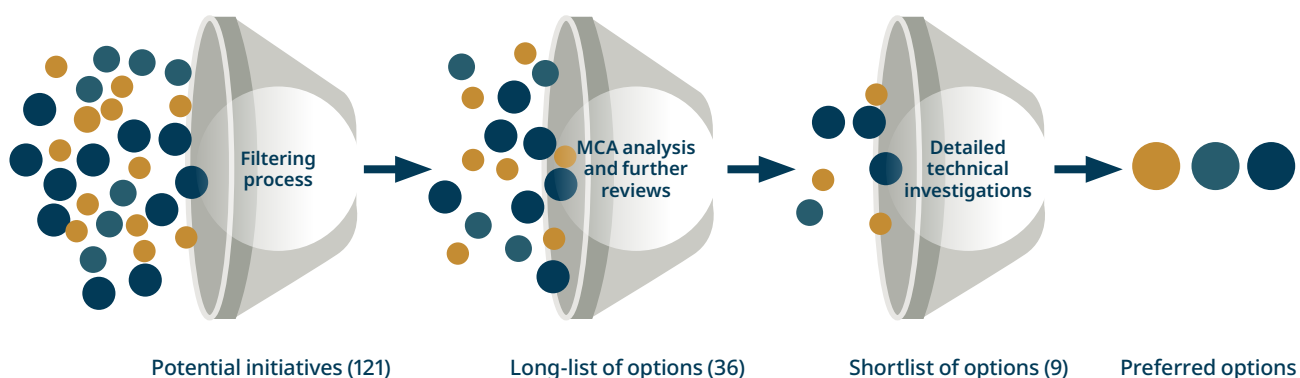
The initiatives were reduced to a long-list of 36 options—27 infrastructure options and nine non-infrastructure options across the Southern and Darling Downs RWA area.

The long-list of 36 options was further investigated using a multi-criteria analysis (MCA) process with support from the WG. Additional feedback was provided by the SAG, and the TAP provided technical advice. As a result, nine options were shortlisted for further analysis in phase 2 of the RWA process.

Figure 6 illustrates the progression from an initial list of potential initiatives (121) to a long-list of options (36), to the shortlisted options (9).

The interdepartmental committee was briefed on this process and its outcomes.

Figure 6: Technical evaluation of options process



The shortlisted options

- › The final shortlist includes six infrastructure and three non-infrastructure options. In assessing one of the infrastructure options, five sub-options were investigated.
- › These were considered to have the greatest potential to support water security and future economic growth in the RWA area.

- › Table 12 and Table 13 categorise these options in alignment with the State Infrastructure Strategy 2022 (SIS) category.
- › The location of the shortlisted infrastructure options is shown in Figure 7.

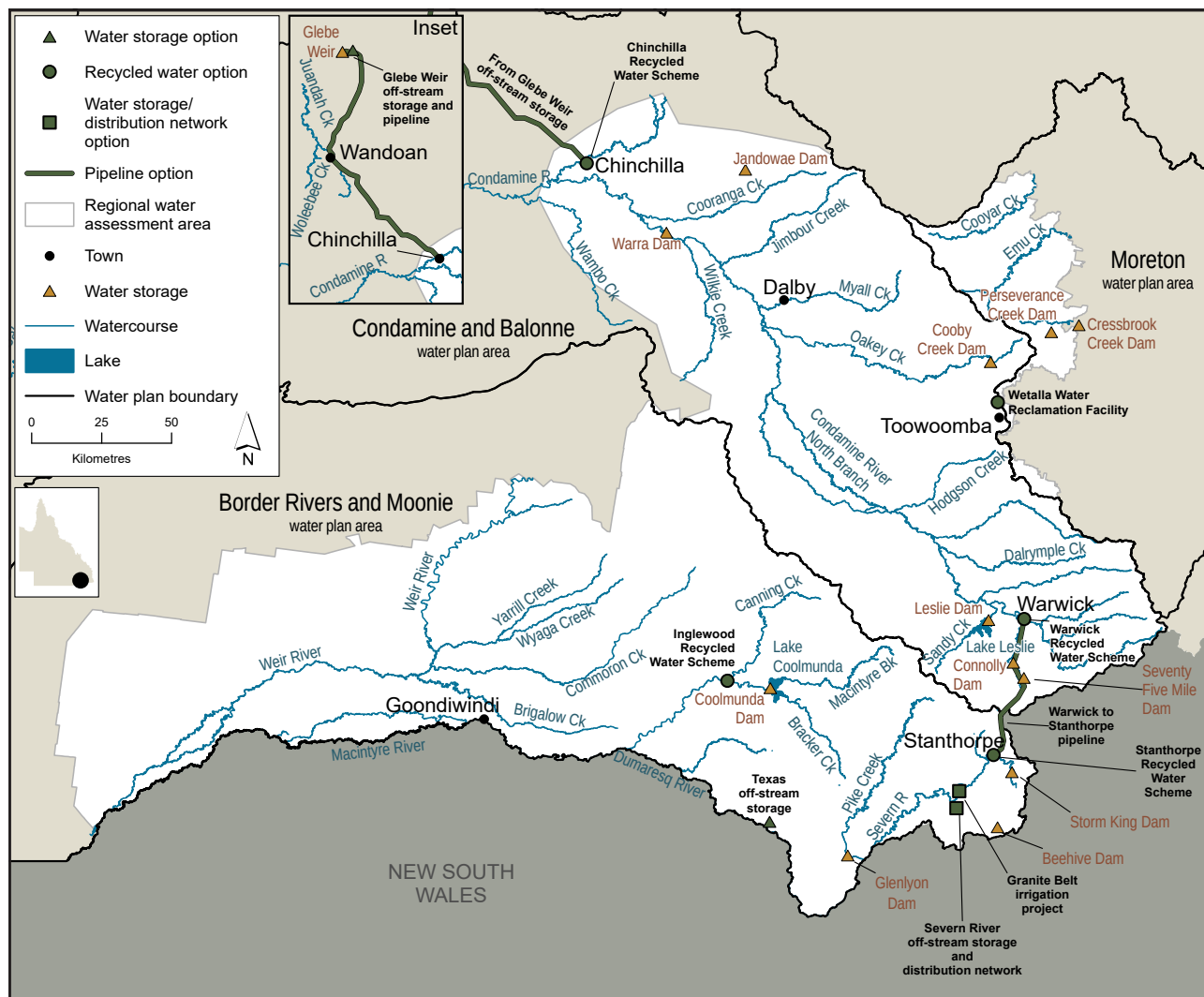
Table 12: Non-infrastructure options categorised into State Infrastructure Strategy (SIS) category

Non infrastructure option	SIS category
Continue collaboration with NSW to optimise Border Rivers water availability	Reform option
Improved access to unallocated water	Reform option
Innovative solutions to reduce on-farm evaporation	Reform option

Table 13: Infrastructure options categorised into State Infrastructure Strategy (SIS) category

Infrastructure option	SIS category
Regional scale non-potable recycled water for irrigation, industrial and greenspace use: <ul style="list-style-type: none"> › Sub-option – expand Wetalla Water Reclamation Facility › Sub-option – expand Stanthorpe Recycled Water Scheme › Sub-option – expand Chinchilla Recycled Water Scheme › Sub-option – expand Inglewood Recycled Water Scheme › Sub-option – expand Warwick Recycled Water Scheme. 	Improve existing option
Severn River off-stream storage and distribution network	New build option
Texas off-stream storage	New build option
Pipeline interconnection between Warwick and Stanthorpe	New build option
Glebe Weir off-stream storage and pipeline	New build option
Granite Belt irrigation project	New build option

Figure 7: Map of shortlisted infrastructure options



Options referred to other existing processes

As part of the initial option shortlisting process, several non-infrastructure options were identified for referral to other existing DLGWV water management processes for potential further consideration. These are detailed in Table 14.

Several infrastructure options were also identified as having potential long-term future benefits to the region. Those options were not progressed for further analysis as they ranked lower in the shortlisting process. However, they remain potential future water sources for the Southern and Darling Downs RWA area and are listed in the responding to the challenges and opportunities section.

Investigation of the shortlisted options

Engineering, environmental, social impact and cost analyses were undertaken for the shortlisted options. An overview of each shortlisted option and a summary of the investigation findings are presented in this section.

The economic and financial merit of each option was also appraised. Criteria used to compare the economic and financial performance of options were estimates of the:

- › net present value (NPV)
- › benefit-cost ratio (BCR)
- › upper bound service charges.

The WG and TAP provided important feedback and quality assurance during the analysis process.

Potential pipeline routes were estimated for the purposes of analysis. Further development of these, along with landowner consultation, would be required to define pipeline routes more accurately.

Table 14: Non-Infrastructure options referred to existing water management processes

Option	Description
Improved water trading opportunities	<p>This option would investigate potential improvements to water trading in the region. It includes:</p> <ul style="list-style-type: none">› developing tradeable water entitlements› enabling trading of groundwater licences in unmanaged areas› enabling and simplifying trading of unsupplemented entitlements› environmental studies to support more flexible trading rules, including in the Great Artesian Basin.
Review water planning framework in Queensland	<p>This option involves reviewing Queensland's approach to water planning, with a focus on the Southern and Darling Downs RWA area.</p> <p>There were several opportunities identified including:</p> <ul style="list-style-type: none">› reducing the complexity of conversions of water products› reviewing limitations to water trading› reviewing the allowances for transmission and operating losses. <p>This option could be aligned to the timing of water plan development or reviews.</p>
Improve visibility of water markets	<p>This option aims to provide current and future water allocation holders with visibility of water market activity in the region.</p>

Non-infrastructure options

Collaborate with NSW to optimise Border Rivers water availability option

This option acknowledges the Queensland Government's continued engagement with the New South Wales (NSW) Government on water resource management in the Queensland Border Rivers region. The option's intent is to ensure effective governance frameworks and collaboration forums support cross-border water planning.

The objective of the assessment was to understand current regulatory and governance arrangements of the Border Rivers region. The assessment outlined the role of each state's legislation and the governance arrangements in place to support it. It considered whether stakeholder input into planning and regulatory processes was facilitated at an appropriate level and at an appropriate time. The assessment explored opportunities for future engagement with NSW, giving stakeholders confidence that cross-border water concerns and issues will continue to be considered with NSW in a timely and fit for purpose way, where mutually beneficial to both states.

There are many recent occurrences of collaboration between the Queensland and NSW governments, agencies or entities signalling a focus on water in the Border Rivers. Some of these include:

- › re-establishment of the Border Rivers Standing Committee
- › leveraging a working group or similar forum of Queensland and NSW departmental officials to consider potential reform options.

Potential opportunities for future collaboration include:

- › future water plan (and equivalent) or associated regulatory reviews
- › governance
- › water trading
- › drought planning and response
- › if determined to be beneficial, Queensland Ministerial advice or briefing on cross-border water matters of potential mutual interest to NSW water portfolio Minister.



 Dumaresq River, Texas

Improved access to unallocated water option

This option explored opportunities to improve access to existing unallocated water reserves in the region, particularly the Queensland Murray Darling Basin (QMDB) deep unallocated water reserves. The deep unallocated water reserves are in groundwater aquifers situated below the Great Artesian Basin (GAB) within:

- › the Condamine and Balonne Underground Water Management Area
- › the Border Rivers and Moonie Underground Water Management Area.

The QMDB deep aquifers were considered a potential water resource to support further economic development within the RWA area, improve the resilience of existing or future economic activities, or support urban water security. Economic development may include high intensity feedlots or an industry with similar water use.

Information on potential aquifers within deep Bowen Basin sediments and basement rocks is limited. This presents a risk for confident groundwater development from the QMDB deep aquifers.

The assessment's focus for developing the QMDB deepwater resources was the western part of the RWA area. There is very limited hydrogeological information about this area of the Bowen Basin. To better inform the economic development opportunities utilising the QMDB deep water resource, further hydrogeological investigation may be beneficial. There may be some further benefit if existing and future relevant hydrogeological information was publicly accessible, centralised and presented in an interpreted format.

The RWA's economic analysis for this option does not provide a compelling case for investing in further investigative work. Private proponents will continue to face potentially high risk and associated costs for exploration to access groundwater in this deep aquifer.

Table 15 provides the environmental and social impact assessment summary for the improved access to unallocated water option.

Table 16 provides the economic and financial assessment summary for the Improved access to unallocated water option.

Table 15: Considerations for the improved access to unallocated water option

Consideration	Description
Environmental	Potential decline in the resource over time due to low recharge rates and uncertainty regarding water quality and suitability for end uses.
Social impact	Local farmers experience substantial benefits from improved water management practices, leading to enhanced water security and a catalytic boost to local economic growth. These practices not only provide immediate advantages but also pave the way for increased water availability within the Murray Darling Basin, ensuring a sustainable water future for the region.

Table 16: Economic and financial summary for the improved access to unallocated water option

Estimated capital cost	Estimated capital cost (\$/ML of yield)	Estimated operating and maintenance cost (ML/year)	Estimated BCR range	Estimated BCR	Estimated upper bound service charge (\$/ML)
\$10m	\$126,582	\$200	0.02 to 0.04	0.03	\$300

Innovative solutions to reduce on-farm evaporation option

This option investigated innovative solutions to reduce on-farm evaporation through increasing on-farm water storage efficiency. The goal was to enhance farm scale water security, particularly drought resilience.

There is estimated to be about 20,000ML of notified overland flow storages greater than 15ML in the Stanthorpe Water Management Area (SWMA), plus a significant number of ring tank type storages. The SWMA has available data and is a similar area to Queensland's Granite Belt region.

Previous investigations identified that either shade cloth or floating covers are highly suitable for reducing evaporation on the type and usage of water storages in the Granite Belt region. It is estimated that if half of these storages were covered, up to 4,500ML of evaporation could be saved annually.

There is also potential for reduced evaporation in the Condamine catchment and Border Rivers areas. Earthworks to raise the walls of existing storages may be a suitable option.

Assessment of this option looked at the impact of increased resilience of existing perennial/seasonal horticulture in the Granite Belt through reduced evaporation losses to support longer production timeframes into future droughts. It also investigated support for broadacre cropping in the Condamine catchment and Border Rivers regions under detrimental future climate change scenarios.

Importantly, the option did not propose any change to the water allocation and management arrangements of relevant water plans and no additional water was intended to be taken out of the system.

Four technologies were identified as suitable for use in the SWMA and the Condamine catchment and Border Rivers areas:

- › shade cloth
- › floating covers
- › chemical formulations, usually in the form of spray
- › structural amendments to existing dams.

The assessment concluded that:

- › shade cloth systems are appropriate for small irrigation dams serving high value crops or storages that permanently hold water, such as those in the SWMA
- › floating covers are less effective than shade cloth for the SWMA area, and not appropriate for other areas, due to the high capital cost, integrity of the product and difficult installation and maintenance, particularly in storages with a surface area greater than 5 hectares
- › chemical methods are not as effective as other methods in reducing evaporation due to being biodegradable and wind affected, resulting in degrading performance over time and a need to reapply in 1 to 10 days
- › structural amendments are more cost effective for larger storages, where earthwork volumes are small relative to the volume of water stored. This method is more suitable for the Condamine catchment and Border Rivers area where storages are typically larger and shallow.

The findings by region and crop type are provided in Table 17.

Table 17: Condamine catchment, Border Rivers and Granite Belt evaporation solution findings for on-farm storages

Region	Product	Average storage size (ML)	Surface area (Ha)	Annual evaporation losses (ML)	Storage type assessed	BCR (7% discount rate)	Outcome
Condamine catchment and Border Rivers	Cotton	1,070	20	91.7 to 183.4	Chemical formulations	0.04 to 0.07	
					Structural modifications	0.52 to 0.83	Structural modifications
Granite Belt	Apples	160	3	27.1 to 43.4	Shade cloth	1.35 to 2.17	Shade cloth
					Floating covers	1.35 to 2.15	Floating covers
					Chemical applications	0.48 to 0.77	
Granite Belt	Strawberries: field grown	48	1.6	14.5 to 23.1	Shade cloth	2.24 to 3.59	Shade cloth
					Floating covers	2.23 to 3.56	Floating covers
					Chemical applications	0.80 to 1.28	
Granite Belt	Strawberries: tunnel grown	48	1.6	14.5 to 23.1	Shade cloth	2.63 to 4.21	Shade cloth
					Floating covers	2.61 to 4.18	Floating covers
					Chemical applications	0.94 to 1.5	
Granite Belt	Strawberry: runners	160	3	27.1 to 43.4	Shade cloth	1.27 to 2.03	Shade cloth
					Floating covers	1.26 to 2.02	Floating covers
					Chemical applications	0.45 to 0.72	
Granite Belt	Tomatoes	48	1.6	14.5 to 23.1	Shade cloth	2.26 to 3.61	Shade cloth
					Floating covers	2.25 to 3.59	Floating covers
					Chemical applications	0.81 to 1.29	
Granite Belt	Green vegetables	160	3	27.1 to 43.4	Shade cloth	1.51 to 2.42	Shade cloth
					Floating covers	1.50 to 2.40	Floating covers
					Chemical applications	0.54 to 0.86	

Table 18 provides the environmental and social impact assessment summary for the innovative solutions to reduce on-farm evaporation option.

Table 18: Environmental and social impact considerations for the innovative solutions to reduce on-farm evaporation option

Consideration	Description
Environmental	<p>Shade cloth: reduction in fringing vegetation and subsequent loss of water quality improvement services from vegetation, reduction in algal blooms.</p> <p>Floating covers: increase substrate for algal growth; reduction in algal blooms.</p> <p>Chemical formulations: potential for impact to other water users including both native fauna and stock.</p> <p>Structural amendments to existing dams: potential for sub-optimal water quality, short-term reduction in water quality due to earthworks.</p>
Social impact	<div> <p>The positive impacts include:</p> <ul style="list-style-type: none"> › increased agricultural productivity › enhanced rural livelihoods › better water efficiency › quality, construction industry growth › infrastructure enhancement › future water allocations, driving economic, environmental, and social progress. </div> <div> <p>Potential negative impacts include:</p> <ul style="list-style-type: none"> › health risks from construction and maintenance › environmental degradation › affordability challenges for some farm businesses. </div>

Table 19 provides the economic and financial assessment summary for the innovative solutions to reduce on-farm evaporation option. This option is most suited to the Granite Belt region, particularly the use of shade cloth or floating covers.

Table 19: Economic and financial summary for the innovative solutions to reduce on-farm evaporation option

Mitigation technology	Shade cloth	Floating covers	Chemical applications	Structural amendments
Capital cost (\$/ha of storage)	\$120,000 to \$190,000	\$110,000 to \$180,000	\$720 to \$2,400	\$13,500 to \$48,700
Annual maintenance and operating cost (\$/ha of storage)	\$600 to \$950	\$550 to \$900	\$547 to \$10,950	\$0
BCR for apples	1.35 to 2.17	1.35 to 2.15	0.48 to 0.77	N/A
BCR for strawberries field grown	2.24 to 3.59	2.23 to 3.56	0.80 to 1.28	N/A
BCR for strawberries tunnel grown	2.63 to 4.21	2.61 to 4.18	0.94 to 1.5	N/A
BCR for strawberry runners	1.27 to 2.03	1.26 to 2.02	0.45 to 0.72	N/A
BCR for tomatoes	2.26 to 3.61	2.25 to 3.59	0.81 to 1.29	N/A
BCR for green vegetables	1.51 to 2.42	1.50 to 2.40	0.54 to 0.86	N/A
BCR for cotton	N/A	N/A	0.04 to 0.07	0.52 to 0.83

Infrastructure options

Regional scale non-potable recycled water for irrigation, industrial and greenspace use option

Recycled water can generally be supplied irrespective of weather conditions. Depending on the class of treatment, it can be cheaper than potable water and it is not directly subject to water restrictions.

Classes of recycled water under consideration in this assessment were Class A+, Class A, Class B, Class C and Class D. Of these, Class A+ has the highest level of treatment and Class D the lowest. Recycled water arrangements, for urban and industrial uses and minimally processed food crops, are required to have a recycled water management plan approved by the regulator.



Water tower, Goondiwindi

Sub-option – expand Wetalla water reclamation facility

Wetalla is located north of Toowoomba. The Wetalla water reclamation facility (WRF) sub-option includes the Wetalla WRF and the Wetalla advanced water treatment plant (AWTP), which treats some product effluent flow from the main treatment plant.

The Wetalla WRF has a capacity of 30ML/day (average dry weather flow). The effluent quality is rated at Class C with nutrient removal. The Wetalla AWTP has a capacity of 9ML/day, expandable to 15ML/day once all membranes are installed in the ultrafiltration plant. The effluent quality is rated at Class A+. It is estimated that treatment will increase, but augmentation is not anticipated until around 2041.

The RWA was developed acknowledging that Toowoomba Regional Council has also explored an alternative for developing the Wetalla WRF. Both assessments provide useful information for considering the facility's development potential.

Currently, any unused effluent from the WRF and AWTP is discharged to Gowrie Creek. It is used by agricultural producers downstream. It is estimated that 10 to 18ML/day from the WRF and up to 6ML/day from the AWTP is discharged into the creek.

Some stored effluent is pumped to the Millmerran Power Station via a 100km pipeline. The pipeline has the capacity to transfer 1,000ML/a or 2.7ML/day.

New Acland Coal (NAC) Mine has a 45km buried pipeline with the capacity to convey up to 5,500ML/a or 15ML/day from Wetalla AWTP. Wetalla AWTP treats water to Class A+ for distribution to NAC.

It is estimated that in 2052, the average recycled water volume for the current treatment plant will be 32.4ML/day.

The Wetalla WRF sub-option also involves:

- › construction of a new 15ML/day ultrafiltration plant to produce Class A+ effluent
- › construction of a new reticulation system (approximately 21km).

A pump station is also required at the new plant to transfer the recycled water to the new Reservoir 1 with gravity-fed water flows to a new Reservoir 2. Reservoirs help manage storage and flow control under different conditions and the approximately 21km pipeline reduces potential conflicts with existing services.

The scheme would distribute Class A+ effluent to the identified industrial areas in line with the service need assessment. The existing contracted users are Millmerran Power Station with 2.7ML/day and NAC Mine with 15ML/day. Locations in and near Toowoomba were identified for potential further demand of 14.5ML/day.

This option, if developed, assumes that all the treated water would be used by the proposed end users.

Table 20 provides a summary of the environmental and social impact considerations for this sub-option.

Table 21 provides the economic and financial assessment summary for this option.

Table 20: Environmental and social considerations for the sub-option to expand Wetalla water reclamation facility

Consideration	Description
Environmental	<p>No major barriers that impact the viability of the project have been identified. Most of the route is mapped as Category X. There are some matters of state environmental significance (MSES). The regulated vegetation map identified areas of category B.</p> <p>Further consideration is needed for potential impact of:</p> <ul style="list-style-type: none"> › freehold property land acquisitions › areas of potential contaminated land › sections of the project area coinciding with Flood Hazard Area – Level 1 (Queensland floodplain assessment overlay and Condamine-Balonne 1% AEP flood mapping) › threatened flora and fauna and their habitats, including species and communities listed under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> and <i>Nature Conservation Act 1992</i> › unidentified and intangible Indigenous Cultural Heritage places › potential traffic impacts from construction.
Social impact	<div> <p>The positive impacts include:</p> <ul style="list-style-type: none"> › additional water supply for agriculture › job creation › upgraded infrastructure › cost savings › improved amenities › environmental benefits through reduced freshwater use and habitat preservation. </div> <div> <p>Potential negative impacts include:</p> <ul style="list-style-type: none"> › community disruption › habitat destruction › road disruptions › potential cultural disturbances arising from construction activities. </div>

Table 21: Economic and financial summary for the sub-option to expand Wetalla water reclamation facility

Risk adjusted construction cost (\$m)	Estimated capital cost (\$/ML of yield)	Estimated operating and maintenance cost (\$m)	Estimated BCR range	Estimated BCR (7% discount rate)
\$135	\$25,600	\$20.7	2.80 to 3.06	2.96

Sub-option – expand Stanthorpe recycled water scheme

The Stanthorpe wastewater treatment plant (WWTP) is located west of Stanthorpe. It has a capacity of 1.5ML/day and on average, treats 0.82ML/day of raw sewage. The wastewater recycling process takes treated wastewater from the Stanthorpe WWTP and supplies Class A and Class B water for irrigation to local horticultural growers, a local sports and recreation field, the golf course, the public high school and the cemetery. Almost 100% of effluent from the WWTP is reused.

This option targeted high effluent quality uses to generate higher revenue for the respective regional council and economic value to the region.

It was determined that existing recycled water demand and usage exceed the WWTP inflow. It was also found that most of the identified users already have a recycled water connection and are using this water to produce high value horticultural crops.

From the available information, it is not likely that additional recycled water users need to be identified. The existing WWTP and associated network has sufficient capacity to meet the demand from existing users.

It is noted that addressing irregular wastewater disposal issues, resulting from increased flows during prolonged wet weather periods, was not considered in the RWA's scope. The focus was on achieving economic outcomes from increased water supply to identified service needs.

It was concluded that there is insufficient benefit to justify further development of this sub-option.



📍 Strawberry crop, Stanthorpe

Sub-option – expand Chinchilla recycled water scheme

The Chinchilla WWTP is located west of the Chinchilla township, adjacent to Charley's Creek. The Chinchilla sewage treatment plant has a capacity of 1.7ML/day and on average, treats 1.4ML/day of raw sewage. With some nutrient removal, the effluent quality is rated at Class B.

Currently, effluent from the treatment plant is pumped to a neighbouring farm where it is mixed with other water and used for irrigation purposes. Although 100% of the effluent is being reused already, it was assumed that the 1.4ML/day could be treated to a higher standard for new users.

The service need assessment identified a high demand from beef feedlots in the Western Downs LGA which provides the best economic benefit to the region. Whilst new users are yet to be confirmed, this option assumes there would be demand from the intensive agriculture industry (a future feedlot or feedlots) and that this could be located within 10km of the sewerage treatment plant. Western Downs Regional Council (WDRC) helped to identify potential users in the Auburn Road industrial area if the treatment plant was upgraded to tertiary treatment (Class A).

In conceptualising this option, an assumed location was chosen to develop a design for costing and economic assessment and was based on environmental considerations and flooding concerns. Development at an actual location/s would be the responsibility of a feedlot owner/operator and would be subject to WDRC consideration.

To provide water to one new high value customer (for this assessment only) the option involves:

- › a pump station to transfer the recycled water
- › an approximately 7km long pipeline from the WWTP to the sample feedlot
- › an onsite treatment facility at the feedlot
- › onsite storage, such as a tank or turkey's nest, which would be the responsibility of the feedlot owner/operator.

If this option is further developed, consideration could be given to supplying more than one new high value user.

Table 22 provides the environmental and social impact considerations for this sub-option.

Table 23 provides the economic and financial assessment summary for this sub-option.

Table 22: Environmental and social considerations for the sub-option to expand Chinchilla recycled water scheme

Consideration	Description
Environmental	<p>A 30m wide pipeline corridor buffer and a 1km buffer from the proposed feedlot is required. No major barriers impacting the project viability were identified. It avoids all essential habitat. Areas mapped as Category B and remainder is mapped in Category X.</p> <p>Further consideration is needed for potential impact of:</p> <ul style="list-style-type: none"> › freehold property with land acquisitions potentially required › areas of potential contaminated land and potential acid sulfate soils › threatened flora and fauna and their habitats, including species and communities listed under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> and <i>Nature Conservation Act 1992</i> › unidentified and intangible Indigenous Cultural Heritage places.
Social impact	<p>The positive impacts include:</p> <ul style="list-style-type: none"> › additional water supply for agriculture › job creation › upgraded infrastructure.

Table 23: Economic and financial summary for the sub-option to expand the Chinchilla recycled water scheme

Risk adjusted construction cost (\$m)	Estimated capital cost (\$/ML of yield)	Estimated operating and maintenance cost (\$m)	Estimated BCR range	Estimated BCR (7% discount rate)
\$10.3	\$16,566	\$5.3	2.08 to 3.12	2.54



Condamine River, Chinchilla

Sub-option – expand Inglewood recycled water scheme

The Inglewood WWTP is located west of the Inglewood township on the north side of Macintyre Brook. The Inglewood WWTP has a capacity of 150kL/day (average dry weather flow). The effluent quality is rated at Class C with some nutrient removal. Currently, all treated effluent goes to Goondiwindi Regional Council (GRC) owned land about 1km north of the WWTP for irrigation disposal (natural grasses).

For future recycled water volumes, the current inflow and plant capacity will be assumed, as it is larger than the mid-point population growth projection. This results in an average recycled water volume of 150kL/day. The effluent quality will remain at Class C.

Potential users identified and discussed with GRC are:

- › the neighbouring golf course: limited prospect of progressing due to water quality management requirements, increased maintenance requirements and access to other water sources
- › construction use: this has been considered previously, but low water quality makes it difficult
- › a local farm for crop irrigation
- › a third party operating a commercial activity on the existing council disposal area.

Providing the treated effluent for agricultural irrigation, by a local farm or a commercial operator within the existing disposal area, was identified to deliver the best benefit for this option. To investigate the option, one potential user was chosen in order to develop and assess a cost estimate and a nominal BCR.

The conceptualised design involves:

- › an extension to the existing irrigation pipeline onto the local property
- › supply discharge into a farm operated storage, where the operator can irrigate at the required time, flow and head for the application
- › use of existing pumps that are assumed to be sufficient based on the small length of the extension and the supply type.

As part of any next steps for this option, the potential end user(s) and detailed design would need to be more accurately identified.

Table 24 provides the environmental and social impact assessment results for this sub-option.

Table 25 provides the economic and financial assessment summary for this sub-option.

Table 24: Environmental and social considerations for the sub-option to expand Inglewood recycled water scheme

Consideration	Description
Environmental	<p>No major barriers impacting project viability. Avoids all essential habitat. No change to flow regime. Works will involve clearing of Category X, non-remnant vegetation. Clearing of vegetation in Category X area is exempt clearing work on freehold land.</p> <p>Further consideration is needed for potential impact of:</p> <ul style="list-style-type: none"> › potential contaminated land › threatened flora and fauna and their habitats, including species and communities listed under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> and <i>Nature Conservation Act 1992</i>.
Social impact	<div> <p>The positive impacts include:</p> <ul style="list-style-type: none"> › enhanced support for agriculture › job creation › upgraded infrastructure › cost savings › improved amenities › environmental benefits through reduced freshwater use and habitat preservation. </div> <div> <p>Potential negative impacts include:</p> <ul style="list-style-type: none"> › community disruption › habitat destruction › road disruptions › potential cultural disturbances arising from construction activities. </div>

Table 25: Economic and financial summary for the sub-option to expand Inglewood recycled water scheme

Risk adjusted construction cost (\$)	Estimated capital cost (\$/ML of yield)	Estimated operating and maintenance cost (\$)	Estimated BCR range	Estimated BCR (7% discount rate)
\$161,000	\$2,939	\$70,000	0.63 to 0.91	0.75



Weir, Inglewood

Sub-Option – Expand Warwick recycled water scheme

The Warwick WWTP is located west of Warwick township. The facility consists of a WWTP and a tertiary plant. The tertiary plant treats a proportion of the secondary effluent to produce Class A effluent. The design capacity of the WWTP is 3.5ML/day. On average it treats 3.1ML/day of raw sewage. The tertiary plant has a design capacity of 1.75ML/day.

Raw sewage received at the WWTP is screened and de-gritted prior to flowing into primary settlement tanks. Effluent from these tanks is fed to an activated sludge bioreactor for secondary treatment. The bioreactor effluent flows into secondary settlement tanks from where the clarified effluent is sent to a pump sump. Some of the effluent is pumped to tertiary filters prior to disinfection to produce Class A effluent for reuse. The Class A effluent is stored. It is then pumped via a reticulation system to a variety of users. Around 50% (1.75ML/day) of the secondary treated effluent is diverted and further treated in the tertiary plant on site.

The remaining secondary treated effluent above 1.75ML/day bypasses the tertiary treatment and is currently piped to a local farm for re-use. Southern Downs Regional Council (SDRC) has plans to upgrade the tertiary plant. This will result in 2.7ML/day of effluent being treated to a Class A standard. Potential users have been identified.

The remaining recycled water produced by the WWTP (0.8ML/day) is unclassified. It may be available to service additional demand for water in the local area. The RWA has identified supply to intensive livestock production as a potential high value use for this water.

SDRC modelling indicates that the current capacity of the existing distribution network is approximately 2.1ML/day. It was found that this could be increased by 0.5ML/day if a constrained section was increased to a 200mm diameter.

The proposed design to expand the Warwick recycled water scheme involves:

- › An upgrade of approximately 950m of the existing main pipeline along Canning Street to DN200 PVC to match upstream and downstream pipe. This will increase the capacity of the network by 0.5ML/day ensuring continuity between the upstream and downstream pipe.
- › Design of a new transfer system to supply 0.8ML/day of unclassified treated effluent to prospective intensive livestock user(s).

For the prospective intensive livestock supply, RWA investigations focussed on the development of a feedlot and identified a potential development location. This location was conceptualised to help develop a cost estimate and calculate a nominal BCR. In the next design phase, other potential end users may need to be identified. Actual development at a suitable location would be the responsibility of the feedlot owners/operators and would be subject to SDRC consideration.

The sub-option involves:

- › a pump station to transfer the recycled water through a new pipeline from the WWTP to the feedlot
- › onsite storage and treatment system, at cost to the feedlot owner/operator.

Should this option be further developed, consideration could be given to supplying more than one beneficiary.

Table 26 provides the environmental and social impact assessment summary for this sub-option.

Table 27 provides the economic and financial assessment summary for this sub-option.

This option is recommended to be referred to SDRC for further consideration.

Table 26: Environmental and social considerations for the sub-option to Expand Warwick recycled water scheme

Consideration	Description
Environmental	<p>No major barriers identified that may impact viability of the project. Project will not transect any MSES vegetation. No change to flow regime.</p> <p>Further consideration is needed for potential impact of:</p> <ul style="list-style-type: none"> › the project area coinciding with Flood Hazard Area – Level 1 (Queensland Floodplain Assessment Overlay 1% AEP flood mapping) › threatened flora and fauna and their habitats, including species and communities listed under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> and <i>Nature Conservation Act 1992</i> › unidentified and intangible Indigenous Cultural Heritage places and potential traffic impacts from construction.
Social impact	<div> <p>The positive impacts include:</p> <ul style="list-style-type: none"> › enhanced support for agriculture › job creation › upgraded infrastructure › cost savings › improved amenities › environmental benefits through reduced freshwater use and habitat preservation. </div> <div> <p>Potential negative impacts include:</p> <ul style="list-style-type: none"> › community disruption › habitat destruction › road disruptions › potential cultural disturbances arising from construction activities. </div>

Table 27: Economic and financial summary for the sub-option to expand Warwick recycled water scheme

Risk adjusted construction cost (\$m)	Estimated capital cost (\$/ML of yield)	Estimated operating and maintenance cost (\$m)	Estimated BCR range	Estimated BCR (7% discount rate)
\$14.1	\$48,082	\$5.32	1.12 to 1.85	1.43

Severn River off-stream storage and distribution network option

The Severn River off-stream storage (OSS) and distribution network option would contribute to building drought resilience in the Stanthorpe area. The additional water would be available for mainly high value perennial/seasonal horticulture in the region and urban water supply to Stanthorpe.

The proposed OSS site is located south of Booth Lane, adjacent to the New England Highway. It is near an existing weir on the Severn River. The proposal includes a downsized version of the distribution network previously designed for the Granite Belt Irrigation Project. It would transfer water to Stanthorpe township and the high value horticulture users located to the north of the OSS in the Granite Belt, including Applethorpe and Thulimbah.

Booth Lane was chosen as the most optimal site for the OSS based on geotechnical and environmental considerations, distribution network access, land tenure and public interest considerations, technical viability of the site and distribution costs.

Preliminary concepts were initially developed with OSS storage capacities of 5,000ML (option 01) and 7,500ML (option 02). The 7,500ML was considered the maximum practical storage volume that can be accommodated on the proposed site. For storage capacities larger than approximately 5,000ML, excess cut material is produced which cannot be beneficially used in the storages construction and would require off-site disposal. The incremental out-turn costs to increase the storage capacity from 5,000ML to 7,500ML were estimated to be approximately 70 to 80%. The target storage capacity of 5,000ML was adopted as the basis of design for the assessment.

The project has an estimated yield of 1,860ML/a. This is comprised of 1740ML/a for agricultural purposes and 120ML/a for urban use.

The proposed works comprise the following key components:

- › offtake from Severn River via intake structure on the northern bank, adjacent to an existing weir
- › diversion pump station and diversion pipeline
- › off-stream storage
- › inlet/outlet structure
- › distribution pump station and distribution network to the Applethorpe area
- › distribution break tank and pump station and distribution network to the Cottonvale and Pozieres area
- › distribution break tank at end of distribution network
- › supply points (tee and valve) at various locations along the distribution network
- › offtake locations, proposed to consist of a tee and valve, have been positioned along the pipe alignment at locations that represent potential future offtakes, either for branch pipelines or private pipelines to users.

Table 28 provides the environmental and social impact assessment summary for this option.

Table 29 provides the economic and financial assessment summary for this option. Option 01 assumed a concrete lined OSS. Option 02 assumed a geomembrane lined OSS.

This option is not recommended for further development primarily because it does not effectively meet the service need for water security or urban water supply.

Table 28: Environmental and social considerations for the Severn River off-stream storage and distribution network option

Consideration	Description
Environmental	<p>No major barriers that may impact the viability of the project.</p> <p>Further consideration is needed for potential impact of:</p> <ul style="list-style-type: none"> › freehold property with land acquisitions potentially required › areas of potential contaminated land › sections of the project area coinciding with Flood Hazard Area › threatened flora and fauna and their habitats, including species and communities listed under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> and <i>Nature Conservation Act 1992</i> › unidentified and intangible Indigenous Cultural Heritage places › Refer current Granite Belt Irrigation Project Environmental Impact Statement for distribution line.
Social impact	<div> <p>The positive impacts include:</p> <ul style="list-style-type: none"> › enhanced future water access › employment opportunities › business prosperity › infrastructure upgrades › drought resilience › economic boost › agricultural support › enhanced water security. </div> <div> <p>Potential negative impacts include:</p> <ul style="list-style-type: none"> › possible land acquisition › landscape changes › restricted access › cultural disturbance › potential operational costs. </div>

Table 29: Economic and financial summary for the Severn River off-stream storage and distribution network option

Option	Estimated project cost (\$m)	Estimated capital cost (\$/ML of yield)	Estimated operating and maintenance cost (\$m)	Estimated BCR range	Estimated BCR (7% discount rate)	Estimated upper bound service charge (\$/ML)
01	\$608.5	\$349,724	\$41.46	0.09 to 0.16	0.12	\$2,000
02	\$527	\$302,689	\$41.46	0.10 to 0.19	0.14	\$2,000

Texas off-stream storage option

Texas is located approximately 250km south-west of Brisbane, near the Dumaresq River, in the Goondiwindi LGA. It is dependent upon regular water releases for Goondiwindi from Glenlyon Dam, which generally occur every three weeks. There is no reliable in-stream waterhole at the Texas pump site. GRC has a 270ML/a supplemented surface water allocation from the Border Rivers WSS accessed from the Dumaresq River and a 350ML/a groundwater allocation from the Border Rivers Alluvium. GRC has a recently installed operational bore for the extraction of its groundwater allocation.

A new OSS in Texas would provide GRC with a balancing storage to better manage access to its 270ML/a surface water allocation. The purpose of the Texas OSS is to improve urban water supply security. This option looks at water from the Dumaresq River being pumped into the proposed OSS, utilising the existing pump station. The water would then be pumped to the Texas water treatment plant (WTP) as required. The actual reliability of the OSS during extreme dry years will be dependent on the operation of Glenlyon Dam and the GRC's increased use of bore water.

The OSS is proposed to be located off Potters Lane, near the existing pump station, on council owned land.

The storage would be a 15ML lined turkey's nest embankment with a 10% buffer volume (16.5ML), and a floating cover to combat evaporation losses. The proposed works comprise the following key components:

- › an upgrade to the existing river pump station
- › alteration of the raw water rising main adjacent to the OSS
- › a new pump station connecting to the existing pipeline.

Hydrologic modelling shows an annual reliability of 100% for the 15ML OSS. However, this was based on Glenlyon Dam releases every three weeks, which do not occur in extremely dry years.

Benefits of the option include:

- › better management of water allocations to provide opportunities for improved water security that provide opportunities for businesses that rely on these supplies
- › a cost-effective solution that does not deplete other ground or surface water supplies in the region and provides backup supply to groundwater resources/ existing alluvial bores.



 Water infrastructure, Texas

While the project is not anticipated to increase overall yield, its primary objective is to enhance water availability and security during drought periods.

It was found that a 15ML OSS is sufficient to meet an estimated future demand of 230ML/a, taking the use of water restrictions and 70ML/a of bore water use into account. The hydrological modelling assessment assumed the bore water was reliable. The actual reliability of the storage during extreme dry years will be dependent on the operation of Glenlyon Dam and the increased use of bore water. Under extremely dry conditions (such as those experienced in 2019–20), releases are made from Glenlyon Dam at 6 to 12-month intervals to fill Goondiwindi Weir and Boggabilla Weir.

During the drought, Texas relied on bore water for its urban water supply. A key finding from the assessment of this option is that the bore water appears to be more reliable than originally understood during the earlier RWA shortlisting process. This is mainly because of the installation of a new alluvial bore in 2019. The benefits originally assumed for this option have likely been negated in the detailed options analysis stage of the RWA process. As a result, it is recommended that a decision to progress this OSS be deferred until the new bore's water supply reliability is better understood.

Table 30 provides the environmental and social impact consideration assessment summary for this option.

Table 31 provides the economic and financial assessment summary for this option.

Table 30: Environmental and social considerations for the Texas off-stream storage option

Consideration	Description
Environmental	<p>No major barriers that will impact viability of the project. Project is located in Category X which is exempt from clearing work.</p> <p>Further consideration is needed for potential impact of:</p> <ul style="list-style-type: none"> › potential contaminated land › threatened flora and fauna and their habitats, including species and communities listed under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> and <i>Nature Conservation Act 1992</i> › unidentified and intangible Indigenous Cultural Heritage places.
Social impact	<div> <p>The positive impacts include:</p> <ul style="list-style-type: none"> › enhanced future water access › employment opportunities › infrastructure enhancements › improved water resource management › water security › population sustainability › improved health and wellbeing. </div> <div> <p>Potential negative impacts include:</p> <ul style="list-style-type: none"> › community disruption › habitat destruction › land access disruption › cultural impact › operational costs. </div>

Table 31: Economic and financial summary for the Texas off-stream storage option

Risk adjusted construction cost (\$m)	Estimated capital cost (\$/ML of yield)	Estimated operating and maintenance cost (\$m)	Estimated BCR range	Estimated BCR (7% discount rate)	Estimated upper bound service charge (\$/ML)
\$11	N/A	\$1.36	0.02 to 0.04	0.03	N/A

Pipeline interconnection between Warwick and Stanthorpe (Warwick to Stanthorpe pipeline) option

Both Warwick and Stanthorpe have experienced prolonged periods of drought in recent years. Stanthorpe required water carting from Connolly Dam between September 2019 and April 2021, as Storm King Dam reached critically low levels in extended drought conditions.

This option seeks to ensure drought resilience in Stanthorpe through the construction of a new pipeline and augmentation of an existing pipeline to connect Stanthorpe to Warwick's water supply.

Leslie Dam has a capacity of 106,300ML. It is situated west of Warwick and provides water to the towns of Warwick and Cecil Plains. Water supplied from Leslie Dam currently meets Warwick's water demands. Warwick's water security has also been improved with the recent Queensland Government commitment to the Toowoomba to Warwick pipeline project.



 Connolly Dam

Connolly Dam, with a capacity of 2,100ML, is located on Rosenthal Creek. It is currently connected via a single direction pipeline to Warwick's water supply network, 15km to its north. It can supply water for Stanthorpe via water carting, particularly as part of drought responses.

Storm King Dam is situated approximately 8km south-east of Stanthorpe, on Quart Pot Creek. It has a capacity of 2,065ML. During a recent drought, Storm King Dam ran out of water. This resulted in Stanthorpe relying on water being trucked in from Connolly Dam until significant inflows into Storm King Dam occurred in March 2021.

The design of the Toowoomba to Warwick pipeline includes a 1.6ML/day drought contingency for Stanthorpe.

It is proposed to use existing or refurbished infrastructure from Leslie Dam to Connolly Dam, with the addition of 40km of pipeline and associated infrastructure from Connolly Dam to the Mt Marlay WTP at Stanthorpe. This will provide the Stanthorpe region with a secure urban water supply during severe droughts.

This option is focused on the use of existing water entitlements.

The proposed key infrastructure conveying water from Warwick to Stanthorpe comprises:

- › a high lift pump station at Warwick WTP conveying water through a relined 375mm asbestos-cement main between Connolly Dam and Warwick WTP
- › a high lift pump station and associated power supply at Connolly Dam
- › two booster pump stations between Connolly Dam and Dalveen
- › two 1ML break pressure tanks located at Wildash and The Summit
- › a new rising main (pressure pipeline) between the pump station at Connolly Dam and Mt Marlay WTP.

Table 32 provides the environmental and social impact assessment summary for this option.

Table 33 provides the economic and financial assessment summary for this option.

Table 32: Environmental and social considerations for the Warwick to Stanthorpe pipeline option

Consideration	Description
Environmental	<p>No major barriers impacting viability of the project. Largely avoids essential habitat. Scattered areas of category B and C regulated vegetation. Areas mapped as MSES where the project passes through.</p> <p>Further consideration is needed for potential impact:</p> <ul style="list-style-type: none"> › of disturbances to First Nations cultural areas from construction activities › to existing water quality › on threatened flora and fauna and their habitats including species and communities listed under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> and <i>Nature Conservation Act 1992</i> › on unidentified and intangible Indigenous Cultural Heritage places.
Social impact	<div> <p>The positive impacts include:</p> <ul style="list-style-type: none"> › upgraded water infrastructure › improved future water access › enhanced community wellbeing › sustainable population growth › supported businesses › benefits spanning generations. </div> <div> <p>Potential negative impacts include:</p> <ul style="list-style-type: none"> › potential land acquisition › future land use restrictions › access limitations › disruption › cultural impact › operational costs for Council. </div>

Table 33: Economic and financial summary for the Warwick to Stanthorpe pipeline option

Risk adjusted construction cost (\$m)	Estimated capital cost (\$/ML of yield)	Estimated operating and maintenance cost (\$m)	Estimated BCR range	Estimated BCR (7% discount rate)	Estimated upper bound service charge (\$/ML)
\$90.6	N/A	\$14.61	0.03 to 0.06	0.04	N/A

Glebe Weir off-stream storage and pipeline option

Glebe Weir is located approximately 30km northeast of Taroom on the Dawson River at an adopted middle thread distance (AMTD) of 326.2km.

This option proposes to draw water from Glebe Weir to a new nearby OSS facility, creating a scheme with a yield of approximately 6,000ML/a. This option utilises the existing Woleebee Creek to Glebe Weir pipeline, reversing the flow direction to transfer water from Glebe Weir and the OSS to Wandoan. From Wandoan, a proposed new pipeline would transfer water to support intensive animal production near Chinchilla.

Benefits of this option include:

- › strong alignment with the service need by supplying water demands of the animal intensive agricultural industry in the Western Downs LGA
- › a comparatively cost-effective solution that would access unallocated water reserves in the Dawson sub-catchment in the Water Plan (Fitzroy Basin) 2011
- › an opportunity to utilise the existing Glebe Weir to Woleebee Creek pipeline once it is no longer required for CSG water transfer.

This option initially proposed to raise Glebe Weir to a full supply level (FSL) of between 1 and 2.1m above the existing FSL of 170.54m AHD by either a concrete crest or the installation of flap gates. After early investigation, it was determined that a weir raising could not be progressed due to technical risks and constructability issues. The option was subsequently adjusted to investigate a proposed new OSS near the existing Glebe Weir.

Several potential storage reservoir sites were considered, both turkey nest and river valley type dams. The preferred OSS site is situated approximately 3km east of Glebe Weir. This storage location can provide the required 10,000ML capacity in a 4-sided turkey nest, earth embankment dam. Raw water from the Dawson River would only be transferred to the OSS when Glebe Weir was overflowing. The preferred pump capacity is 250ML/d.

The transfer system is comprised of three sections:

1. OSS to Woleebee Creek to Glebe Weir (WC2GW). This section connects the OSS to the WC2GW pipeline. An intake structure is proposed at Cockatoo Creek, approximately 2.3km upstream of its confluence with the Dawson River. Cockatoo Creek feeds into the Dawson River just upstream of the Glebe Weir right abutment. Water is pumped into the OSS. The OSS pump is located outside the 1-in-100-year floodplain level of the Dawson River. With an estimated population at risk of greater than 1, the consequence category for the Glebe off-stream storage is classified as low (Australian National Committee on Large Dams (ANCOLD), 2012).
2. Raw water is conveyed from WC2GW to Wandoan via the existing pipeline. A break tank and pump station will be installed on Cracow Road and Nathan Road and a reservoir built on Nathan Road.
3. A new 105km pipeline from Wandoan to Chinchilla will transport water via a proposed break tank and pump station at Wandoan. A further booster break tank and pump station at the corner of Still Bros Road and Martindale Road and a reservoir at B Tennysons Road near Cameby Road, are proposed.

This option meets the Water Plan (Fitzroy Basin) 2011 performance objectives, but with a minor impact on water availability for existing users. There would be an approximately 1% reduction in mean annual diversions (MAD) for both medium priority supplemented water allocations and unsupplemented water allocations.

Table 34 provides the environmental and social impact assessment summary for this option.

Table 35 provides the economic and financial assessment summary for this option.

This option, as investigated, did not deliver a strong financial or economic result. There is merit in further investigating the concept outside the Southern and Darling Downs RWA process with a revised scope that aims to provide water for potential high value users closer to the Glebe Weir and existing Woleebee Creek pipeline area.

Table 34: Environmental and social considerations for the Glebe Weir off-stream storage and pipeline option

Consideration	Description
Environmental	<p>No major barriers that will impact viability of the project. Most of route is Category X. Areas of MSES are present.</p> <p>Further consideration is needed for potential impact of:</p> <ul style="list-style-type: none"> › freehold property with land acquisitions potentially required › areas of potential contaminated land › sections of the project area coinciding with Flood Hazard Area – Level 1 (Queensland Floodplain Assessment Overlay mapping) › threatened flora and fauna, and their habitats, including species and communities listed under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> and <i>Nature Conservation Act 1992</i> › unidentified and intangible Indigenous Cultural Heritage places › potential traffic impacts from construction.
Social impact	<div> <p>The positive impacts include:</p> <ul style="list-style-type: none"> › improved future water access › job creation › economic growth › enhanced infrastructure › water security spanning generations › heightened community resilience. </div> <div> <p>Potential negative impacts include:</p> <ul style="list-style-type: none"> › community disruption › access limitations › potential cultural disturbance during the construction phase. </div>

Table 35: Economic and financial summary for the Glebe Weir off-stream storage and pipeline option

Risk adjusted construction cost (\$m)	Estimated capital cost (\$/ML of yield)	Estimated operating and maintenance cost (\$m)	Estimated BCR range	Estimated BCR (7% discount rate)	Estimated upper bound service charge (\$/ML)
\$735	\$122,490	\$40.53	0.39 to 0.74	0.53	\$2,500

Granite Belt irrigation project option

The Granite Belt irrigation project (GBIP) is a proposal to build a 12,000ML water storage facility on the Severn River (Emu Swamp Dam) and a 117km long water distribution network. The project yield is 3,900ML of water per annum, at 85% reliability, for irrigation and urban supply to Stanthorpe and potentially nearby regional communities. It includes 585ML/a for urban supply.

In 2018, a DBC was developed by the Stanthorpe and Granite Belt Chamber of Commerce which estimated the GBIP's cost at \$84 million. The DBC was approved in 2019. The GBIP was largely focussed on helping to meet the district's agricultural water requirements. During 2020 and 2021, a tender process, based on a design and construct delivery model, resulted in updated and increased cost estimates for the project.

Given the high level of business case development already completed for this option, no additional hydrological modelling was undertaken in the RWA process.

While this option would improve urban water security for Stanthorpe, it does not provide a fully reliable outcome. In extreme droughts, like the one experienced in 2019, Emu Swamp Dam may not provide ongoing emergency urban water supply. More modelling would be required to comprehensively quantify the dam's contribution to urban water security.

The Australian and Queensland governments have supported pre-construction activities to progress the GBIP. Due to the significant increase in costs, the GBIP was referred to the Southern and Darling Downs RWA for a re-evaluation of its merits as an option, along with considering all other potential options for the Granite Belt region.

The RWA process has improved the evidence base for Emu Swamp Dam, including clarifying the construction material. Noting the Emu Swamp Dam design was unsettled, the RWA's scope of works was limited to the dam and associated infrastructure (spillway, outlet works, fishway) and related cost estimation.

It relied on all other aspects of the existing GBIP proposal, including the distribution network, environmental, water entitlement acquisition and social considerations, in the assessment.

The original DBC recommended a clay core structure. The RWA's analysis determined that no suitable clay source was available at a cost-effective location near the project site. Dam types with an earthen core were not further considered. The TAP supported the conclusion that if the Emu Swamp Dam was to proceed, it should be as a concrete gravity structure.

The RWA's Emu Swamp Dam concept design is:

- › a concrete gravity dam constructed from mass concrete (dam body) and conventional vibrated concrete for structural elements
- › a centrally located uncontrolled ogee crested spillway
- › a stilling basin (or energy dissipator)
- › an outlet works with a multiple level intake tower enabling selective withdrawal
- › a mechanical fish lift
- › a pump station
- › all of which are located on the left of the spillway.

The supply requirements adopted for the project are consistent with the existing GBIP distribution network, which delivers a scheme capacity of 3,900ML continuously over a 180-day irrigation season. The outlet works are designed to have sufficient capacity to supply a maximum flow rate of approximately 21.7ML/day or 0.25 m³/sec. The dam outlet works have also been assessed to meet the emergency drawdown requirements for urban water supplies.

The Emu Swamp Dam site was not changed and remains located at approximately AMTD 73km on the Severn River. Aligning the dam axis perpendicular to the flow of the watercourse is considered necessary to improve the hydraulic performance of the spillway and ensure high energy flows are discharged parallel to the watercourse. Should the option progress, ground conditions and foundation levels along the proposed alignment will need to be confirmed by geotechnical investigations.

Table 36 provides the economic and financial assessment summary for the Granite Belt irrigation project option. Option 01 is a concrete gravity dam allowing for a deep weathering left abutment. Option 02 is a concrete gravity dam allowing for a shallow weathering left abutment. Further geotechnical investigations would need to be undertaken to ascertain appropriate left abutment costs.

It is important to highlight that the RWA investigations focused on the Emu Swamp Dam design and related cost estimation only. As far as necessary, existing GBIP knowledge was used, with costs for the distribution network updated to 2022–23 estimates.

While the RWA helped to better develop the GBIP, there is persisting uncertainty about the proposal's overall viability. More information and further expenditure would be required to enable any final investment decision about the GBIP. This includes:

- › confirmation of sources of capital considering the increased delivery cost
- › additional geotechnical investigations
- › confirmation of water plan compatibility and securing necessary water entitlement
- › confirmation of the dam's ability to provide urban water supply for Stanthorpe in extreme drought, through additional hydrological and drought modelling
- › confirmation of pipeline alignment and further design development.

Table 36: Economic and financial summary for the Granite Belt irrigation project option

Option	Estimated project cost (\$m)	Estimated capital cost (\$/ML of yield)	Estimated operating and maintenance cost (\$m)	Estimated BCR range	Estimated BCR (7% discount rate)	Estimated upper bound service charge (\$/ML)
01	\$649	\$166,431	\$39	0.13 to 0.26	0.18	\$2,000
02	\$537	\$137,677	\$39	0.16 to 0.31	0.22	\$2,000



Severn River, Fletcher



Responding to the challenges and opportunities

The findings of this RWA are identified by local government area as each has unique future challenges and opportunities. They have been shaped by the important feedback provided by local governments, industry and peak body representatives, Sunwater and Seqwater representatives, other relevant entities, Traditional Owners and Native Title Holders and local communities.

Across the Southern and Darling Downs RWA area, an assessment of the potential impacts of climate change produced estimates of increased temperatures and evapotranspiration, increasing water demand and reducing water availability. Trends in average rainfall are uncertain, with a modest decline in the median being estimated. There is more certainty that rainfall will reduce in cooler months and the severity of extreme rainfall events will increase.

Water resource development in the RWA area is constrained by Murray-Darling Basin Plan commitments to not increase water take. There is a genuine need to make the most of available water resources, including pursuing any opportunities for local recycling that can deliver economic benefit to the RWA area through investment in water.

Southern Downs LGA

Water supplies in the Southern and Darling Downs LGA are highly utilised when available. A variety of broadacre crops, horticulture and intensive animal operations need reliable, high quality water supplies to support the expansion of their businesses.

The Upper Condamine WSS provides just over 30,000ML/a of irrigation water entitlements, along with 3,300ML/a of urban water entitlements. There is also a significant volume of unsupplemented water entitlements (approximately 120,000ML/a MAD) and groundwater usage. Water demand is expected to remain strong. Beyond current water projects that will benefit this LGA, the volume and reliability of available water supplies is likely to constrain further investment in business expansion or development.

In this regard, the Toowoomba to Warwick pipeline project and other Southern Downs drought resilience projects are expected to significantly improve water security for Warwick and surrounding towns and some towns to the south of Toowoomba.

In the Granite Belt, approximately 10,700ML (MAD) of unsupplemented water entitlements showed a high sensitivity of surface water sources to climate change scenarios.

Modelling showed that historically, Storm King Dam has been unable to fully meet Stanthorpe's water demand for approximately 10% of years. This security is estimated to further diminish when climate change risk is considered.

Potential water sources

A range of potential water sources and development options were identified. These could be used to supplement supply or increase water security in the Southern Downs LGA. These are:

1. reduced evaporation losses through on-farm dam covers in the Granite Belt
2. expansion of the Warwick recycled water facility
3. a pipeline between Warwick and Stanthorpe via Connolly Dam
4. Emu Swamp Dam
5. raising Storm King Dam.

Key findings and considerations

Key findings and considerations are:

1. Evaporation covers can help to maximise the efficiency of on-farm water storages, delivering positive economic and financial outcomes. The RWA found that shade cloth is most suited to small irrigation dams and storages in the Granite Belt region, followed by floating covers, with both technologies estimated to deliver both positive economic and financial outcomes. While there is merit in undertaking further investigations for the installation of on-farm evaporation covers in the Granite Belt region, irrigation-based businesses may individually benefit from considering these evaporation covers for enhancing the water security and drought resilience of their agricultural operations.
2. Expansion of the Warwick recycled water facility would support local industrial and commercial water users and facilitate the growth of the agricultural sector in the LGA. This option builds on a planned upgrade of the capacity of the tertiary treatment plant to provide increased supply through an upgraded section of the current distribution network. In addition, the option considers the construction of a new transfer system to supply a prospective intensive livestock development in the local area. The development of the new transfer system would be subject to further detailed analysis of the location and the beneficiaries of this water. This option is recommended for further consideration.
3. The Warwick to Stanthorpe, via Connolly Dam, pipeline was the only option investigated that fully addresses Stanthorpe's urban water security risk. However, it did not present a strong economic or financial case. This is because there is capacity to cart water from Connolly Dam or, in times of extreme drought, from Warwick after the Toowoomba to Warwick Pipeline is completed. While water carting in emergency supply situations may represent a cost-effective short-term approach, initiating a DBC for this pipeline would provide valuable information for a potential long-term urban water security solution for Stanthorpe.
4. The RWA delivered improved information about Emu Swamp Dam's design and construction material and also substantially increased the GBIP's cost estimates. The GBIP requires more work to deliver an appropriate level of information and confidence to support any final investment decision. Unresolved matters include confirmation of sources of capital to fund the proposal's increased delivery cost; geotechnical investigations; confirmation of water planning compatibility and securing of necessary water entitlement; further hydrological and drought modelling; pipeline alignment and design development.
5. Raising Storm King Dam could provide increased urban water security for Stanthorpe by enabling access to existing unallocated water reserve within the SWMA. It may also enhance flood mitigation. This option was not further developed in the RWA as it did not meet the identified agriculture service need. However, it remains a potential future option for urban water supply only, but with a potentially high-cost and a low indicative BCR. There would also be impacts on existing landholders if the dam was raised by 2.5m. In addition, the fish passage provision would require further understanding as a construction consideration.

Toowoomba LGA

Toowoomba's urban water supplies are sourced from Cooby, Cressbrook and Perseverance dams, along with a contingency pipeline from Wivenhoe Dam and GAB groundwater bores. Toowoomba Regional Council (TRC) holds a total of 21,200ML/a of surface water entitlements, with an additional 2,800ML/a of groundwater entitlements from the GAB. The City of Toowoomba is expected to see urban water demand continue to grow by 46% to 24,463ML/a, in line with population growth over the next 30 years. This exceeds the total volume of TRC's current water entitlements.

TRC has identified projects, such as increasing treatment plant and pump station capacities, to ensure urban water security until the mid-2040s. Around then, Toowoomba is estimated to require an additional water supply source to maintain its water security.

Agricultural production in the region is dominated by cotton and other broadacre crops. Eggs and livestock production is also significant. Most water requirements for these operations are met by opportunistic water harvesting, or from overland flow or groundwater. Some supply comes from either the Upper Condamine WSS or releases from the Wetalla WRF, which currently supplements irrigators in the Oakey and Gowrie Creek Water Management Area.

There are 18,550ML/a of unsupplemented water entitlements available to irrigators in the Oakey and Gowrie Creek Water Management Area. Hydrologic modelling shows reasonable performance of these entitlements against a historical climate. There is a high degree of sensitivity under the range of potential climate change scenarios.

Potential water sources

A range of potential water sources and development options were identified. These could be used to supplement supply or increase water security in the Toowoomba LGA. These are:

1. expansion of the Wetalla Water Reclamation Facility
2. Wivenhoe Dam to Cressbrook Dam pipeline duplication
3. pipeline/supply sourced from Boondooma Dam.

Key findings and considerations

Key findings and considerations are:

1. An expansion of the Wetalla WRF could directly supply surrounding industrial precincts with Class A+ treated effluent. This option is recommended over a potable supply option as it avoids upgrading the Cooby Dam WTP. It is noted that, following the RWA options shortlisting process in mid-2022, TRC has released its Water Vision 2071, which identifies both a potential southern WWTP and the need for an additional bulk water supply source by the mid-2040s. Any further development of this option, as investigated in the RWA, should be in the context of the Water Vision 2071 and its underpinning analysis.
2. A Wivenhoe to Cressbrook pipeline duplication could address urban water security requirements for Toowoomba, which have been identified as the region's most significant urban water security need. While explored early in the RWA process, this option did not progress to the options shortlist. To be considered further, it would require further analysis of the effects on Southeast Queensland's overall water security and pricing arrangements. Additional augmentations would also be required within TRC's network to enable this option. The pipeline alignment has several environmental and social challenges, such as the pipeline passing through areas with MSES, and koala habitat restoration. While the option has a potentially high cost and low indicative BCR, it remains a potential urban water security option to support Toowoomba's water security.
3. A pipeline or supply sourced from Boondooma Dam could address Toowoomba's urban water security requirements and align with the service needs of the region. While explored early in the RWA process, this option did not progress to the options shortlist. Access to water allocations supporting the Tarong Power Station is required to enable the option. This assumes that there is no other demand or higher capacity to pay for that water. It is also a potentially high-cost and low indicative BCR option. Additional augmentations would also be required within TRC's network to enable the option. Despite these significant challenges, the option remains a potential urban water security option to support Toowoomba's water security.

Goondiwindi LGA

The Border Rivers WSS makes available 84,000ML/a of medium priority water allocations, predominately supplying water for cotton and pasture, vegetables, fruit, nuts and cereals production. The towns of Goondiwindi, Texas and Yelarbon are supplied by just over 2,000ML/a of high priority water allocations sourced from Glenlyon Dam.

Hydrologic modelling demonstrates that town water supplies for Goondiwindi are performing well, though they rely on groundwater substitution on occasion. Texas and Yelarbon town water is less reliable. Poor performance under an historical climate and are estimated to have more regular dependence on groundwater sources to maintain town water supplies.

The Macintyre Brook WSS provides 488ML/a of high priority water allocations for Inglewood's town water supplies, along with 23,700ML/a of medium priority water allocations for agricultural and industrial or commercial purposes. Water in the scheme is close to fully allocated and tightly held. Only around 2% of total allocations are traded per annum. The WSS supports the production of lucerne, cereals, stone fruit and olives, along with intensive animal production. Hydrologic modelling shows Inglewood's town water supply requirements are expected to be fully met in most years.

There are approximately 170,000ML/a (MAD) of unsupplemented water entitlements across the region. This includes both stream-flow and overland flow harvesting. This supports a variety of broadacre cropping, which is a major source of economic activity in the LGA.

Hydrologic modelling demonstrates that all surface water entitlements in the Border Rivers are highly sensitive to the impacts of climate change, particularly town water supplies for Texas and Yelarbon and medium priority water allocations. This highlights the increasing need for contingent urban water supplies and on-farm water efficiency practices in the future.

Potential water sources

A range of potential water sources and development options were identified. These could be used to supplement supply or increase water security in the Goondiwindi LGA. These are:

1. expansion of the Inglewood recycled water scheme
2. Texas off-stream storage
3. collaboration with NSW to optimise Border Rivers water availability.

Key findings and considerations

Key findings and considerations are:

1. Expansion of the Inglewood recycled water scheme is a cost-effective opportunity for local development and would maximise the use of available climate resilient water supplies. It is recommended for further consideration.
2. While the Texas OSS did not have a strong economic or financial basis, it does improve access to the surface water allocation within the Border Rivers WSS. This result was in part due to the apparent benefits of a recently installed groundwater bore. Should that bore fail to deliver sufficient water security or quality over time, further development of this option would contribute to improved water supply outcomes for Texas. An audit of the reliability and quality of water supplies available from the new groundwater bore in Texas is recommended prior to further progressing this option.
3. Collaboration with the New South Wales Government is expected to improve stakeholder confidence in cross-border dialogue and enhance opportunities to identify and action efficient and effective initiatives to optimise Border Rivers water availability.

Western Downs LGA

The Chinchilla Weir WSS provides 1,165ML/a of high priority water allocations for Chinchilla's town water supplies. Chinchilla also has a 200ML/a surface water entitlement from a small weir on Charley's Creek.

Hydrologic modelling demonstrates good reliability for Chinchilla's town water supplies, with low risk associated with climate change. This reliability was based on the availability of CSG water from the Kenya WTP.

Dalby is supplied by a 650ML/a surface water entitlement extracted from Loudoun's Weir and a 1,094ML/a groundwater entitlement from the GAB.

The Chinchilla Weir WSS supplies 2,884ML/a of medium priority water allocations supporting irrigation of broadacre and horticultural crops, including melons. These irrigators also benefit from treated CSG water from the Kenya WTP when it is available. Modelling showed that these entitlements performed well, with moderate risk associated with climate change in the longer term.

There are also approximately 130,000ML/a (MAD) of unsupplemented entitlements along the Condamine River, along with approximately 4,000ML/a (MAD) of unsupplemented entitlements along Charley's Creek. These entitlements are considered highly sensitive to the impacts of climate change, though there were no clear positive or negative trends.

Potential water sources

A range of potential water sources and development options were identified. These could be used to supplement supply or increase water security in the Western Downs LGA. These are:

1. Glebe Weir off-stream storage and pipeline
2. expansion of the Chinchilla recycled water scheme
3. Chinchilla off-stream storage
4. a water supply source from the Dawson Valley.

Key findings and considerations

Key findings and considerations are:

1. Development of the Glebe Weir off-stream storage and pipeline concept may be beneficial. Further investigations should focus on better understanding the local service need around Glebe Weir, including the Dawson Valley WSS and the Wandoan area, which is connected to Glebe Weir via the Woleebee Creek to Glebe Weir Pipeline. Any progression of this activity should be subject to outcomes of the Central Queensland RWA.
2. Expansion of the Chinchilla recycled water scheme is potentially a cost-effective opportunity for development. It would maximise the use of available climate resilient water supplies and provide a reliable water supply for local, high value, intensive animal production. This option is recommended for further consideration.
3. A new Chinchilla off-stream storage would access the WDRC's existing water allocation from Chinchilla Weir. While explored early in the RWA process, this option did not progress to the options shortlist given the uncertainty about the service need priority of Chinchilla in the broader regional context. The magnitude of potential benefit that could be delivered by the option was also uncertain. However, the option is still a potential future source to support Chinchilla's urban water security needs.
4. The Nathan Dam and pipeline option was considered in the RWA as a potential water supply source from the Dawson Valley. While explored early in the RWA process, this option did not progress to the options shortlist due to its significant geotechnical challenges associated with the proposed site and its substantial high cost compared to other options. Construction of the dam would also inundate Glebe Weir. This option remains a potential future supply source and can be considered part of the Central Queensland RWA, alongside other options explored as part of the Upper Dawson options analysis.

Recommendations and implementation

The Southern and Darling Downs RWA prioritises recommendations for potential delivery over the next 30 years to approximately the early 2050s. The dependencies and enabling preconditions are also specified.

Recommendations are summarised in Tables 37 to 39 for consideration in short, medium and long terms.



 Macintyre River, Goondiwindi

Short term – target completion within two years

Table 37: Short-term recommendations across the Southern and Darling Downs RWA area

Recommendation
Initiate a detailed business case for the Warwick to Stanthorpe pipeline.
Explore opportunities to support local governments to expand non-potable recycled water networks: <ul style="list-style-type: none">› Chinchilla recycled water scheme› Inglewood recycled water scheme› Warwick recycled water scheme› Wetalla water reclamation facility
Develop an on-farm dam evaporation saving initiative for the Granite Belt region: <ul style="list-style-type: none">› Complete an audit of existing storages, in consultation with relevant stakeholders, to more accurately identify and quantify those that may benefit from evaporation covers.› Identify preferred delivery arrangements, participation criteria and implementation approach for an evaporation saving initiative.› Subject to outcomes of the above steps, progress the preferred solution.

Medium term – target completion within five years

Table 38: Medium-term recommendations across the Southern and Darling Downs RWA area

Recommendation
Collaborate with the New South Wales Government on ways to optimise water availability in the Border Rivers.
Initiate detailed assessment of the Glebe Weir off-stream storage and pipeline augmentation, subject to outcomes of the Central Queensland RWA.
Undertake a post-implementation review of the on-farm dam evaporation saving initiative for the Granite Belt region.
Continue Granite Belt Irrigation Project development including geotechnical investigations, water plan compatibility and securing of necessary water entitlement, further hydrological and drought modelling, pipeline alignment and design development.

Long-term – target completion in 10 years and beyond

Table 39: Long-term recommendations across the Southern and Darling Downs RWA area

Recommendation
Collaborate with the New South Wales Government on future water plan reviews in the Border Rivers region.
Deliver the Texas off-stream off-stream storage, subject to undertaking an audit of the reliability and quality of water supplies available from the new groundwater bore at Texas.

Appendix A – Glossary

Table A.1: Glossary

Term	Meaning
Benefit-cost ratio	The discounted value of the option's benefits, divided by the discounted value of the option's costs.
Detailed Business Case	A business case developed in accord with the Queensland Business Case Development Framework to evaluate the viability of preferred options to provide clear, comprehensive evidence for decision-makers.
Evapotranspiration	Evaporation of water from the soil surface and loss of water from plant tissue.
Groundwater	Groundwater is the water below the land surface. Groundwater slowly moves between gaps in rocks and sediments.
Investment logic mapping	Is an early-stage technique that assists in developing and documenting the logic that underpins a potential investment decision, before specific solutions are identified, and before a decision is made. See the Queensland Government Investment Logic Mapping Guide for more.
High priority water allocations	High priority water allocations are the most reliable water allocation and are typically for town water supply or industrial uses. High priority water allocation holders can usually access water more frequently and with fewer restrictions than holders of a medium priority water allocation.
Medium priority water allocations	Medium priority water allocations generally have lower reliability than high priority water allocations and are typically used for irrigated agriculture.
Monte Carlo simulation	A mathematical technique that predicts possible outcomes of an uncertain entity. Historical data is analysed to predict a range of future outcomes based on a choice of action.
Multi-criteria analysis	This is a detailed filtering process to investigate further the long list of initiatives that could benefit the RWA area against the economic, environmental, regulatory, social, community, technical, and delivery risk criteria into a shortlist of options. Each criteria could also have several sub-criteria.
Net present value	The discounted value of the option's benefits minus the discounted value of the option's costs.
Non-infrastructure	Some examples of non-infrastructure water options include: <ul style="list-style-type: none"> › improving water markets › changing water sharing rules › conversion of water entitlements to tradeable water allocations.
Non-potable water	Water that is not for drinking purposes.
Options analysis	Developed in accord with the Queensland Business Case Development Framework, aims to narrow the breadth of options by applying rigorous evaluation criteria before assessing the viability of any remaining options.
Risk adjusted construction cost	The estimated cost to construct the project, based on the level of current design, including a suitable contingency allowance to manage the identified risks for the project.
Service Need Assessment	Completed in the first phase of the RWA process, it identifies the water supply needs of the RWA area, now and in the future.
Surface water	Water in a watercourse, lake or spring.

Term	Meaning
Unallocated water	Reserved under regulatory water planning instruments – it can be made available for future use without compromising the security of existing users or the environmental values within a catchment.
Unsupplemented water	Where the water supplied is not dependent on any infrastructure (dam, weir or other bulk water infrastructure) to store or distribute it (for example water entitlements which authorise the harvest of water from a river).
Upper bound service charges (cost per ML)	Water service charges for customers that recover capital costs, operating costs and infrastructure renewals.
Water entitlement	<p>The Queensland water legislation administers a range of water entitlements and authorisations which are important to consider in the review. These entitlements include water licences and water allocations.</p> <ul style="list-style-type: none"> ▸ Water licences are an authority to take water and/or interfere with the flow of water (for example a weir interferes with a watercourse). It is usually attached to a parcel of land. ▸ Water allocations authorises the holder to take a certain volume of water from a particular water source, such as a watercourse or aquifer. Allocations have a separate title, similar to a land title, and they can be bought and sold on the water trading market. They can also be used as a mortgageable asset.
Water harvesting	The taking of water during high flow events, such as wet season flows, and storing it for future use.
Water Plan	<p>A water plan approved as subordinate legislation under Division 3 of the <i>Water Act 2000</i> (Qld). Water plans are developed under the <i>Water Act 2000</i> to sustainably manage and allocate water resources in Queensland. They consider historical rainfall and run-off information to help understand and manage risks to water security, communities, and the environment.</p> <p>They also define the volume of unallocated water that can be made available for future supply, without impacting existing water entitlement holders, or key economic, environmental, or cultural uses of water within a catchment.</p>
Water service charges	Are the charges on a customer's water bill relating to their water consumption over a billing period and largely reflect the cost of providing water, see Water charging in Queensland.
Water supply scheme	Is a system designed to provide clean, reliable and safe water to people in a specific area, including the collection, treatment, storage and distribution to homes, businesses and industries.
Water year	The annual accounting period which sometimes coincides with the financial year, for a water management protocol, operations manual, or water licence, as provided in the Water Regulation 2016.

Table A.2: Acronyms

Acronym	Meaning
AMTD	Adopted middle thread distance
AWTP	Advanced water treatment plant
BCR	Benefit-cost ratio
CSG	Coal seam gas
DBC	Detailed business case
DLGWV	Department of Local Government, Water and Volunteers
DRDMW	Department of Regional Development, Manufacturing and Water
GAB	Great Artesian Basin
GBIP	Granite Belt Irrigation Project
GRC	Goondiwindi Regional Council
IDC	Inter-departmental committee
LGA	Local government area
MAD	Mean annual diversion
MCA	Multi-criteria analysis
MSES	Matters of state environmental significance
NPV	Net present value
NSW	New South Wales
NWI	National Water Initiative
OSS	Off-stream storage
QMDB	Queensland Murray Darling Basin
RWA	Regional water assessment
SAG	Stakeholder advisory group
SDRC	Southern Downs Regional Council
SEQ	South East Queensland
SIS	State infrastructure strategy
TAP	Technical advisory panel

Acronym	Meaning
TRC	Toowoomba Regional Council
WDRC	Western Downs Regional Council
WG	Working group
WRF	Water reclamation facility
WSS	Water supply scheme
WWTP	Wastewater treatment plant

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