

Queensland bulk water opportunities statement

Part A – Strategic framework

December 2019



Front cover image: Chinaman Creek Dam

Back cover image: Copperlode Falls Dam

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Hinze Dam



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Boondooma Dam

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1. Introduction

1.1 Purpose

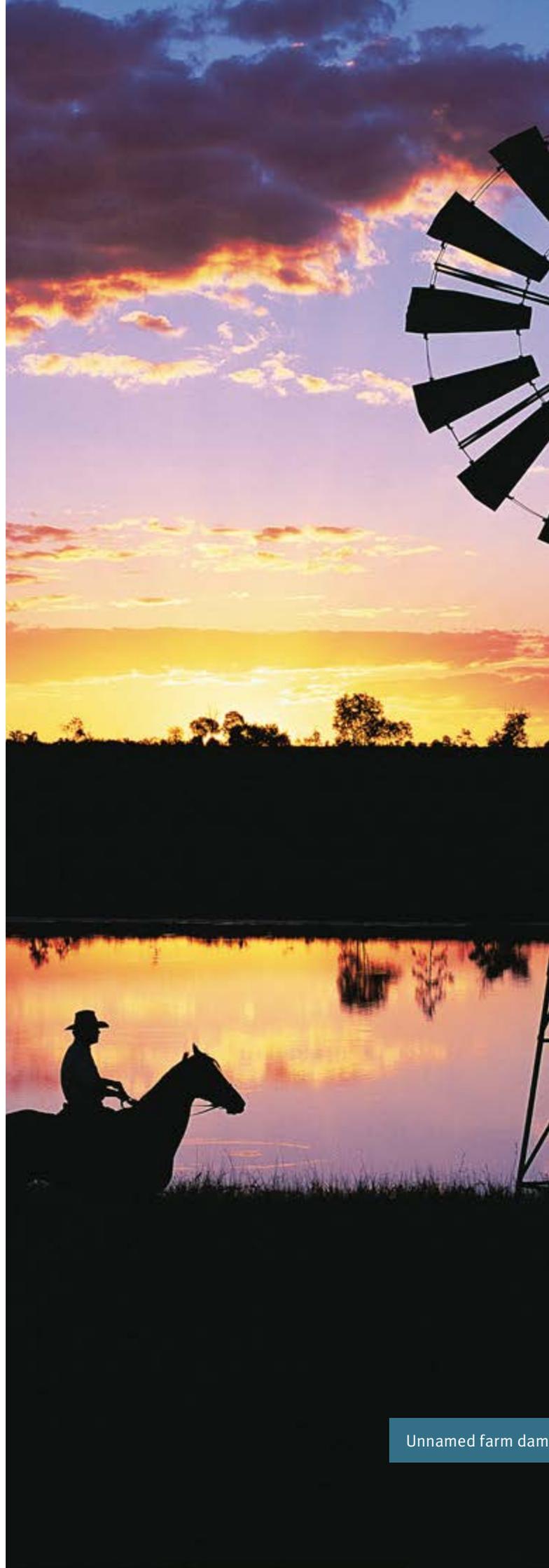
The Queensland bulk water opportunities statement (QBWOS) outlines the Queensland Government's framework for sustainable regional economic development through better use of existing bulk water infrastructure and effective investment in new infrastructure. Now in its third annual release, the QBWOS continues to facilitate discussion with the community and the water sector about water security planning in Queensland including demand management, optimal use of existing supplies and future bulk water infrastructure supply options to support growth and economic development in regional communities.

The QBWOS provides:

- a clear statement of the Queensland Government's objectives for its investment in bulk water supply infrastructure, and the principles that underpin these objectives
- an annual update on initiatives that deepen value obtained from the State's water resources and water infrastructure investments;
- background and contextual information, including a current account of bulk water use and latent capacity across the state, and the roles and responsibilities of the various entities that contribute to the effective use of Queensland's bulk water resources.

1.2 Context

The QBWOS is the state's strategic infrastructure document for water, and a critical element of the State Infrastructure Plan (SIP).



Unnamed farm dam

State infrastructure plan

The QBWOS is one of five strategic infrastructure documents outlined in the State infrastructure plan (released in March 2016).

These five strategic infrastructure documents are designed to provide a clear policy direction for strategic infrastructure decisions across transport, water, energy, digital and social asset classes.

A key objective of these five documents is to inform future regional plans. In setting the strategic direction for each asset class, these documents also strive to achieve the broader social, economic and environmental outcomes sought by the Queensland Government.



Figure 1: The five state strategic infrastructure documents

The QBWOS was first released in 2017 (covering the water year 2016/17), with a focus on bulk water supplied from systems that primarily access surface water resources supported by a dam or weir. This scope covered the state's 42 regulated bulk water supply schemes plus four additional town water supply systems. The QBWOS defined underutilised water as 'unused water entitlements' and presented an assessment of underutilised water entitlements across eight of the major water supply schemes.

In the QBWOS 2018 update (covering the water year 2017/18), the assessment of underutilised water allocations was expanded to cover the state's 42 regulated bulk water supply schemes plus 16 additional town water supply systems. High-level information on groundwater and non-traditional water supply sources was included to support understanding of alternative water supply opportunities.

1.3 Current scope

The Queensland Government is committed to ensuring that the community has better access to information about its activities. The QBWOS is a means to promote access to the Queensland Government's vast datasets to inform program, policy, service design and regulation, contribute to infrastructure planning, and better coordinate and communicate our future infrastructure needs. The 2019 QBWOS update continues to provide an accessible and interactive digital account of the state's bulk water supplies through its **sister story map**, and updated data layers accessible through the Queensland Globe. Through QBWOS, we continue to strengthen our direct engagement with communities and other stakeholders, and increase opportunities for collaboration and partnerships.

The 2019 QBWOS is presented in two parts:

Part A articulates the strategy underpinning the QBWOS and contextual information on the water sector. It provides:

- objectives for the state's investment in bulk water supply infrastructure
- principles that guide bulk water investment decision-making, if Queensland Government investment is to be considered
- critical context and background including:
 - policy environment, planning complexities, risks and general considerations
 - description of bulk water entities and their infrastructure
 - roles and responsibilities of various entities

Part B presents an annual update focused on:

- bulk water availability across the state
- updates on Queensland's key infrastructure projects, current policy initiatives and opportunities

Released separately, the **story map**, is a visual representation of existing bulk water supply infrastructure and current activities across Queensland. It provides details of water entitlements and availability, and useful climate-related data. It also provides details of bulk water infrastructure projects currently or recently under investigation.

The bulk water infrastructure layer in Queensland Globe provides an interactive online tool with a detailed graphical display of key information for Queensland bulk water supply infrastructure information that may be integrated with other Queensland Globe layers.

1.4 Objectives and principles

The Queensland Government continues to ensure the planning frameworks that support and enable efficient and effective delivery of bulk water supplies across the state are responsive to current and emerging conditions, to best support growth and underpin economic development.

The Queensland Government supports commercially viable infrastructure development that does not place a financial burden on the state's budget. Proponents, water users and water service providers should work together to determine water needs and agree on solutions through commercial negotiations. The

Queensland Government's role in such cases is to ensure the frameworks are in place so proponents can advance their project, including appropriate processes for regulatory approvals.

The Queensland Government also recognises that in instances where there is a public or economic benefit, but market failure or the scale of the problem or solution is such that private proponents and service providers are unable to advance their project on a commercial basis, there may be a responsive role for the state to play. The QBWOS provides information on the circumstances that could trigger government involvement, and the associated objectives and principles for potential Queensland Government consideration of water projects.

1.5 Objectives

State infrastructure objectives

The Queensland Government's objectives for the community are to create jobs in a strong economy, give all our children a great start in life, keep Queenslanders healthy, keep communities safe, protect the Great Barrier Reef and to be a responsive government.

The State Infrastructure Plan (SIP) describes the objectives that will guide infrastructure priorities over the coming decades. These objectives prioritise infrastructure that supports growth and productivity and connects communities and markets to improve prosperity, liveability, sustainability and resilience. The state infrastructure objectives provide the foundation for the state's objectives for bulk water supply.

Bulk water supply objectives

The Queensland Government’s objectives for bulk water supply, in order of priority, are as follows:

1. **Safety and reliability of dams and urban water supplies**—As a dam owner and regulator, the Queensland Government has an obligation to keep its dams safe, consistent with national standards and state regulatory requirements under the *Queensland Water Supply (Safety and Reliability) Act 2008* (the Water Supply Act). The Water Supply Act also protects community interests by establishing obligations for water service providers to deliver safe water and ensure continuity of supply.
2. **Use existing water resources more efficiently**—Significant volumes of uncommitted and underutilised water are currently available in Queensland. These could be used for economic development without the need to construct new bulk water supply infrastructure. Governments at every level are experiencing fiscal constraints, and a prudent response is to facilitate better use of the substantial water resources and bulk water supply infrastructure already available before investing in new infrastructure.
3. **Support infrastructure development that provides a commercial return to bulk water providers**—The Queensland Government supports commercially viable infrastructure development that does not place further burden on the state’s budget.
4. **Consider projects that will provide regional economic benefits**—These projects would be identified on a case-by-case basis through a standardised best practice assessment process. To be considered, projects must provide significant economic benefits to the state over the long term.

The hierarchy of the objectives are driven by safety and efficiency first – including making the best use of existing available water, and then considering the need for further investment (Figure 2).

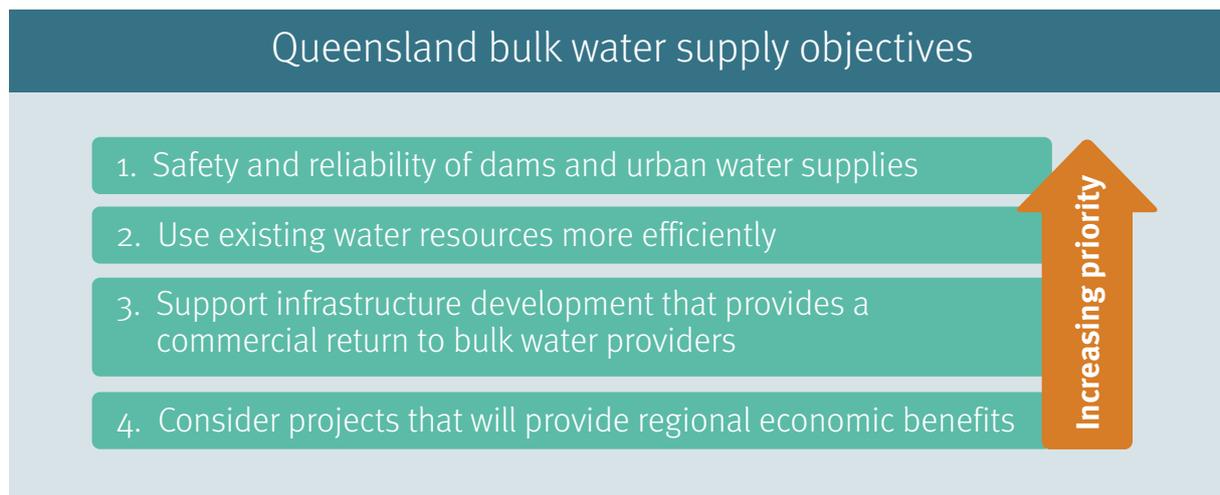


Figure 2: Queensland’s bulk water supply objectives hierarchy

Boundary conditions

A range of boundary conditions were considered during development of the Queensland Government's objectives for bulk water supply, including the following:

- Through the *Water Act 2000*, Queensland has a well-established water planning process in place to sustainably manage the allocation of water to meet the state's current and future water needs.
- Dam owners are responsible for dam safety.
- Drinking water service providers are responsible for the provision of water that is safe.
- Under the *Water Supply (Safety and Reliability) Act 2008*, responsibility for urban water supply security (continuity of supply) lies with water service providers. In South East Queensland this is the responsibility of Seqwater. Outside South East Queensland, this responsibility generally lies with local governments.
- All investment of public funds must minimise risks and costs to the government and community, maximise outcomes for Queensland, and must be considered in the context of all competing budget demands.
- Queensland has a well-established project assessment framework in place that must be considered when preparing evaluations, particularly concerning environmental, social and financial sustainability.
- Bulk water supply infrastructure proposals must satisfy all requirements for environmental and other approvals.

1.6 Principles guiding Queensland Government investment

In 2004 the *National Water Initiative* (NWI) outlined a commitment to advance bulk water supply infrastructure on the basis that costs should be paid for by customers and beneficiaries. The NWI provides additional guidance for consideration of projects that may not meet these fully commercial levels. For example, while some projects may not provide a full commercial return to a bulk water provider, they may drive direct economic benefit, enable job creation and broader benefits such as investment and financial returns from industry and agriculture. Together, these may result in a net economic benefit for the state.

If a contribution is requested from the Queensland Government, then economic benefits are considered by government through a process that allows prioritisation of expenditure across a range of proposals. The Queensland Government has developed a set of principles to guide bulk water investment decision-making for projects that may not be commercially viable but may provide regional economic benefits. The application of these principles will help ensure that all relevant options and risks are meaningfully assessed by stakeholders—including potential customers, proponents and decision-makers—when considering potential infrastructure projects.

These principles should be read in conjunction with existing government guidance on investment decision-making, including the Project Assessment Framework developed by Queensland Treasury, the Business Case Development Framework developed by Building Queensland, and the Directions for demand assessment developed by DNRME (see *Chapter 4.4*), the **Queensland Disaster Resilience and Mitigation Investment Framework**, and the **Guidance on Prioritisation (2019)** for climate and disaster risks.

Strategic principles for Queensland Government investment in proposed bulk water supply infrastructure

1. Queensland Government investment should only address a market failure that cannot be addressed by proponents, local governments or other stakeholders. If projects are economically beneficial but not commercially viable, Queensland Government investment should be considered on a case-by-case basis. These investment decisions will be consistent with the state's budget constraints and other government priorities.
2. Proposed investments should provide the highest net benefit of all options considered according to best practice assessment of proposals, including options analysis, demand assessment, transparent cost sharing and cost–benefit analysis.
3. Economic assessments that underpin potential investment in new water infrastructure should:
 - a. consider environmental and social implications using the best available information
 - b. consider the potential wider benefits to the Queensland community
 - c. systematically address risks, including the risk of overestimation of benefits such as forecast revenues and wider benefits to the community.
4. For proposals with a significant urban supply component, there should be a local government financial contribution as a default.
5. For proposals with a significant industrial or agricultural component, there should be strong private sector support with financial contributions if appropriate.
6. Projects should align with the National Water Initiative principles, including appropriate cost recovery. If full cost recovery is not deemed feasible (including capital), any federal, state or local government subsidies should be transparent to the community.
7. If the Queensland Government makes the majority investment in infrastructure, it should own and manage the assets either directly or through its statutory authorities or government-owned corporations.

The Queensland Government has also endorsed complementary 'comparative principles', which guide the State's consideration of the relative merits of individual bulk water projects. Over the past decades, numerous water supply proposals have been identified and considered by many stakeholders and at all levels of government. Comparison of the value of these infrastructure proposals can be difficult, due to the varying degrees of detail and robustness with which they were proposed. These comparative principles are intended to provide a basis for comparison of bulk water projects when considering Queensland Government investment.

The Department of Natural Resources, Mines and Energy (DNRME) is developing a methodology for benchmarking and comparing these water infrastructure proposals, and prioritising them (on relative merits) for further assessment. This

infrastructure prioritisation program (the Bulk Water Prioritisation Program) is discussed more fully in the 2019 QBWOS Part B. These 'comparative principles' form part of that methodology, build on the QBWOS objectives, and create a firm foundation for Queensland Government decision making and guiding negotiations with proponents and other jurisdictions on bulk water infrastructure projects.

These comparative principles are:

- a) High degree of certainty regarding the demand for water
- b) If the project is not commercially viable, then the project should have proven economic viability based on realistic assumptions and robust evidence
- c) Proven environmental credentials



Awoonga Dam

- d) At an absolute minimum water users are able to cover the cost of operation and maintenance (including allowance for ongoing renewal) of the scheme through appropriate pricing, and preferably can contribute to construction costs of the project.
- e) When considering moving to investment, firm commitments from potential customers are secured that reflect (d) above and evidence of appropriate sequencing of early activities such as environmental and geotechnical assessments
- f) Consider the relative benefits of supporting areas where existing supply chains, logistics are developed and established in the area, and there is proven well established and sustainable economically viable agricultural industry, and the lack of water supply is limiting expansion
- g) Seek credible industry/sectoral based evidence of strong prospect of attracting and establishing economically viable industries, to diversify the economy of the area, that are dependent on or enhanced by secure water supply
- h) Where principle (d) cannot be achieved, seek a greater Australian Government upfront contribution to reflect the present value of the estimated shortfall in anticipated ongoing operation and maintenance costs (similar to 80/20 type arrangements in the transport sector)
- i) Demonstrated sustainability of the proposal over the life of the asset with no need for ongoing support for operation

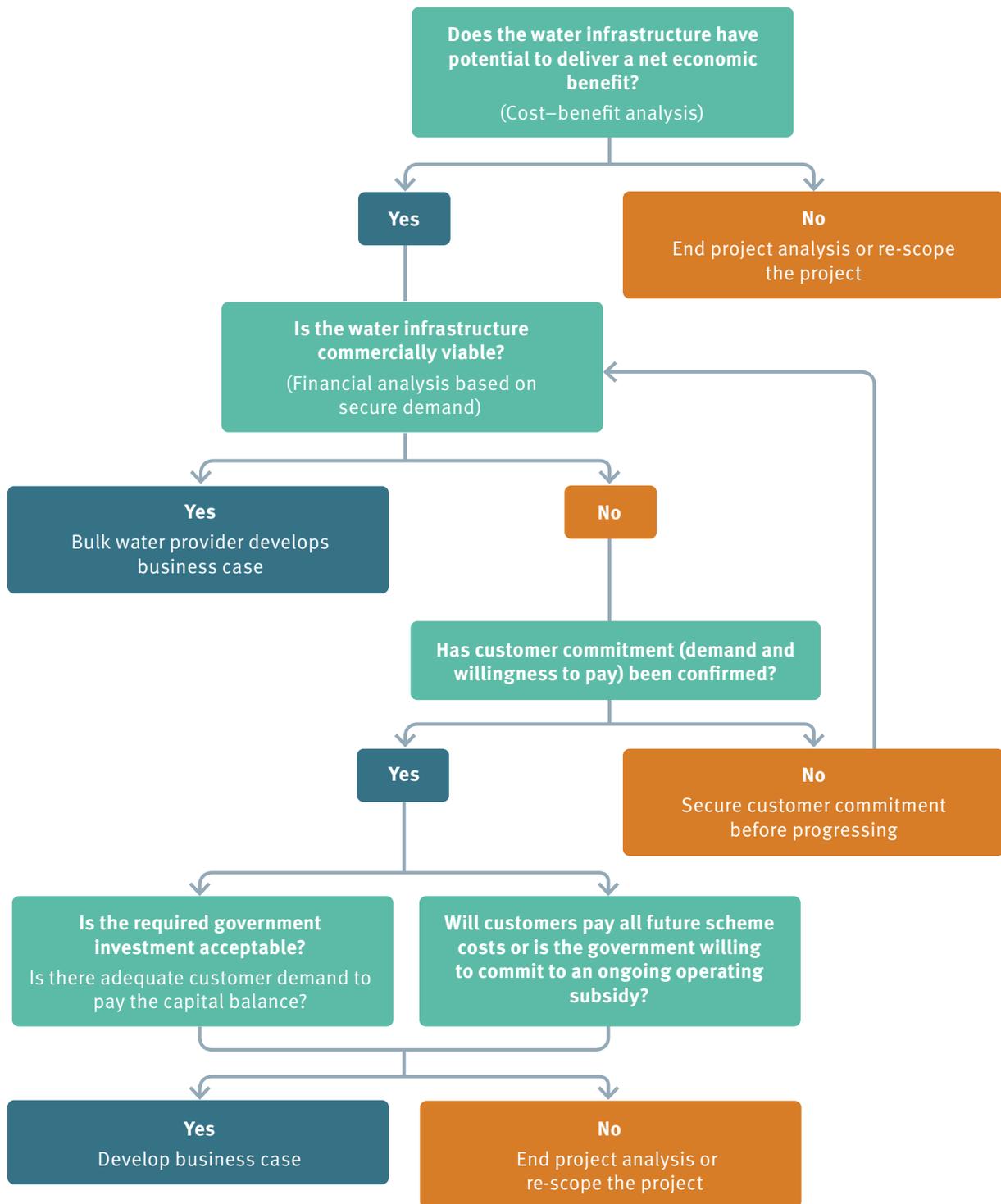


Figure 3: Decision tree to support investment assessment processes

Figure 3 shows a ‘decision tree’ that filters consideration given to economically viable projects as distinct from pathways for commercially viable projects. When integrated with the required project assessment frameworks, the decision tree process provides key points of consideration to better guide relevant agencies when assessing commercially viable or economically beneficial projects. There are many types of investigations required before making a decision on whether to construct new infrastructure, including engineering assessments, environmental impact assessments, demand studies, social impacts and economic costs and benefits.

In line with the QBWOS objective of supporting infrastructure that provides a commercial return, Sunwater has worked to develop a Sunwater Regional Blueprint, as a long term strategy that prioritises and advances commercial opportunities associated with Sunwater supply schemes. The Blueprint explores potential future water demand scenarios across the State and summarises Sunwater’s strategy for responding to these scenarios should they arise. A regional rollout of the Blueprint has commenced, engaging Sunwater customers in the definition of future scenarios and potential ways of addressing them.

Sunwater’s assessment applies a financial and economic framework to prioritise growth opportunities. This serves as an input for Government in its broader state-wide analysis of projects that offer regional economic benefits. In 2018-19 Sunwater completed a deep dive on long term customer scenarios and relevant opportunities for the Burdekin region over the next 20 years.

1.7 Summary of initiatives

A number of policy initiatives are being progressed to achieve the Queensland Government’s objectives for bulk water supply. These initiatives commenced in the 2017-18 financial year. Some initiatives are intended as ongoing core business, while others are project-based. Table 1 provides a summary of these initiatives and full progress reports can be found in the 2019 QBWOS Part B Chapter 2, along with updates on the infrastructure initiatives that are being progressed the 2019 QBWOS Part B Chapter 3.



Table 1: Summary of the QBWOS policy initiatives and opportunities

Objectives	Policy initiatives and opportunities
Safety and reliability of dams and urban water supplies	<ul style="list-style-type: none"> • State entities (including Sunwater and Seqwater) will continue to direct significant capital funds to dam safety upgrades for relevant dams. • DNRME will continue to develop Regional Water Supply Security Assessments to assist local governments responsible for ensuring urban water security for Queensland communities. • Departments of Local Government, Racing and Multicultural Affairs (DLGRMA) and State Development, Manufacture, Infrastructure and Planning (DSDMIP) are enhancing local government funding programs to encourage consideration of alternative water supply options and fit-for-purpose solutions.
Use existing water resources more efficiently	<ul style="list-style-type: none"> • DNRME is leading a project to supply customers and investors with proactive assistance, integrated advice and online services to provide better access to water information and available water entitlements. • DNRME is reviewing and enhancing market and trading arrangements to better suit Queensland conditions, and improve the way market information is provided to make the most of existing infrastructure. • DNRME will remove constraints to accessing water associated with existing infrastructure by assessing processes to achieve greater and more effective movement of water within a water supply scheme. • DNRME is developing a process for release of unallocated water to improve uptake of unallocated water reserves. • DNRME is developing options for allowing alternative use of water currently reserved for strategic infrastructure needs by allowing for its temporary release. • DNRME will provide better public access to data and information on available volumes of water and bulk water infrastructure assets across Queensland (through the QBWOS story map and Queensland Globe). • DNRME, DSDMIP and the Department of Agriculture and Fisheries (DAF) will promote active consideration of new technologies and approaches in water security planning, including provision of Waterwise home, business and educational resources. • Sunwater is developing an integrated strategy to better use latent capacity of existing assets (including pricing to support the use of latent capacity, making water products better suit business needs and removing constraints). • Sunwater is developing options to better support the government’s objectives for regional economic development.
Support infrastructure development that provides a commercial return to bulk water providers	<ul style="list-style-type: none"> • State entities will continue to develop infrastructure proposals for commercial return.
Consider projects that will provide regional economic benefits	<ul style="list-style-type: none"> • DNRME is creating a Bulk Water Prioritisation Framework for evaluating and prioritising new bulk water infrastructure proposals for government consideration. • DNRME has developed directions for project proponents to assess demand for water that are consistent with existing project assessment frameworks for evaluating and prioritising new bulk water infrastructure proposals for government consideration. <p>DNRME will continue to coordinate National Water Infrastructure Development Fund project activities.</p>

2. Background and current considerations

2.1 History of bulk water in Queensland

Water is extremely valuable to both Indigenous and non-Indigenous peoples, and is used for many different purposes. Water is also important to both for different reasons. Indigenous peoples' water values are regionally diverse and complex, but there are some commonalities. In particular, Indigenous peoples' relationships with water are holistic—combining land, water, culture, society and economy. As well as underpinning social and economic wellbeing, Indigenous peoples' relationship with water, land and the resources of each is crucial to cultural vitality and resilience. Following European settlement, Queensland's water supply sources were initially developed to support early economic and population growth. Later, development promoted and supported growth in the agricultural sector via irrigation schemes and supported the rapid expansion of mining in the 1960s to 1980s.

From the early 1940s, town water supply, sewerage and urban drainage was driven through the Department of Local Government, and the Irrigation and Water Supply Commission was responsible for water resource development, water supply, irrigation works and conservation. Over the next 50 years, small-scale water resource development (weirs) occurred across the state, and major dams were constructed at key sites from the 1970s through to the early 2000s. In 1978, the Queensland Water Resources Commission was established, with the additional functions of allocating water rights, planning, monitoring and managing the state's water resources.

In the 1980s, regional growth and, to a lesser extent, mining industry expansion drove water resource development in Queensland. The 1980s were the beginning of a period of significant change in Australia, with sweeping economic reform, increasing exposure to international competition and increasing environmental consciousness reflected in new environmental protection legislation. For water supply

planning, this meant environmental impacts needed to be considered and addressed in detail to obtain approval for new dams. At the same time, planning for new dams and management of existing dams also evolved to embrace a new understanding of the potential impacts of high rainfall events.

In the mid-1990s, federal and state government leaders committed to a further program of economic reforms known as the National Competition Policy. In 1994, the Council of Australian Governments (COAG) adopted a water reform framework informed by this policy. These reforms covered pricing, rural water schemes, water trading, resource management, institutional reform and public consultation.

In Queensland, this led directly to the development of the *Water Act 2000*, which underpins water resource planning and management. Responsibility for bulk water service provision (Sunwater and Seqwater) were separated from the state agencies responsible for water resource management and for protecting public health and safety, and an independent pricing regulator was established (the Queensland Competition Authority).

In 2004, COAG agreed to the National Water Initiative (NWI) as the blueprint for water reform into the future. Access to, and management of, water by Indigenous peoples is provided for under the NWI, to which Queensland is a signatory. Queensland also has laws in place to protect Indigenous peoples' cultural heritage, including their property, land, sea and water rights, which must be integrated into decision-making for new infrastructure.

Beyond the COAG reforms, the severity of the Millennium Drought brought a renewed focus to urban water security. A more conservative approach to water supply security planning was adopted in South East Queensland based on level of service objectives—these are broadly defined in terms of the demand that will be able to be met from water supply infrastructure, and the acceptable frequency, severity and duration of water restrictions where full demand cannot be met, and are fundamental to the estimation of the supply

yield of a system. Queensland Government support for urban water security planning across the rest of the state is discussed in Chapter 2.4.

From late 2010 until early 2011, a series of flood events occurred in Queensland resulting in the declaration of 78% of the state as a disaster zone. As a result, the Queensland Floods Commission of Inquiry was established. Its focus was wide ranging, considering floodplain management, planning instruments, development, essential services, emergency responses and dam operations. The implementation in South East Queensland of the inquiry's recommendations has clarified responsibilities and accountabilities for flood risk management and has led, for the first time, to integrated regional consideration of water resource planning, water supply security, weather forecasts, dam operations, flood mitigation and dam safety matters. Chapter 5 gives further consideration to the current challenges and opportunities for bulk water supply arrangements in Queensland.

2.2 Current policy environment

Queensland has a well-established project assessment framework in place, including guidance on investment decision-making provided by Queensland Treasury, Building Queensland and other entities (see Chapter 4.4). There are a range of legislative instruments to consider when planning and assessing potential infrastructure projects, both on a state and federal level. These include planning, environmental, cultural heritage and financial sustainability requirements.

State and federal initiatives

In March 2016, the Queensland Government released the SIP and committed to an infrastructure reform agenda. As part of the implementation of the SIP, the (then) Department of Energy and Water Supply was tasked with developing a Queensland future water security strategy— the QBWOS.

Water infrastructure projects typically involve long-life assets that are complex and expensive to build, own and operate. The QBWOS is an important step in building a framework that stands the test of time, supporting better use of existing infrastructure and informing construction of new infrastructure if and when appropriate. While consideration of the commercial viability of infrastructure projects is important, and still the priority, the Queensland

Government also has a role to facilitate and support projects demonstrated to be in the best overall interests of the state (economically viable). The focus has shifted to reducing the barriers to using available water within existing bulk water supply infrastructure and considering new projects with demonstrable economic benefits within the context of all competing budget constraints.

There is a general acknowledgment that governments of all levels should consider the benefits of investing in infrastructure to support growth and regional economic development. Much of the recent bulk water infrastructure development in the state, particularly during the resources boom, readily demonstrated a commercial return. With those supply sources now developed, the long-term economic and social benefits of new water infrastructure are receiving broader consideration as the increasing demand for water necessitates investigation of less commercially-effective supply options.

In 2015, the Australian Government announced the establishment of the National Water Infrastructure Development Fund (NWIDF). The NWIDF arose from the Australian Government *Our north, our future: white paper on developing northern Australia and Agricultural competitiveness*. NWIDF provides funding to accelerate the detailed planning and construction of water infrastructure projects to enhance water security and help stimulate regional economic growth, including irrigated agriculture.

In late 2018, additional funds from the NWIDF were announced by the Australian Government. Funding arrangements and the proponents are now in place and feasibility assessments have commenced on the Granite Belt Irrigation Project (Emu Swamp Dam), Hells Gates Dam Scheme and Big Rocks Weir Project and the North and South Burnett Regions Feasibility Study. The Lakelands Irrigation Area Business Case, also funded through the NWIDF, is developing a project scope and milestones at the time of writing.

In addition to the identified feasibility study funding, there have been capital contributions offered towards developing Emu Swamp Dam, MareebaDimbulah Water Supply Scheme Modernisation, and Warwick Recycled Water for Agriculture. Funding offers are subject to establishing the necessary agreements between the Australian and Queensland Government and subsequent agreements with proponents delivering the studies/projects.

The Queensland Government is committed to ensuring that consideration of water infrastructure projects includes rigorous technical, environmental, social and economic assessments, and ensuring the demand for water is proven.

2.3 Planning complexity

The process of planning and constructing water supply infrastructure is complex. Uncertainties and risks associated with water availability and demand can flow on to financial, economic, environmental and social impacts that require management.

Demand risks for bulk water infrastructure projects can be significant. A dam may have a design life of more than 100 years, yet predicting demand for water (even 20 years into the future) involves considerable uncertainty – some demands may be expected to continue or evolve into the future (such as agriculture), whereas a mine development will have a limited life. Predicting revenue to cover operational costs and provide a return on capital over 100 years is even more difficult.

Demand forecasting is complicated by the fact that significant variation in demand can occur from year to year, often with an inverse relationship between demand and supply. That is, when a dam is full (such as when there has been significant rainfall and inflows) demand for water is often lower, especially from the agricultural and urban sectors (through reduced outdoor water use). Even with the largest dams, during low inflow periods there may be, at times, less water available than needed.

Financial risks for bulk water infrastructure projects can be significant due to the cost involved, the long planning and construction periods, and the long life of the asset. A medium to large dam may cost upwards of \$500 million in planning and construction costs, and will have ongoing operation and maintenance costs in the millions of dollars per annum. Dams can also incur large capital upgrade costs if there are significant changes to populations downstream or if ‘worst-case’ rainfall events are predicted to increase — with consequent design risk implications (see Chapter 5.1).

Climate variability creates uncertainties and risks associated with both water availability and demand. Extreme events such as floods and droughts can have significant impacts on the reliability of water supplies and the demand for water.

Like many other large infrastructure projects, bulk water supply works frequently have significant environmental and social impacts. The impacts and often large geographical areas involved mean that a greater variety of studies and impact assessments may be required compared to other forms of infrastructure. Typically, these assessments include hydrology, environmental flow, transmission loss, aquatic ecology, fluvial geomorphology, geotechnical, flora and fauna, Indigenous and European heritage, land capability, fish passage and socio-economic impacts.

2.4 Drivers of bulk water use

Climate

Queensland has a dynamic climate—from dry and hot in the west to tropical in the north, and some of the highest and lowest rainfalls in the country. Throughout Queensland’s history, water supplies have been developed to meet urban, industrial and agricultural demands, and to support communities and economic development. Drivers for the development of water supplies have changed significantly over time, most recently to meet the rapid urban development and population increases of the last 20 years, the significant growth of the resource sector and the push to develop northern Australia (particularly in support of agricultural development).

Communities that rely on regular seasonal rainfall to replenish their water supplies are likely to be most affected by extreme events and climate change. While water security may be acceptable during normal climatic conditions, the adequacy of a water supply is tested during drought. Robust planning is needed for such circumstances so that, at a minimum, urban water supplies can be maintained to a community. Pre-planning for climate resilience should result in well thought out, appropriate responses—as opposed to reactive measures that can often be more expensive and less effective.

Managing drought

Droughts are part of the normal climate cycle in Australia and Queensland has suffered through many severe droughts in the past. An area or shire drought declaration is made by the Queensland Minister for Agriculture, Industry Development and Fisheries, based on the advice of local drought committees. The main criterion for declaring drought is a rainfall deficiency in the last twelve months that is likely to occur no more than once every ten years.

The infamous ‘Millennium Drought’ commenced in the winter of 2000 and persisted through southern Queensland until the autumn of 2009. However, the last decade brought the most widespread drought in recent history, commencing in the autumn on 2013 and peaking in the autumn of 2017 with over 88% of Queensland drought-declared. Through 2018-19 conditions eased in some locations with about 58% of Queensland officially in drought, however current climate outlooks suggest that a drier than average winter is expected for 2019-20 for most of the state, with dry conditions persisting in the south.

Queensland supports the National Drought Agreement (NDA) among federal, state and territory governments in 2018. The NDA sets out a joint approach to drought preparedness, responses and recovery, with a focus on accountability and transparency. The NDA recognises the need to support farming businesses and farming communities to manage and prepare for climate change and variability. The new agreement focusses measures across all jurisdictions on bolstering risk management practices and enhancing long-term preparedness and resilience. The NDA replaces the 2013 Intergovernmental Agreement on National Drought Program Reform.

The Queensland Government has a range of programs in place to help support rural businesses and communities to prepare for, manage and recover from the impacts of drought. Producers in drought declared areas who qualify for support can access water infrastructure rebates and freight subsidies. The Queensland Government **Drought and Climate Adaptation Program** supports research and development projects to improve seasonal forecasting, and provides tools and systems that support producers and farm managers in their decision-making. Projects are managed and funded through a series of partnerships with government, university and industry partners.

Water for urban needs

The provision of safe, secure and affordable drinking water supplies underpins the social wellbeing, economic prosperity and development of our communities. The Queensland Government closely monitors and regulates the provision of drinking water in Queensland, which constitutes about 9% of Queensland’s total water use. A register of communities experiencing threats to continuity of supply is maintained and communities facing these threats are actively supported to maintain the provision of water.

Under the *Local Government Act 2009* and the *Water Supply (Safety and Reliability) Act 2008* councils and their water service providers are responsible for providing safe, secure water supplies to customers in their designated water supply areas, and for water supply planning to ensure continuity of supply. To protect public health, the Queensland Government closely monitors and regulates the provision of drinking water in Queensland. Water service providers involved in treating, transmitting or reticulating water for drinking purposes are required to have an approved Drinking Water Quality Management Plan in place, and comply with the details of that plan. DNRME also maintains a register of communities with risk to continuity of supply and communities facing supply shortfall threats are actively supported.

In South East Queensland, water supply planning and bulk water infrastructure management for the region is undertaken by Seqwater, which distribute treated bulk water to five water service providers for distribution to SEQ residents. This regional approach is driven by the physically interconnected South East Queensland Water Grid, which was built in response to the Millennium Drought. Seqwater is required to develop and maintain a water security program that describes how they aim to provide bulk drinking water to the region for the next 30 years including in response to extreme weather events such as flood and drought.

Outside South East Queensland, the responsibility for urban water supply planning lies with local drinking water service providers — in most regional areas this is the local council. Local water service providers have the best knowledge of a community’s water supply and future demand needs. They generally own and operate the water supply infrastructure, and this allows town planning and water supply planning to be undertaken together. These councils and their water service providers also need to understand their communities’

acceptance of water restrictions and make decisions to balance higher levels of water security with willingness to pay for that security.

The Business Queensland website links the document, **Water security levels of services objectives: Guidelines for development**, which explains the benefits of water security level of service (LOS) objectives and how they can be developed for a community. Water security LOS objectives set out water security performance standards and will commonly include statements about:

- how much water the supply system will typically be able to supply;
- how often, how severe and for how long water restrictions might occur; and
- the likelihood that emergency actions will be required due to a prolonged drought, such as reducing water demand to essential minimum needs.

The desired LOS objectives for the SEQ region are prescribed by the state, and carefully consider and balance demand for water, resource supply availability and infrastructure operation to facilitate achievement of the objectives. The water security program and annual reports are available on the **Seqwater website**.

It is essential that water supply planning is timely, cost-effective and appropriate for a community's needs. To help support these efforts, DNRME is partnering with councils across Queensland through the Regional Water Supply Security Assessments (RWSSA) program to reach a shared understanding of communities' current and future water supply source security. Local governments and water service providers remain responsible for deciding what should be done and implementing actions to provide an appropriate level of water security for their communities. This includes decisions around LOS objectives and their priorities for future water supply investments. An overview of RWSSAs is provided in the 2019 QBWOS Part B Chapter 2.1.

DNRME also reports annually on the performance of local governments and their water service providers in ensuring urban water security for Queensland communities. In particular, this reporting focuses on how effectively Queensland's local water service providers meet the objectives of the *Water Supply (Safety and Security) Act 2008*, based on Key Performance Indicators (KPIs) that were collaboratively developed with water service providers. These KPIs demonstrate how service providers perform on a range of measures including customer service standards, water balance and water security arrangements, system maintenance, pricing and financial sustainability and so on. DNRME will continue to report on the performance of local governments and their water service providers in ensuring urban water security for Queensland communities.

DNRME will also continue to support local water efficiency initiatives through provision of Waterwise resources to councils, community groups and schools.

Water for agriculture

Water is essential for agricultural production and water used for agriculture, forestry and fishing accounts for about 65% of the state's total water use. The Australian Bureau of Statistics (Cat No 4618.0) estimate that in 2017-18, Queensland had 139 131 719 hectares (ha) open to agricultural production and sourced 2 683 316 ML for on-farm needs, as shown in Figure 4. Most, but not all of this water is associated with water entitlements held in that water year. For example, water stored in on-farm dams may have been harvested under previous years' entitlements. Note also, that some sources are too small to graphically display at this scale.

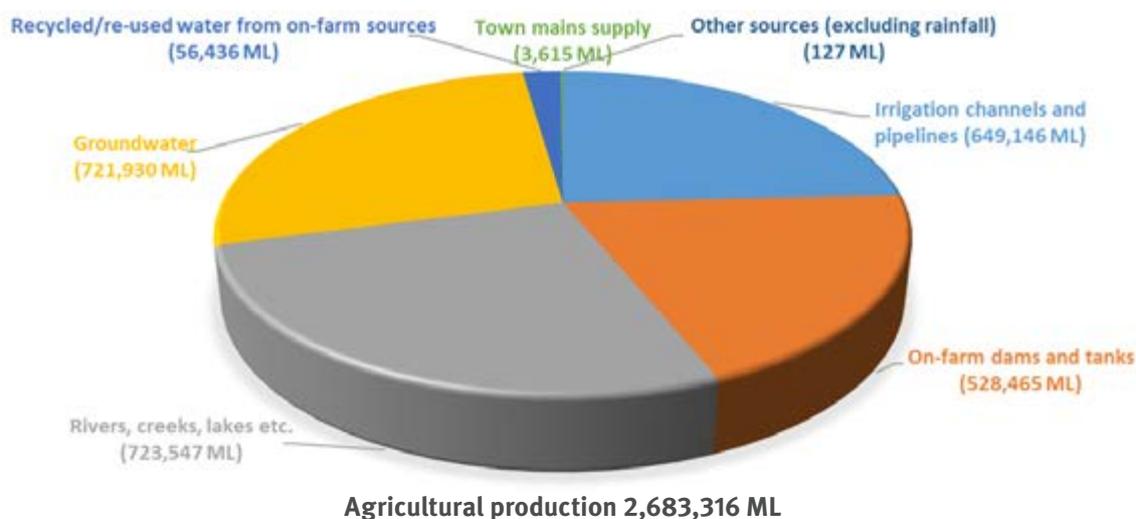


Figure 4: Water sourced for agricultural production 2017-18

Queensland Government investment in large-scale irrigation development began in the Mareeba–Dimbulah area on the Atherton Tableland in Far North Queensland, with the completion of the major storage (Tinaroo Dam) and supporting water supply scheme in 1958. Construction of water supply infrastructure by the Queensland Government followed in the Warrill Creek, Mary River, Callide Creek, Burnett River, Logan, St George, Emerald, Pioneer and Proserpine areas, and resulted in increases in the area of land under irrigation across the state. Many of these schemes also provided mining and/or urban water supplies. The largest water supply scheme in the state, the Burdekin Haughton Water Supply Scheme, is based on the Burdekin Falls Dam, with construction of the channel scheme following. This water supply scheme supplies rural producers that irrigate around 45 000ha.

In addition to the state's bulk water infrastructure, landholders have developed off-stream storages that can be filled by diversions from stream flood flows or overland flows. As well as surface water supplies, subartesian groundwater is also an important source of supply for irrigation in areas such as the Lockyer and Callide valleys and the Don and Burdekin river delta areas. Artesian groundwater from the Great Artesian Basin is critical to maintaining stock water supplies for much of western Queensland.

The QBWOS recognises the push to develop Northern Australia and to create a business environment that supports economic growth (see *Chapter 5.4*). In particular, access to secure and tradeable water is considered to be one of the foundations for development of Northern Australia. The Queensland Government maintains that to progress water infrastructure associated with any strategic agricultural land developments, robust and transparent assessments would need to occur using the same processes as those that apply to any bulk water infrastructure projects.

To develop 'greenfield' irrigation areas such as those considered in the Gulf basins (in addition to the bulk water infrastructure), major costs will be involved to establish the essential supporting and enabling infrastructure and services required to convert land currently used for grazing into areas of irrigated agriculture. Very large scale greenfield irrigation developments (such as the Ord River Irrigation Scheme in Western Australia) can often be unpredictable, with a number of challenges to understand and overcome, including harsh climates, unique pests and difficulties getting product to market. By comparison, the development of an irrigation expansion area (i.e. an area near an existing irrigation area) is likely to have only marginally higher costs compared to the existing irrigation areas.

Fisheries

The commercial, recreational and Indigenous fishing sectors of Queensland rely on healthy fisheries and these can be impacted by development, including bulk water supply infrastructure and the land use activities that are enabled by it. Healthy fisheries are a vital part of Queensland's natural environment, lifestyle and economy. The commercial fishing and aquaculture sectors produce about \$300 million in gross value annually. Aquaculture industries such as prawning can also be significantly impacted by reduced freshwater flows connected to upstream water harvesting from dams. This is why impacts on Queensland's unique fisheries are key considerations when assessing potential new bulk water supply infrastructure and associated development activities.

Water for industry

The availability of a reliable water supply is critical to support industry. The total volume of water used for mining, manufacturing, electricity and other industrial purposes is currently about 27% of the total water use in the state. Well-planned and timely water infrastructure development is critical to achieving Queensland's 30-year vision for vibrant and prosperous communities supported by a strong and diversified economy offering a wide variety of employment opportunities. The core drivers of industrial water use into the future (excluding agriculture) are likely to continue to be manufacturing and mining.

Significant coal reserves are available in the state's Bowen, Surat and Galilee basins. However, the timing of any potential developments in these areas is highly dependent on trends in international markets for coal and, in the case of thermal coal, concerns regarding the impacts of greenhouse gas emissions on the world's climate and corresponding changes to governments' policies. A number of feasibility studies and environmental impact statements have been finalised for construction of dams, if required, that could support expansion of coal mining in Queensland, including Connors River Dam and Nathan Dam.

Additional water demands for power generation are likely to be modest for the foreseeable future because the State has adopted alternative technologies and supply sources to offset demand on traditional supply sources. Technological improvements and water scarcity in the Surat Basin led to the state's recent base load power stations (Millmerran and Kogan Creek)

being air-cooled rather than water-cooled. Additionally, the recent gas-fired power station developments in the state have a minimal water requirement for their operation.

Although an expensive option, the availability of purified recycled water in South East Queensland (when the Western Corridor Recycled Water Scheme is operational) allows the Swanbank and Tarong power stations to use this resource during drought periods rather than using their normal surface water sources.

Finally, the state's renewable energy targets are encouraging increased power production from sustainable energy sources such as wind and solar that use little or no water, and potentially hydro-electricity that utilises bulk water storage dams. Consistent with this approach, the Queensland Government is investigating the potential to develop hydro-electricity generation capacity at Burdekin Falls Dam and has set aside \$100 million to invest in a scheme if it proves feasible.



Somerset Dam

3. Existing bulk water arrangements in Queensland

3.1 Accessing water

In Queensland, regionally-based water plans are developed under the *Water Act 2000* to sustainably manage and allocate water resources in Queensland. A water plan may apply to rivers, lakes and springs, overland flow, underground water or a combination of these. When water plans are developed they aim to balance the needs of water users (e.g. towns, agriculture and industries) and the environment within the defined plan area. Once the volume of water that can be made available for use in a plan area is determined, it can be made available through water licences and tradeable water allocations, or held in reserve as unallocated water.

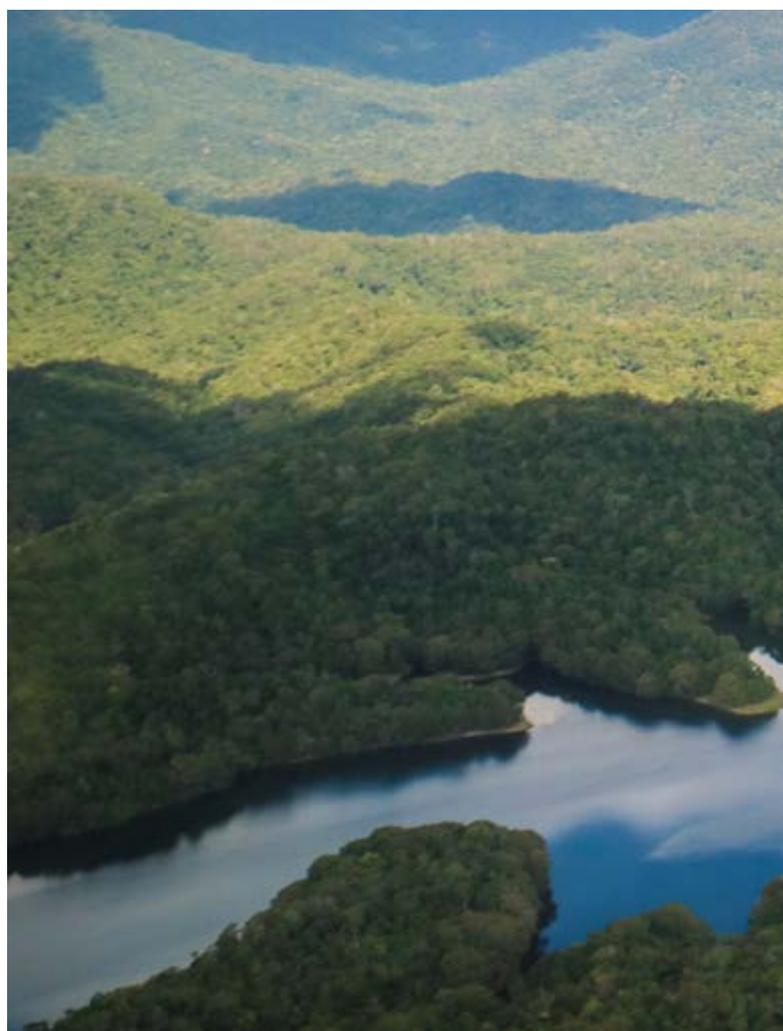
3.2 Bulk water service providers

Operationally, access to water resources across Queensland is managed by registered water service providers. The Queensland Government owns four 'bulk water' service providers that provide essential water supply services including operation and maintenance of critical water supply infrastructure such as dams and water treatment plants.

The State's bulk water entities include one government-owned corporation (Sunwater), one statutory authority (Seqwater) and two 'Category 1' water authorities (Gladstone Area Water Board and Mount Isa Water Board). The State-owned bulk water entities support economic development by supplying bulk water to grow businesses and develop new enterprises. They can provide water from existing supplies or from new infrastructure, if required and justified. Queensland Treasury and DNRME jointly monitor the performance of the State's bulk water entities on behalf of the Responsible Ministers.

Queensland's bulk water supply systems, including dams, weirs, pipes, channels and other assets, are largely owned and managed by the State-owned bulk water entities, private entities (such as mining companies) and local councils (especially outside South East Queensland). Further components of

associated urban water supply systems can include water treatment plants, manufactured water plants (desalination and recycled water) and distribution networks. These are owned and operated by a range of water service providers. Councils own most of the water treatment facilities and generally provide distribution and retail services to homes and businesses. Local councils are also responsible for the water supply planning for urban supplies. Figure 5 and Figure 6 show the division of responsibilities for bulk water supply, treatment, distribution and retail from source to end users.



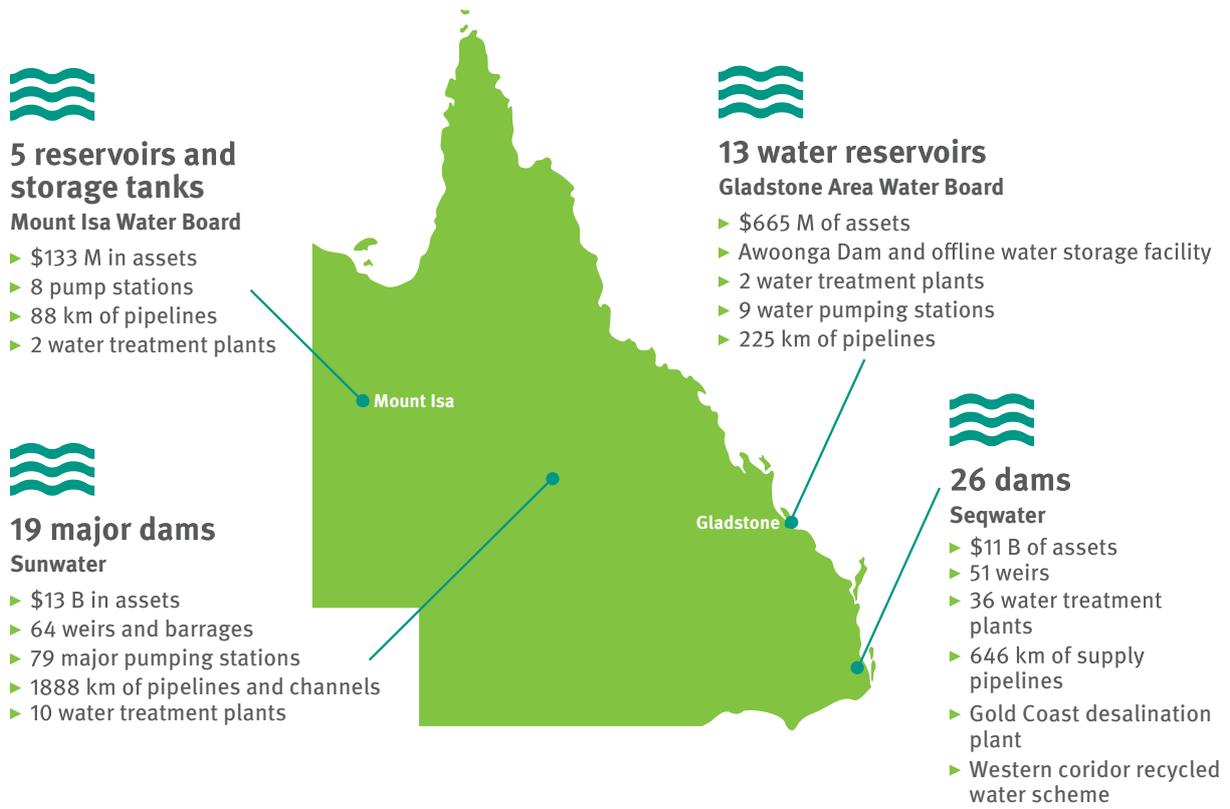


Figure 5: Bulk water supply, treatment, distribution



Copperlode Falls Dam



Figure 6: Retail water supply, treatment, distribution

QBWOS regions

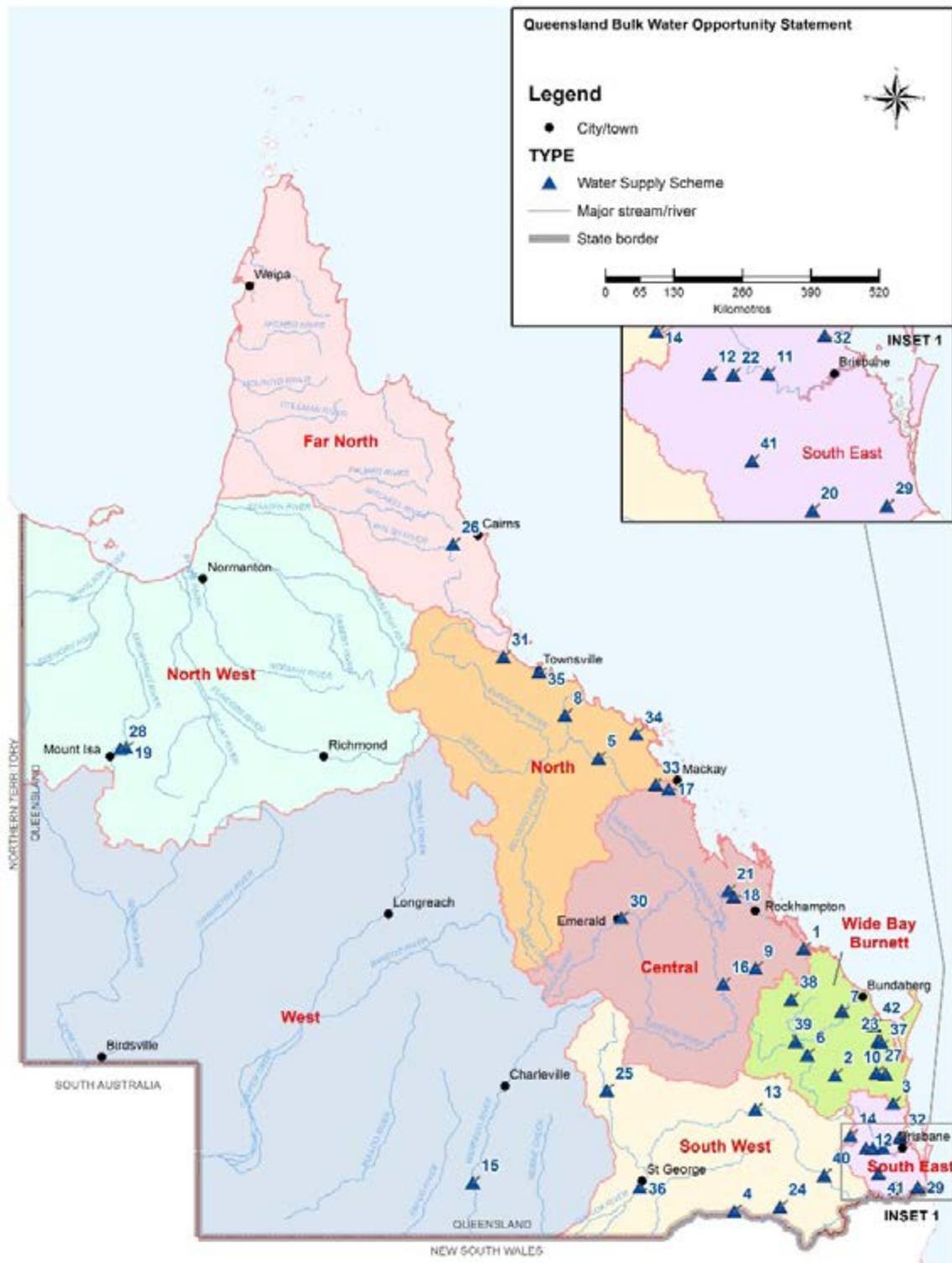
Water supply systems that benefit from integral infrastructure consist of two main types:

- regulated water supply schemes, with associated water allocations identified and authorised through a water planning instrument
- some councils also own water supply infrastructure, typically developed at a local scale to provide for a single-purpose use, such as a town water supply.

Owners of infrastructure in regulated water supply schemes are responsible for managing the infrastructure to deliver the water entitlements associated with the scheme. There are 42 regulated

bulk water supply schemes in Queensland, covering 148 dams and weirs. Outside these schemes there are more than 243 additional dams, weirs and barrages that are part of town water systems or operated as stand-alone water supply infrastructure.

Figure 7 shows how these bulk water supply systems are distributed across the state, which for the purposes of the QBWOS has been divided into one of eight bulk water supply regions. The regions were selected based on major drainage basins, with consideration of catchments, water plan areas, local government boundaries and other factors. It is important to note that the regions do not fully align with any one of these.



NUMBER	BULK WATER SUPPLY NAME	NUMBER	BULK WATER SUPPLY NAME	NUMBER	BULK WATER SUPPLY NAME
1	Awoonga Water Supply Scheme	14	Cressbrook Creek Water Supply Scheme	28	Moondarra Dam Water Supply Scheme
2	Barker Barambah Water Supply Scheme	15	Cunnamulla Water Supply Scheme	29	Nerang Water Supply Scheme
3	Baroon Pocket Water Supply Scheme	16	Dawson Valley Water Supply Scheme	30	Nogoa Mackenzie Water Supply Scheme
4	Border Rivers Water Supply Scheme	17	Eton Water Supply Scheme	31	Paluma Crystal Water Supply Scheme
5	Bowen Broken Water Supply Scheme	18	Fitzroy Barrage Water Supply Scheme	32	Pine Valleys Water Supply Scheme
6	Boyne River and Tarong Water Supply Scheme	19	Julius Dam Water Supply Scheme	33	Pioneer River Water Supply Scheme
7	Bundaberg Water Supply Scheme	20	Logan River Water Supply Scheme	34	Proserpine River Water Supply Scheme
8	Burdekin Houghton Water Supply Scheme	21	Lower Fitzroy Water Supply Scheme	35	Ross River Water Supply Scheme
9	Callide Valley Water Supply Scheme	22	Lower Lockyer Valley Water Supply Scheme	36	St George Water Supply Scheme
10	Cedar Pocket Water Supply Scheme	23	Lower Mary River Water Supply Scheme	37	Teddington Weir Water Supply Scheme
11	Central Brisbane and Stanley River Water Supply Schemes	24	MacIntyre Brook Water Supply Scheme	38	Three Moon Creek Water Supply Scheme
12	Central Lockyer Valley Water Supply Scheme	25	Maranoa River Water Supply Scheme	39	Upper Burnett Water Supply Scheme
13	Chinchilla Weir Water Supply Scheme	26	Mareeba Dimbulah Water Supply Scheme	40	Upper Condamine Water Supply Scheme
		27	Mary Valley Water Supply Scheme	41	Warrill Valley Water Supply Scheme
				42	Wide Bay Water Supply Scheme

Figure 7: Queensland's bulk water supply schemes

The 2019 QBWOS Part B provides an annual update on the capacities and performances of these schemes and regions and the QBWOS **story map** provides a centralised, visual (spatial and graphical) representation of existing bulk water supply infrastructure, with current water information and infrastructure projects being considered across Queensland.

Sunwater

Sunwater is a Queensland Government-owned water service provider, making the most of the available water supply for our agriculture, urban and industrial customers. Sunwater operates 365 days a year to deliver for its customers and the essential role they play in regional growth and prosperity.

Sunwater owns and manages water infrastructure assets with a replacement value of around \$13.7 billion.

From Mareeba in the far north, west to Mount Isa, and south to St George and Goondiwindi, Sunwater works to capture and deliver around 40% of the water used commercially in Queensland through a network of critical infrastructure including:

- 19 major dams
- 64 weirs and barrages
- 625 kilometres of water channels
- 76 major pumping stations
- 2100 kilometres of pipelines
- 5 water treatment plants.

Sunwater supplies water to agriculture, urban and industrial customers throughout regional Queensland. On average, it delivers more than 1300 gigalitres (GL) of water each year. Its strong regional presence helps Sunwater understand and adapt to the needs and changing environment of more than 5000 customers.

Seqwater

The Queensland Bulk Water Supply Authority (trading as Seqwater) is a statutory authority. In south-east Queensland, Seqwater owns the bulk water supply infrastructure, including dams, weirs, water treatment facilities and bulk distribution networks necessary to provide treated water to eleven council areas in south-east Queensland via three council owned water businesses and two retail service providers, shown in F



Figure 8: South East Queensland water industry structure

Seqwater is responsible for managing and operating the South East Queensland Water Grid—an \$11 billion network of bulk water supply assets (replacement value) extending from the New South Wales border to the base of the Toowoomba ranges and north to Noosa Shire Council. During the Millennium Drought regional water security was improved by connecting existing infrastructure and adding new supply sources to form the water grid. The works included significant investment in the construction of major pipelines and two manufactured water supplies — the Gold Coast Desalination Plant and the Western Corridor Recycled Water Scheme.

South East Queensland is the only region in the state where a standard of water security performance (i.e. Level of Service objectives) is prescribed by government. Seqwater must undertake long-term planning to facilitate achievement of this specified level of performance maintaining a safe, secure and cost-effective bulk drinking water supply to the urban communities of South East Queensland and outline its plans in a Water Security Program, available at www.seqwater.com.au/waterforlife. Seqwater is also responsible for providing essential flood mitigation services and for managing catchment health within the region. It also provides water for irrigation to about 1200 farmers and offers community recreation facilities. Seqwater's bulk water and irrigation prices are generally determined by the Queensland Government on the advice of the Queensland Competition Authority.

Gladstone Area Water Board and Mount Isa Water Board

The Gladstone Area Water Board (GAWB) and the Mount Isa Water Board (MIWB) are Category 1 water authorities, established under the *Water Act 2000*.

GAWB was established in 1973 to help the Gladstone Town Council and Calliope Shire Council cope with the heavy financial demands imposed on them to upgrade the water supply system serving the area, as a result of high industrial growth. GAWB owns and operates Awoonga Dam on the Boyne River, along with a network of delivery pipelines, water treatment plants and other bulk water distribution infrastructure in the Gladstone region in Central Queensland. GAWB's total asset base is valued at over \$670 million. GAWB holds a water allocation of 78 000 ML/a in Awoonga Dam on the Boyne River. Of the total water supplied by GAWB, 80% is delivered to industrial and power generation customers, while approximately 20% is supplied to the Gladstone Regional Council as treated drinking water.

Similarly, MIWB was established in 1974 to carry out water activities in the Mount Isa region. MIWB maintains \$135.6 million of water supply and treatment infrastructure, including 86 kilometres of transmission pipeline from Lake Julius to Mount Isa. Each year, MIWB supplies nearly 20 000 ML from Lake Moondarra (the city's primary water source) and Lake Julius to customers. MIWB is responsible for the supply of bulk water to industrial customers and drinking water to Mount Isa City Council, which reticulates drinking water to approximately 20 000 people.

Border Rivers Commission

The Queensland and New South Wales state governments jointly established the Dumaresq-Barwon Border Rivers Commission (BRC), which was constituted under the provisions of the New South Wales-Queensland Border Rivers Agreement made on 27 August 1946 to operate and maintain jointly owned water infrastructure and implement agreed water sharing arrangements in the Queensland-New South Wales border region. The BRC's operational area of responsibility includes:

- Glenlyon Dam on Pike Creek in Queensland
- the border rivers, which include the parts of the Dumaresq, Macintyre and Barwon Rivers that constitute the boundary between New South Wales and Queensland from Mingoola to Mungindi
- the intersecting streams, which include the Moonie, Bokhara, Narran, Culgoa, Ballandool, Warrego and Paroo Rivers and their effluents and tributaries, and any stream or watercourse which forms part of the Darling River drainage system and crosses the New South Wales-Queensland border west of the town of Mungindi.

3.3 Bulk water supplies

Water held in or supplied from bulk water supply systems are generally classified as either 'supplemented' or 'unsupplemented' sources according to the instruments under which operational responsibilities for the bulk supply are regulated.

Supplemented water is provided in a scheme regulated under the *Water Act 2000*, and is usually supported by infrastructure such as a dam, weir or other improvements (e.g. barrage, off-stream storage), but can include natural stream flow. It generally has higher reliability than unsupplemented water. Supplemented water supply schemes are operated by a water service provider, under conditions set out in a ROL, IROL or DOL. These different forms of licencing allow the holder to interfere with the flow of water in order to operate water infrastructure to which the licence applies. Water releases made from this infrastructure must maintain the needs of the environment while meeting consumptive water demands.

Unsupplemented water is available for use outside supplemented water supply schemes. Individual water users taking unsupplemented water are responsible for building and operating any local-scale infrastructure required to access and distribute water.

Understanding potential water availability across Queensland

The *Water Plan 2000* intends that our demands on Queensland’s water resources are balanced with the needs of the environment. Under each water plan, a defined proportion is set aside for each. Of the portion that is set aside for our consumptive use, Figure 9 shows some of this available water is allocated (or licenced) to customers through the State’s bulk water providers, or directly, and some is held in reserve. Some water is in dead storage (i.e. below normal operational access) and some is lost in storage and distribution, but the planning process takes this into account, getting water to customers when and where it is wanted, and uses river systems as an effective means of delivery. Not all of the available water entitlements across the state are owned, though, and not all entitlement holders use their full water entitlements each year.

instruments and can be made available for future use without compromising the security of existing users or the environmental values within a catchment. However, access to this water may require modification and/or development of new infrastructure—in some cases, significant investment may be required.

Water reserves have been identified in various statutory water plans developed by DNRME. The plans identify reserves that have different characteristics and locations that lend themselves to opportunities for different scale developments. However, it is important to note that not all water reserves identified in a plan would be suitable to support the development of bulk water supply systems. Water reserves are specified in water plans with location, volume and conditions. These plans are developed and administered by DNRME. Information on water planning frameworks and links to water planning documents at a catchment level are available on the [Business Queensland website](#).

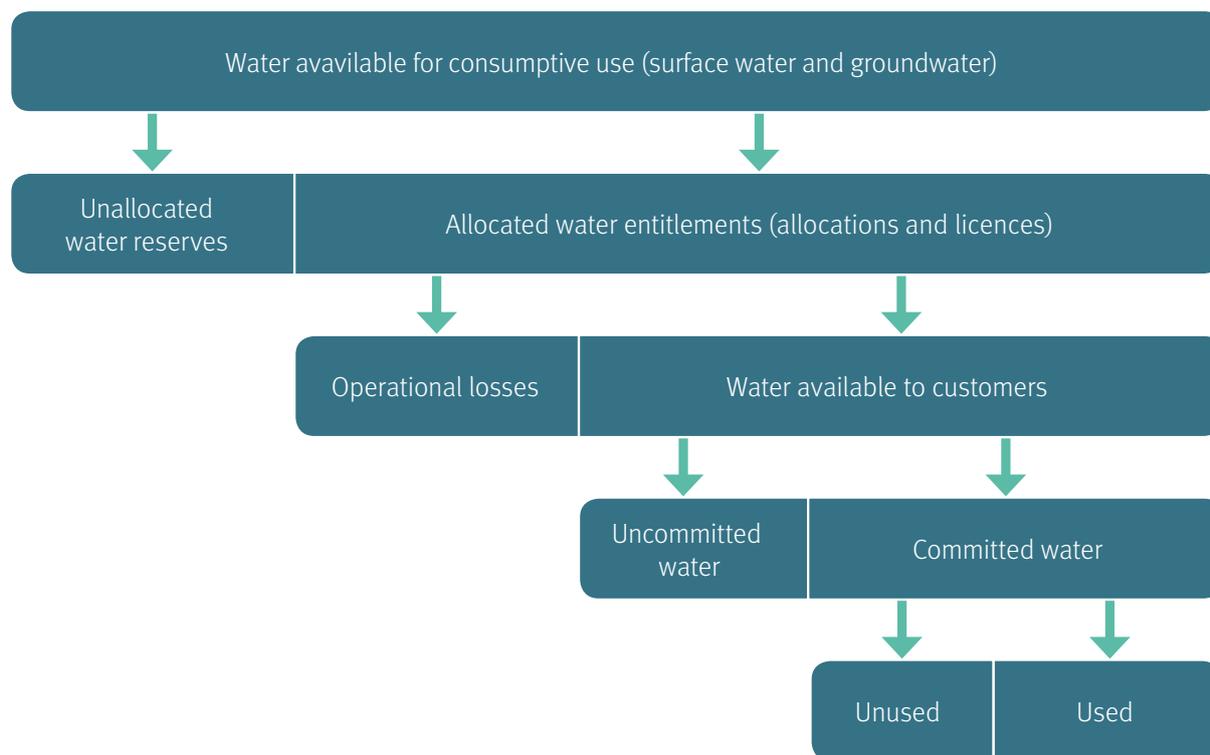


Figure 9: Water supply system relationships

Water reserves

Figure 9 shows additional water resources could also be made available from unallocated water reserves to potentially support the future development of new or expanded bulk water supply infrastructure. Unallocated water is reserved under water planning

The 2019 QBWOS Part B provides a summary of the unallocated water reserves held in each of the eight bulk water supply regions and at a state level, which may support the development of new and/or expanded bulk water supply systems. The reserve volumes provided are for surface water only and are those categorised as strategic or town water supply reserves or strategic infrastructure reserves.

3.4 Assessing latent capacity in bulk water supply systems

There are significant water resources currently available in some Queensland regions that can be readily accessed to support economic development without any new bulk water storage infrastructure being developed. While investigations indicate a substantial volume of water is available in Queensland's existing water infrastructure, there are barriers to using this water.

Unallocated water reserves may be temporarily allocated, while being held to fulfil, at some later point, their intended strategic purpose. The temporary nature of that assignment limits the potential range of its end use.

Uncommitted water entitlements may not always be co-located with commercial demands – for example, being associated with infrastructure in remote locations that requires additional investment to access, or it may be in a location that will not easily support agricultural development.

Water entitlements may not be fully used by the entitlement holder – both at the discretion of the entitlement holder, but also as a result of limitations to the current capacity of the distribution infrastructure, constraining the ability to deliver the desired volumes to potential customers with temporally competing demands.

The QBWOS is the first step in reducing these barriers to support the objective of better using existing water infrastructure and supporting new infrastructure development, where appropriate and particularly where water is a major constraint to economic growth.

Sunwater has sold latent capacity in its dams and pipeline network including tenders for water from Paradise Dam and Burdekin Falls Dam, and sale of surplus capacity in the Eungella Water Pipeline to mining customers in the Bowen Basin.

The 2019 QBWOS Part B provides an update on the stocktake of unallocated, uncommitted and underutilised water. It also details initiatives including assistance to help customers navigate water information and provide solutions, making water markets and trading more efficient, and ensuring water products better suit business needs. These initiatives are being developed in consultation with stakeholders and subsequent versions of the QBWOS will contain updates on their implementation.

Entitlement availability and seasonal availability

Underutilised entitlements may be dependent on the amount of water seasonally available, in accordance with established water sharing rules. The total volume of water allocations remain consistent, but there are a number of factors that constrain real access to water and the demand for water from a system on a year-to-year basis. These include:

- how much water is physically present in bulk water supply sources and systems that can be delivered to customers—this is affected by the weather (rainfall patterns, evaporation, temperatures) and the rules for sharing the water. Limited availability may be managed through a process of announced allocation, whereby full access to an allocation may only be authorised at some point during a water year.
- characteristics of the entitlements, including volumes, reliability and water market arrangements (such as where can the allocation be traded)
- proposed application of the water and broader market factors—which may be affected by the viability and productivity of farming land (such as by salinity or drought) or the risks to sensitive environments (such as the Great Barrier Reef).

The current Queensland water market arrangements were developed with a clear intent to allow for unused or underutilised water allocations to be traded (either permanently or seasonally). Opportunities remain to improve access to water allocations or maximise the value of water that is available seasonally and over the long term. Initiatives to improve current market trading arrangements for water are discussed in the 2019 QBWOS Part B.

4. Key infrastructure initiatives and opportunities

There are a range of drivers for building, upgrading and improving bulk water infrastructure across the state, which include:

- meeting the needs of a growing population
- continuing to meet compliance obligations and regulatory requirements (e.g. for dam safety and water quality)
- increasing climate variability (including reduced surface water, but with increased intensity and flooding)
- using the state's existing and extensive bulk water supply infrastructure more efficiently
- promoting regional economic growth.

With regard to the Queensland Government's objectives for bulk water supply, the priority driver for bulk water supply infrastructure is the safety and reliability of existing dams and urban water supplies (section 4.1), followed by efficiency opportunities (section 4.2) and the need for further investment (sections 4.3 and 4.4).

4.1 Initiatives to keep our dams safe

The Queensland Government's top priority for the State's bulk water supplies is to ensure the safety and reliability of dams and urban water supplies. In Queensland, the responsibility for the safety of a dam rests with the dam owner. This includes dams owned by state and local governments and other entities such as mining companies and farmers.

One of the critical drivers for capital spending by state-owned bulk water entities over the next few decades is the need to upgrade dams and spillways to meet state regulatory requirements for safety, which are linked to guidelines prepared by the Australian National Committee on Large Dams. These guidelines and standards are designed to ensure that dams and weirs are able to perform at appropriate standards. The SIP requires all state government projects of greater than \$100 million in value to include a sustainability assessment, this includes projects delivered by the State-owned bulk water entities

The standards seek to ensure that, from a life safety risk management perspective, the failure of a large dam is an exceedingly rare event. The standards are consistent with other jurisdictions around the world and reflect standards applied to other high risk infrastructure (such as nuclear power stations). They are more stringent when more people downstream are at risk.

However the most significant driver is improved understanding of the science of extreme weather events since many of the state's dams were originally built.

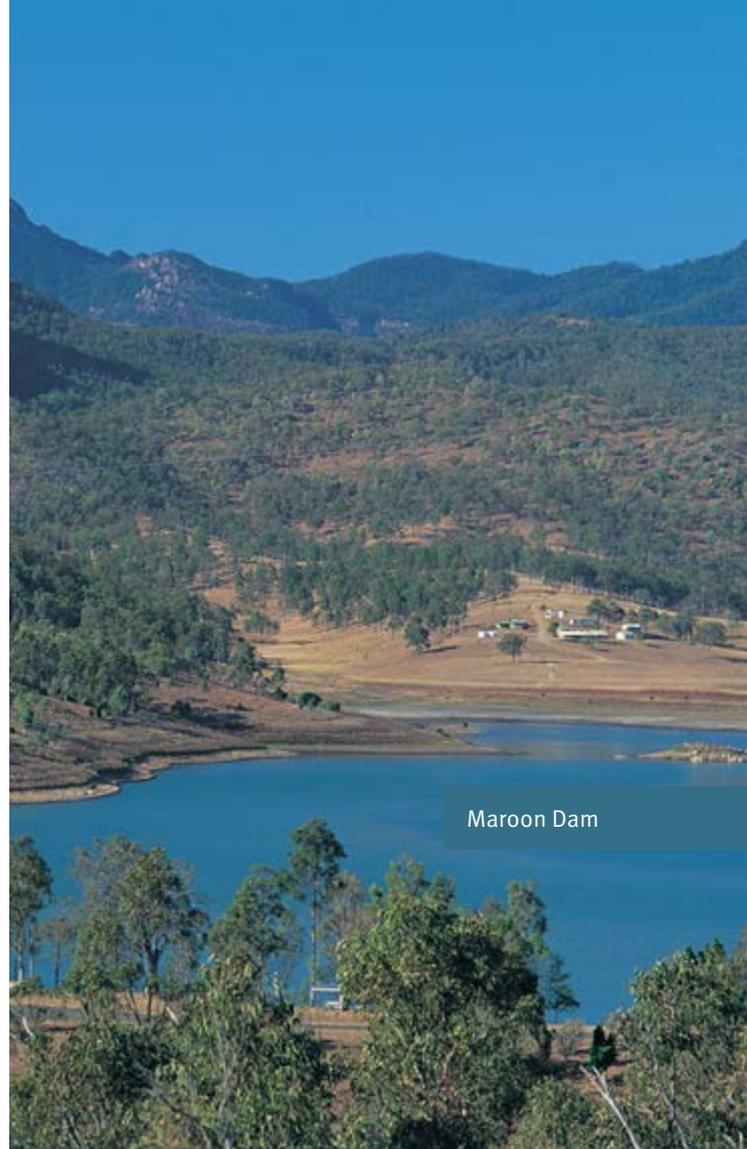
Many of Queensland's dams were constructed more than 50 years ago. In addition to general ageing of the infrastructure, engineering methods have improved significantly in this period. Today, dam engineers have a better understanding of geology, structural design, hydrology and construction methods and as a result, in some cases, improvements to dams are required.

Although the target risk tolerability standards for dam safety have not changed since prior to 2002. The Bureau of Meteorology progressively revises extreme rainfall and flooding estimates and, in 2003, revised the 'probable maximum precipitation' estimates which increase risk associated with the 'probable maximum flood'. In 2016, our understanding of extreme rainfall and its consequences also improved with better methods to assess the variability of rainfall events.

The Queensland Government Guidelines on acceptable flood capacity for water dams (July 2017) provide a schedule for dam upgrades to reduce life safety risks and meet the minimum required standards by 2035. While a number of dams have already been upgraded, more work still needs to be done. Seqwater and Sunwater have assessed the risks associated with their dam portfolios and are working to design and implement improvements in a staged manner consistent with the regulations and guidelines. Both entities have substantial capital allocations in their forward budgets to accommodate the costs, and these are refined and updated regularly as new information becomes available.

4.2 Using existing water resources more efficiently

The State's second bulk water objective is to promote more efficient use of our water resources. The QBWOS 2019 Part B provides details of programs and projects that were developed to meet this objective, including the Underutilised Water Partnership Project, which was completed in 2019, and the Water Markets and Trading Optimisation Project. Both these projects are being delivered as part of the **Rural Water Management Program**.



Inset 1: Rural Water Management Program

Rural Water Management Program

The Rural Water Management Program (RWMP) was established in 2018 to drive a more transparent and sustainable rural water management across the state. The program will improve rural water management and ensure our valuable water resources are used, measured and monitored effectively.

WHAT THE RWMP AIMS TO ACHIEVE

The Program is delivering better systems, policies and processes to give public confidence that the state's water resources are managed fairly and responsibly. The Program also delivers on the government's response to the Queensland independent audit of non-urban water measurement and compliance and state's commitments under the Murray–Darling Basin Compliance Compact.

The program addresses the following five key areas:

- strengthened water measurement
- transparent water information
- an enhanced regulatory approach
- robust compliance
- optimising water markets.

Key projects within the program of works include publishing online information relating to water resource management, water use and compliance and a review of water measurement activities, including metering. The RWMP also has a focus on supporting water trading and the optimal use of unallocated water reserves to deliver economic benefits. Project activities, including implementation of new business-as-usual practices, are expected to be complete by 2025. Key deliverables of the program include the following.

WATER INFORMATION SYSTEMS

Access to transparent and timely information is essential for sound water management. It helps improve water use efficiency, reduce costs and enable the department to make better decisions about access to water and managing compliance. Better information also encourages better use of our water resources and supports water markets and trading. DNRME is taking steps to enhance and develop systems to ensure that water users and the community can access accurate water information.

WATER MEASUREMENT

A new water measurement policy is being finalised. The policy deals with optimal measurement, where metering should be undertaken, standards for metering and how other water measurement systems and technology such as telemetry can be used. Telemetry would provide real-time water use data to assist water users in making informed decisions, help entitlement holders to meet their obligations by providing timely and transparent information systems and processes, and provide water managers with the information they need to ensure effective and equitable water access and management. Department is engaging with peak bodies and irrigator groups across the state, to discuss options to strengthen measurement assurance and accuracy, and support the capture of real-time information. DNRME will continue to engage with all relevant stakeholders during this process to ensure any changes are fair and equitable.

ROBUST COMPLIANCE

A robust compliance framework gives Queenslanders the confidence that our water resources are being managed fairly and responsibly. DNRME continues to improve its compliance policies, procedures and guidelines. Helping water users to understand their obligations and the department's compliance approach will support greater self-compliance. DNRME is also developing a regulatory assurance framework that will enable us to assess and report on our performance as a regulator. **Performance reports** will be published annually starting from September 2019.

WATER MARKETS, TRADING AND UNSUPPLEMENTED WATER RELEASES

The trading and markets component of the RWMP will pursue opportunities to maximise the value of Queensland's water resources by enhancing our water markets and trading regime, as well as releasing more unsupplemented water. This will enable optimal use of Queensland's water entitlements by introducing mechanisms to mobilise water that is being underutilised not only in the supplemented schemes, but expanding on the original QBWOS initiative, to include unsupplemented catchment areas for both surface and groundwater resources of Queensland. Through the Program, DNRME is engaging with water users and industry to develop strategies to optimise water use for economic development and improve water trading.

DNRME has also made progress to improve access to unallocated water. Recently, the first ever release of water from strategic water infrastructure reserves was made to support economic development in the Dawson Valley, until such time that water is needed for proposed infrastructure.

Further information on the Independent audit of Queensland non-urban measurement and compliance, the Government's response, the Murray–Darling Basin Compliance Compact and the RWMP are available at the **DNRME website**.

4.3 Support infrastructure that provides a commercial return

The State's third bulk water objective is to support infrastructure development that provides a commercial return to the State-owned water providers (i.e. Sunwater, Seqwater, Gladstone Area Water Board and Mount Isa Water Board, which are required by legislation to act commercially. This objective is met in two ways.

The first is by project proponents (such as Sunwater and Seqwater) advancing particular infrastructure projects that provide a commercial return. State-owned water entities are required to comply with various guidelines and processes when investigating commercial projects. This includes:

- Building Queensland Business Case Development Framework - state entities must work with Building Queensland in developing the business case for projects over \$50 million, while for projects over \$100 million Building Queensland is the lead for developing the business case;
- Queensland Treasury Project Assessment Framework – applies to all government agencies including state owned water entities;
- Ministerial oversight also requires businesses to seek approval for projects over certain thresholds, which varies across the entities.

The second approach to supporting this objective is to advance methodologies that can assist confirmation of the commercial nature of infrastructure projects under investigation. Queensland has a well-established project assessment framework in place for qualifying and progressing infrastructure development projects that provide a commercial return.

In 2018, DNRME developed 'Directions for project proponents to assess demand' for water. The Directions for project proponents to assess demand for water is an important step in ensuring there is a stable, sustainable and sufficient market supporting better use of existing infrastructure and informing construction of new infrastructure (see Chapter 4.4).

The Directions integrate with an existing framework that includes the Project Assessment Framework developed by Queensland Treasury and the Business Case Development Framework developed by Building Queensland, the Directions for demand assessment developed by DNRME (see Chapter 4.4), the Queensland Disaster Resilience and Mitigation

Investment Framework, and the Guidance on Prioritisation (2019) for climate and disaster risks.

The **Queensland Disaster Resilience and Mitigation Investment Framework** (2019) was developed by the Queensland Reconstruction Authority in close consultation with Queensland agencies and other stakeholders to support decision makers in the assessment and prioritisation of infrastructure-based resilience and mitigation investments and non-infrastructure or community resilience. The **Guidance on Prioritisation** (2019) is part of a series of Commonwealth documents on climate and disaster risk decision making and contains a Prioritisation Framework that allows users to evaluate interventions based on how they reduce vulnerability and the economic net benefits create.

4.4 Consider projects that will provide regional economic benefits

The fourth prioritised bulk water objective is to consider projects that will provide regional economic benefits. Much of the recent bulk water infrastructure development in the state, particularly during the resources boom, readily demonstrated a commercial return. With those supply sources now developed, the long-term economic and social benefits of new water infrastructure are receiving broader consideration as the increasing demand for water necessitates investigation of less commercially-effective supply options.

Government funding is often required to make water affordable – without government funding, there is either no new bulk water infrastructure, or the price of additional water supplied is in excess of what consumers can pay. Delivering better infrastructure should include an assessment of how infrastructure provides better services for the consumer. This is a key consideration within the bulk water asset class, as community and economic benefits cannot be realised if the price of water to be supplied is too high.

The key challenge for the State is ensuring that when subsidies are provided, they are to the right projects in the right circumstances, and are transparent. Consequently, the State reviews project delivery to evaluate the benefits gained for the broader community.

While the most obvious beneficiaries of subsidies are the supplier (through cheaper infrastructure) and the consumer (through cheaper prices), there are potential benefits to the broader community. These benefits are realised when additional bulk water supply leads to economic development, more jobs, improved community resilience, and greater demand for other services, such as freight.

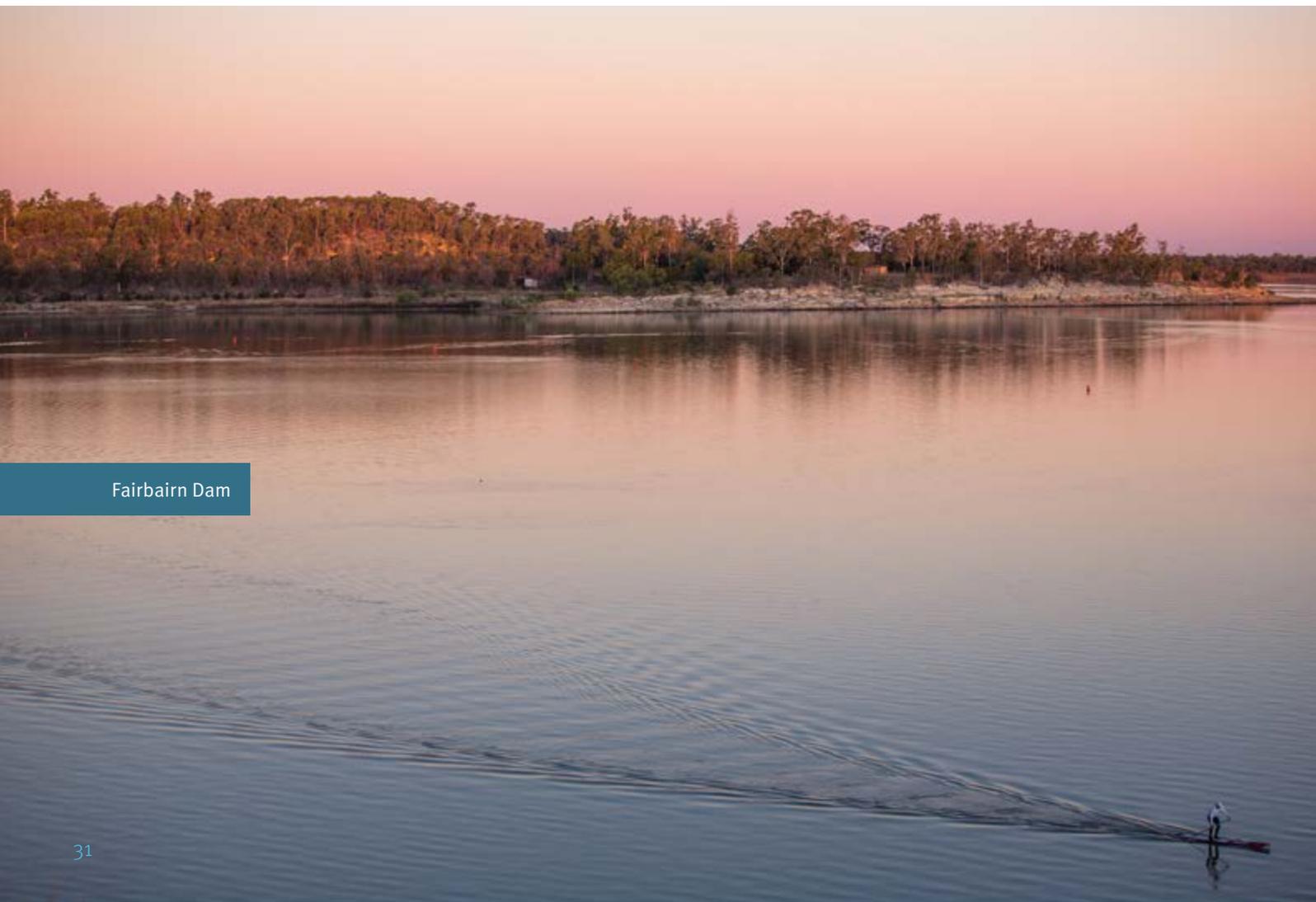
The 2019 QBWOS Part B provides a comprehensive update of the Bulk Water Prioritisation Project (BWPP) (previously called the Infrastructure Prioritisation Project) which considers both commercially viable infrastructure proposals, and those that may not meet the standards of commercial viability, but provide regional economic benefits to the state and local communities, agriculture and industry.

The BWPP is a key QBWOS initiative being led by DNRME, and includes NWIDF assessments, as they are finalised, for government consideration. As these studies are finalised, it will be important for the Queensland Government to have a position in relation

to each of these proposals. Discrete infrastructure proposals often consider varying degrees of detail and robustness. A clear benefit of the BWPP is its benchmarking comparison of the proposals, and prioritising them (on relative merits) for any possible future progress.

This is relevant in the current environment where there is a high level of interest in water supply projects across all levels of government and many stakeholders. It has resulted in a large number of water supply proposals being identified and considered at various times in the past and, recently, the Australian Government funded 15 feasibility assessments under the NWIDF.

As part of supporting this objective, Sunwater has worked with a number of interested parties to explore opportunities to meet short and long-term water supply needs, and progressed the Sunwater Regional Blueprint to serve as an input for Government in their broader state-wide analysis of projects that offer regional economic benefits.



Fairbairn Dam

Planning to maximise economic benefit: Is new bulk water supply infrastructure the solution?

Before a proposal for new bulk water supply infrastructure is developed, a range of factors need to be considered. These include identification of a water supply need, challenge or opportunity, the potential benefits of addressing it, consideration of what water resources may be available, evaluation of supply options, and assessment of capacity to pay for development and ongoing operation and maintenance of new infrastructure.

Identifying the need and benefits

Identifying and clarifying the water supply need or issue is an important step prior to considering new bulk water supply development. Undertaking and completing this step will allow an understanding of factors such as the scale of demand, level of commitment from potential customers, type of water products required and areas where further work is required. This will inform subsequent actions and guide which water supply options, including non-infrastructure options, should be further investigated. Equally important is understanding what benefits could be realised by addressing the need or issue. A significant net commercial or economic benefit should be clearly demonstrated before a project proceeds for further assessment.

Availability of water in the relevant water plan

Not all areas of Queensland have water reserves identified in the water plans that could be accessed through development of new bulk water supply infrastructure. In some circumstances, the water reserves may be put aside for other uses or may not provide water products that will meet the identified need—for example, there may not be the right reliability of supply.

Water supply options

All potential water supply options should be assessed, including both infrastructure and non-infrastructure (such as market options). There may also be merit in considering demand management and efficiency initiatives such as improved irrigation practices or lining of irrigation channels.

When considering water supply options, it is important to understand the current use and products, as well as the additional requirements. Infrastructure and non-infrastructure options need to be considered in the long list of options, and only through evaluation against agreed criteria can options be shortlisted. In many circumstances, an approach centred around efficient and appropriate use of existing developed water resources can delay the need for expensive new infrastructure. See Section 6.6 on new technologies and approaches.

Queensland Government consideration

The Queensland Government will consider investing in proposals for new bulk water infrastructure that are well supported with evidence and analysis that proves the need and the benefits, demonstrates alignment with water planning arrangements and justifies the preferred option. If a local government is the project proponent seeking state investment, they should also demonstrate that they have worked with the Queensland Treasury Corporation and considered all other funding avenues.

If it is determined that new bulk water infrastructure is required, a proposal will need to be assessed against Queensland Treasury's Project Assessment Framework (or Building Queensland's Business Case Development Framework as appropriate) and guided by principles of best practice. Relevant state agencies, bulk water entities and the project proponent will work together to progress the project through the various decision gates and processes put in place to ensure state funds continue to be spent prudently and efficiently.

4.5 Key agency roles

The **Queensland Plan** is the Queensland Government's 30 year vision for the state and sets out the strategy and progress towards the delivery of our most important priorities and hardest challenges.

It emphasises a drive towards strong and diverse regional economies that balance and preserve liveability with robust, sustainable economic growth, with infrastructure as a key driver of that growth.

The Queensland Plan affirms that quality, secure and reliable infrastructure and services boost business confidence and supports economic growth. It also recognises that the changing and sometimes extreme environment in Queensland can produce conditions can limit the capacity of our infrastructure and can have an adverse effect on our economic performance.

In responding to these opportunities and challenges, Queensland Government departments have key roles in planning and administration of water resources, regulating the provision of water supply, management and operation of existing bulk water supply infrastructure and consideration of new infrastructure. These roles are summarised below to provide clarity to customers, potential customers and those seeking more information on Queensland's water arrangements.

Department of Natural Resources, Mines and Energy

DNRME helps the community and the government make the best use of our water resources to deliver safe, secure, affordable and sustainable water supplies. DNRME provides a regulatory framework to manage security of rights (entitlements, allocations, licences etc.) to water resources, which involves both legal ownership and security to exercise those rights. Water users in Queensland are subject to fees and charges set out in schedule 12 of the *Water Regulation 2016*.

The management of water resources within Queensland is undertaken on a catchment basis using water plans and management areas developed under the *Water Act 2000* and implemented through subordinate instruments such as water management protocols (previously resource operations plans), water supply scheme operations manuals, resource operations licences (ROLs), and water entitlement notices. These instruments are developed through

technical and scientific assessments, as well as extensive community consultation, to determine the appropriate balance between the economic, social and environmental demands on the state's water resources. This balance is achieved by establishing rules for operating water supply schemes and sharing water within schemes and management areas.

In addition, DNRME provides advice on water-related economic and pricing policy, institutional arrangements, bulk water supply infrastructure, and urban water security. DNRME regulates water service provision, drinking water, recycled water and dam safety and provides oversight of the State-owned bulk water entities. On behalf of the Queensland Government, DNRME manages the non-commercial asset portfolio of 21 dams and weirs, and associated land, plant and equipment. DNRME also administers the NWIDF projects for Queensland.

Department of State Development, Manufacturing, Infrastructure and Planning

DSDMIP brings together the functions of infrastructure planning and policy, planning, local government, regional services and economic and regional development to create better cities, towns and communities. DSDMIP leads the development of infrastructure policy, including the SIP, regional plans and investment prioritisation for Queensland.

The SIP sets Queensland's future infrastructure agenda by providing a framework for planning and prioritising infrastructure investment and delivery to support growth, employment and economic development. The SIP is currently being redesigned as part of the 5-yearly review. From 2020 the SIP Part A strategy will reflect a 25-year outlook, establishing a unified, clear and long-term vision for the state's infrastructure requirements such as water security in regional communities. The SIP Part A update will also establish a stronger connection with the SIP Part B program.

DSDMIP is responsible for leading the delivery of economic development outcomes for Queensland. With a focus on industry, regions and projects, DSDMIP supports economic development by influencing the policy and the investment environment, supporting projects with funding and coordination, and supporting new and emerging industries and job creation.

DSDMIP also plays a key role in helping develop place based (autochthonous) regional economic development strategies and incorporating them into statutory Regional Plans as well as local government planning instruments, priority industry development, project facilitation and investment attraction strategies, infrastructure pipelines and forward planning by service delivery agencies across government.

The Queensland Government assists local governments to plan and provide infrastructure for their communities through funding programs managed by DSDMIP. Local government infrastructure includes water supply and reticulation, sewage treatment, local roads, stormwater management and parks and land for community facilities. Through the Office of the Coordinator-General, DSDMIP also progresses assessment of coordinated projects, investigation of potential coordinated projects and facilitation of all approvals for construction-ready projects.

Department of Local Government, Racing and Multicultural Affairs

DLGRMA administers the legislation that regulates the roles and responsibilities of local governments. The DLGRMA assists local governments with infrastructure funding proposals, such as those for water infrastructure, and provides some targeted funding and grants. Their Works for Queensland (W4Q) program supports local governments outside of South East Queensland to undertake job-creating maintenance and minor infrastructure projects and the Local Government Grants and Subsidies Program (LGGSP) aims to support local governments to meet the needs of their community by providing funding for the delivery of priority capital infrastructure projects. See the 2019 QBWOS Part B for more on government grant and subsidy programs in 2018-19.

Department of Agriculture and Fisheries

DAF facilitates the growth and sustainable development of the agriculture, fishing and forestry sectors, and seeks to optimise their contribution to economic, environmental and social outcomes for Queensland (including developing export markets). DAF assists producers to implement best management practices for their farming enterprises, including

in relation to water efficiency (and water quality) and productivity. DAF does this through research, development and extension including of technological advances in crop management practices.

With respect to bulk water infrastructure, DAF is an advocate for agriculturally important land, energy and water, and the sector's key role in regional economies and employment. It also actively advocates for leveraging changes in water and land use to develop new agricultural and aquaculture opportunities. DAF also has a role to protect fish habitat; activities that disturb fish habitats (such as the construction or raising of waterway barriers, including weirs and dams) may require fisheries development approval under the *Planning Act 2016*.

Department of Environment and Science

The Department of Environment and Science (DES) has responsibility for protecting and managing Queensland's parks, forests and the Great Barrier Reef and avoiding, minimising and mitigating impacts to Queensland's environment. It also has responsibility for delivering scientific expertise to protect and manage our environment and natural resource base. DES has a number of roles relating to environmental impact assessment of development (including bulk water supply projects) depending on the type of development proposed, including:

- assessment manager or referral agency for development applications to undertake environmentally relevant activities that are listed and defined in the *Environmental Protection Regulation 1998*
- assessment manager or referral agency for assessable development regulated under the *Coastal Protection and Management Act 1995*
- advice agency as part of assessment processes managed by the Coordinator-General under the *State Development and Public Works Organisation Act 1971*
- coordination of advice and statutory notices to the federal environment department related to assessments (including accredited environmental impact statement processes) under the federal *Environment Protection and Biodiversity Conservation Act 1999*

- Office of the Great Barrier Reef, which implements and coordinates reef management strategies and programs (see *Section 5.1 Strategic Regions*)
- DES also provides expert hydrological modelling services that underpin development of water plans and support the preparation of RWSSAs.

Queensland Treasury

Queensland Treasury is responsible for managing Queensland's revenue and expenditure in a way that drives economic growth, creates jobs, and improves prosperity now and into the future. The remit of Queensland Treasury includes providing economic and commercial advice to government, procuring infrastructure (including through optimised public infrastructure investment), and monitoring the performance of the state's commercial businesses (including providing oversight of Sunwater and Seqwater jointly with DNRME).

Considering the complexities that arise across a range of issues associated with better use of existing infrastructure and developing new infrastructure where appropriate, it is acknowledged there can be improvements in the way relevant Queensland Government departments work to better achieve beneficial economic outcomes for the state. Improvement is an ongoing process; however, specific opportunities have been identified and progress on their implementation is outlined in the 2019 QBWOS Part B.

New Australian Government water agencies

The Australian Government has established new agencies focussed on developing and delivering additional water supply. The North Queensland Water Infrastructure Agency (NQWIA) provides strategic planning and coordination of Australian Government resources to implement the Hughenden Irrigation Scheme and the Hells Gates Dam Scheme (which includes the Big Rocks Weir). The NQWIA will liaise with the Queensland Government and Sunwater in their delivery of the Rookwood Weir and efficiency measures for the MareebaDimbulah Water Supply Scheme.

The National Water Grid is an agency with national scope. Its first activities will be developing a better understanding of existing water resources across Australia, and then investigating opportunities for large scale water diversions. It is not literally tasked with creating a national water grid.

The Queensland Government looks forward to working with these new agencies to develop a better, shared understanding of the State's bulk water infrastructure priorities, and identifying solutions that will help support the State's economic development through additional water supply. This will be achieved in consultation, using DNRME's Bulk Water Prioritisation Project as a guide to which proposals are the most viable.



Tinaroo Falls Dam

5. Addressing unique risks and uncertainty

5.1 Flood mitigation

Flood mitigation is part of the Queensland Government's top priority for the managing the State's bulk water supplies – safety. A recent history of flooding of urban areas across Queensland, in particular in 2011 and 2013, put a focus on flood mitigation and operational strategies for managing dams (whether or not they have dedicated flood mitigation capacity). The 2011 flood events forced thousands of people to be evacuated from towns and cities across the state, much of the state was declared a disaster zone and a significant damage bill was incurred.

Mitigating the social, environmental and economic impacts of floods is likely to be an increasing driver for investment in bulk water storage infrastructure. All dams provide a limited mitigating effect on floods. However, only a small number of Queensland dams (such as Wivenhoe and Somerset dams in South East Queensland and Peter Faust Dam in the Whitsunday region) have been specifically designed to provide flood mitigation in addition to providing water supplies.

Following the flooding events of 2011, the Queensland Floods Commission of Inquiry recommendations support increasing flood mitigation capacity, particularly in the heavily populated south-east corner. These included reviewing operating strategies, increasing flood mitigation capacities of existing storages, and building new storages. Flood mitigation solutions may include development of specific infrastructure, such as dedicated flood mitigation compartments in dams, stormwater detention basins, or levees, and non-infrastructure solutions like changes to operational practices and investment in community resilience to flooding events.

Increasing the flood mitigation capacity of existing storages to better protect downstream properties, communities and major population centres is often not possible without affecting water supply security, unless major works are considered. It is often necessary to

strike a balance between acceptable levels of flood mitigation and the provision of appropriate water supply security.

Recent reviews of this balance occurred in a number of Queensland communities. For example, following the 2015 flood event in the Callide Valley, DNRME, Sunwater (the Callide Dam owner) and Banana Shire Council engaged with the local community to assess whether the dam could be operated differently to maintain water supply security while assuring more effective flood mitigation. In south east Queensland, Seqwater implemented findings from the Wivenhoe and Somerset Dams Optimisation Study (which investigated alternative strategies for operating those dams during floods) to achieve a more appropriate balance between flood mitigation and water supply security.

It should be noted that traditional project assessment techniques are difficult to apply to flood mitigation proposals. This type of infrastructure can have a significant gap between commercial and economic viability due to the broad economic benefits to multiple residents and businesses, with a limited ability to recover specific costs related to flood mitigation from these beneficiaries.

In June 2019 the Office of the Inspector-General Emergency Management provided a review of disaster response during the monsoon event in Far North Queensland. During this event, Townsville experienced an extreme flood event that resulted in extensive flooding. The review found that the performance of Ross River Dam (approximately 20km upstream of the city) demonstrated effective dam safety regulation, responsible and diligent dam owners and effective communications between agencies during this extreme event. Lessons learned from this event are being incorporated into our methodologies as part of continual improvement to dam management across Queensland.

5.2 Planning for an uncertain climate

Ensuring water resources are reliably available is part of the Queensland Government's top priority for the managing the State's bulk water supplies. Queensland is a vast state with great variations in climate—from the temperate south to the tropical north and the arid west. Queensland also experiences high-impact extreme weather events, such as heatwaves, droughts, floods, tropical cyclones, bushfires and severe storms. Increased climate variability as a result of climate change will have an increasing influence on water security and availability from existing and potential bulk water supply sources.

The majority of modelling results for Queensland, including Bureau of Meteorology (BoM) and Commonwealth Scientific and Industrial Research Organisation (CSIRO) studies indicate Queensland's future climate will have:

- higher temperatures, with hotter and more frequent hot days,
- fewer frosts
- less frequent but more intense cyclones in the north
- drier winters and more intense summer downpours across the state
- reduced rainfall in the south-east
- more time in drought in the south and west.

Less surface water is likely to be available for both the environment and water supply infrastructure, but with increased rainfall intensity there may also be more flooding events.

At the same time, climate change is expected to lead to an increase in water demand and changing demand patterns. With these changes expected to occur over the medium to long term, it is imperative that water security planners consider and manage the risks of climate variability and climate change. There will need to be sufficient flexibility in planning to accommodate and adapt to changing climate trends as they are established by ever-improving science.

Queensland Strategy for Disaster Resilience

The Queensland Reconstruction Authority (QRA) developed the **Queensland Strategy for Disaster Resilience** (2017) on behalf of the Queensland Government. This strategy is the guiding instrument to realise the state's vision to make Queensland the most disaster resilient state in Australia. The strategy incorporates climate change risk and deliver a comprehensive, all-hazards approach to building disaster resilience throughout Queensland. It provides an overarching framework to empower Queenslanders to factor in resilience measures and activities as they anticipate, respond and adapt to changing circumstances. To deliver the Strategy, QRA developed **Resilient Queensland 2018-2021** – a detailed blueprint for use across government, the community, non-for-profit sector, business and industry, to ensure outcomes are delivered against the objectives of the Queensland Strategy for Disaster Resilience.

Queensland Climate Adaptation Strategy

In 2017, the Queensland Government released the Queensland Climate Adaptation Strategy (Q-CAS), a framework to support an innovative and resilient Queensland that manages the risks and harnesses the opportunities of a changing climate. The Q-CAS is centred on a partnership approach that recognises that climate change is everyone's responsibility, and that a collaborative approach is needed to ensure resilience is embedded in Queensland's diverse economies, landscapes and communities.

Supporting Q-CAS are **Sector Adaptation Plans** that help to prioritise climate change adaptation activities across key sectors of the community. The plans are being developed in consultation with stakeholders to reflect the needs and priorities of each sector. They identify emerging opportunities, share knowledge and encourage collaboration.

Planning for climate change

Amendments to the *Water Act 2000* in 2018 now require the effects of climate change on water availability to be considered at all phases of the water planning process. Consideration must also be given to the effect of climate change on water use practices and the risk to land and water resources arising from water use.

The water planning framework under the *Water Act 2000* is a key adaptation tool to manage the effects of climate change on water resources. Climate variability and climate change forms part of the technical assessment process that supports water planning, but how this science informs water planning policy has not always been transparent in the past. The new requirements will inform the development of future water plans and influence the design of implementation instruments, so that strategies are adaptive to the prevailing climate conditions.

DAF plays an important role in helping primary producers manage their business through a range of services, including financial assistance, livestock nutrition and animal welfare information, and business-management strategies. More discussion on drought management is provided in *Chapter 5.2*.

DNRME and local governments partnering through the Regional Water Supply Security Assessment (RWSSA) program assess the performance of the bulk water supply in meeting forecast urban demands, with consideration of a broad range of climate scenarios. There is a drive to better understand and reflect how climate change may affect rainfall and weather patterns. As the science around climate impacts becomes more certain, new information will be factored into RWSSAs. This will improve the quality of water security assessments and the accompanying planning and investment decision-making.

Sunwater's Regional Blueprint is a long-term plan to maximise assets and water availability. The first stage of Sunwater Regional Blueprint: Existing Braintrust, identified climate change as a key global trend that will impact Sunwater, its customers and the communities in the regions Sunwater serves. Sunwater commenced the Regional Blueprint Stage 2: Exploring Possible Futures, to analyse long term risks and opportunities on a regional basis, including those related to climate change.

Designing and adapting infrastructure

Climate-adapted and disaster-resilient infrastructure can be more cost-effective in the long term, as it reduces the need for modifications, repairs or relocation due to environmental impacts. Accordingly, it is important to consider the effects of climate change when designing new infrastructure and adapting existing infrastructure.

The Queensland Government recognises climate change as a challenge in its SIP, which highlights the need for adaptation, in particular to build resilience in its infrastructure networks, and ensuring the safety, reliability and connectivity of these networks are maximised during extreme events. The SIP, through the Building Queensland project assessment process, also requires a sustainability assessment for government projects greater than \$100 million in value across design, construction and operation, and recommends assessments for projects worth less than \$100 million.

Existing bulk water infrastructure is susceptible to the impacts of climate change. As discussed, climate change may reduce the performance of bulk water supply infrastructure, including reduced water supply yields and water quality. In addition, infrastructure can be affected directly by extreme weather events such as droughts, floods, storms and cyclones. The risk of damage to infrastructure escalates as it is exposed to increasingly extreme climate-related events (natural disasters). Adaptation strategies for infrastructure can include:

- adjusting the capacity of infrastructure elements
- undertaking modifications
- retrofitting or replacing infrastructure components
- delaying action until new information is available
- relying on insurance to cover damage.

Responsive management includes selecting among these strategies to achieve the best possible outcomes.

5.3 Diversifying supply

Diversifying supply contributes to efficient use of the State's water resources. In Australia, water for urban, agricultural and industrial use has traditionally been sourced from surface and groundwater resources using infrastructure, including dams, weirs and bores. Developing and accessing alternative water supplies will increase diversity, increase resilience and improve the overall security of supply for both non-drinking and drinking purposes. These alternative supplies include municipal and industrial waste water recycling, desalination, coal seam gas water, rain water and storm water.

As our population grows and our climate future becomes more uncertain, a push towards diversification of water supplies, with an increased proportion of climate resilient water may become necessary. The 2019 QBWOS Part B includes discussion of harnessing technologies to support urban water security. This is a long-term, intricate challenge that requires some difficult choices. It is also complicated by the lack of supply options in urban areas. The role of demand management initiatives will also become more significant. Best practice water supply planning must take into account the technical, environmental, social and economic impacts and benefits of potential water supply sources. The focus will always be on sustainably providing safe, reliable and affordable water supplies that are fit for purpose and support long-term economic benefits for our state.

Recycled water

Recycled water is generated from sewage, greywater or storm water systems that is treated to a standard appropriate for its intended use. In Queensland, recycled water that is produced from sewage, effluent or wastewater from municipal, industrial, commercial, manufacturing or animal husbandry activities is regulated under the *Water Supply (Safety and Reliability) Act 2008*. Indirect reuse of recycled water to augment raw water supplies upstream of a water treatment plant is permitted in Queensland. However, direct reuse by injection of recycled water into the drinking water system is not permissible. An approved Recycled Water Management Plan is required for all high exposure uses (such as indirect reuse, supply to premises and the irrigation of minimally processed food crops) and some prescribed low exposure uses of recycled water.

Desalination

Desalination is a process for removing salt and other minerals from seawater or brackish water (surface or groundwater), to produce high quality water for drinking and other uses. There are two main desalination methods— distillation and reverse osmosis. All desalination processes require energy input, with energy recovery techniques used to improve the efficiency of the process. The waste brine stream containing the salt may be discharged back into the environment (e.g. by ocean outfall or blending with freshwater) or the salt may be recovered as a by-product of the process (e.g. using evaporation ponds). In Queensland, desalination plants are used to provide water in a range of scenarios including at large scale at Tugun near the Gold Coast (133 ML per day) – or at remote locations with saline groundwater such as island resorts and indigenous communities, and rural communities. The regional deployment of portable desalination plants can augment supplies where source water quality is not initially fit-for-purpose. In inland areas, where there limited amounts of receiving water available to dilute the brine discharge, other arrangements may need to be considered for brine disposal.

Coal seam gas water

Coal seam gas (CSG) is natural gas (predominately methane) trapped in underground coal seams by water and ground pressure. To produce CSG, wells are drilled into underground coal seams, releasing the gas brings water (CSG water) from the seams to the surface. The management of CSG water is heavily regulated through a range of regulations including the *Petroleum and Gas (Production and Safety) Act 2004*, the *Water Act 2000* and the *Environmental Protection Act 1994*.

Beneficial reuse of CSG water in a way that protects the environment and maximises its productive use is strongly encouraged. Over the proposed life of all current CSG projects, an estimated 1 700 000 ML of water will be produced. The quality of CSG water varies greatly, however it is generally rich in salts and other minerals, requiring some degree of desalination or treatment to make it usable. For associated water to be used for beneficial purposes it must meet strict conditions regarding water quality including pH and salinity levels. In 2019, the GasFields Commission Queensland reported that around 145 000 ML of treated water produced during CSG production has been beneficially used by agriculture, industry, and aquifer reinjection over 2015-18.

5.4 Strategic regions

Great Barrier Reef

To advance Queensland, a key priority of the Government is to protect the Great Barrier Reef's economic, social and iconic value as a global asset is estimated at \$56 billion. It supports 64 000 jobs and contributes \$6.4 billion annually to the Australian economy. However, the Reef is facing a number of challenges. The *Great Barrier Reef Outlook Report 2019* states that the highest risks to the health and resilience of the Reef are: climate change (i.e. stronger storms, flooding, thermal stress), coastal development including land-based soil run-off and direct human use (e.g. illegal fishing, shipping). Risks considered low at the scale of the whole Reef can still have local impacts.

Bulk water infrastructure, such as large dams, can have a direct impact on water quality downstream by altering the natural volumes of water flowing into a watercourse, in-stream flow velocities, the chemical composition of the flow, as well as creating physical barriers to the passage of fish and other fauna — all of which have impacts on species health and water quality.

The development of new water storages can also lead to land-use changes. Bulk water supply for irrigation is associated with potential environmental risks such as irrigation salinity or nutrient run-off into waterways or other sensitive coastal environments. The main source of excess nutrients, fine sediments and pesticides from Reef catchments is diffuse source pollution from agriculture and grazing. Activities that benefit from bulk water supply, such as irrigation, are a direct cause of land-based run-off of nutrients and sediment.

An updated *Reef 2050 Plan* was released by the Australian and Queensland governments in July 2018 and is the overarching framework for protecting and managing the Great Barrier Reef until 2050. In light of the mass coral bleaching of 2016 and 2017 and the deteriorating outlook, the Great Barrier Reef Ministerial Forum brought forward the scheduled mid-term review of the plan to ensure it addresses current pressures and remains effective. The updated plan sets clear actions, targets, objectives and outcomes to drive and guide the short, medium and long-term management of the Reef, responds to the pressures facing the Reef, and will address cumulative impacts and increase the Reef's resilience to longer term threats such as climate change.

Improving water quality is a major theme under the plan, supported by the *Reef 2050 Water Quality Improvement Plan 2017-22*, which addresses all land-based sources of water pollution including run-off from urban, industrial, agricultural and public lands adjacent to the Reef. The Queensland and Australian governments committed to new water quality targets at the catchment, region and whole-of-Reef scale. Targets are based on the quality of water that corals and seagrass need to be healthy, and support better prioritisation of on-ground management and investment. Whole-of-Reef targets include reducing anthropogenic end-of-catchment loads for dissolved inorganic nitrogen by 60% by 2025, and fine sediment by 25% by 2025. More detail, and the **2018 Reef report card** is available online.

The Queensland Reef Water Quality Program (QRWQP) is the Queensland Government's five year program of actions (until 2022) to improve the quality of waters flowing to the reef. The Queensland Government's focus has been on working with farmers to improve the quality of water in the Reef by improving land management in Reef catchments.

QRWQP is supported by a five year investment plan of more than \$261 million to accelerate progress towards water targets, achieve minimum standards of practice across all land uses, encourage a culture of innovation and stewardship, and restore catchments. These actions are supported by programs to fill science and knowledge gaps, develop decision support tools, and monitor, evaluate and report on progress towards water quality targets.

The Environmental Protection (Great Barrier Reef Protection Measures) and Other Legislation Amendment Bill to strengthen existing Reef protection regulations was passed on 19 September 2019 with the new laws proposed to come into effect on 1 December 2019. The regulations set minimum practice agricultural standards for all sugarcane, beef cattle grazing, banana, grains and horticulture production in five of the six Reef regions - the Wet Tropics, Burdekin, MackayWhitsunday, Fitzroy and Burnett-Mary.

To protect the gains already made to Reef water quality, all new and expanded cropping and horticulture activities on more than five hectares without a cropping history will be required to have an Environmental Authority (permit) within six months of the new laws commencing. This will require the activity be set up to meet farm design standards which will include standards on irrigation practices. They will also

need to comply with any minimum practice agricultural standards for the commodity.

Over and above the standard environmental approvals required for new bulk water infrastructure, proponents seeking to expand existing infrastructure or develop new bulk water infrastructure will need to take into account policies and regulations to meet the Great Barrier Reef water quality targets. This will include nine of the fifteen Queensland proposals being assessed under the NWIDF, as they are based in catchments with inflows into the Reef.

Murray–Darling river system

The Murray–Darling Basin (MDB) is a large, complex, diverse and dynamic system that is home to about two million people, including more than 40 Indigenous nations. It generates 40% of Australia’s agricultural production, about one third of which is irrigated.

Its water resources are relied upon and enjoyed by its inhabitants and also many more who live outside of the MDB. It contains both highly developed and natural rivers, floodplains and extensive groundwater resources, many of which are also heavily developed. These systems provide home and habitat to millions of fish, birds and other animals, many of them protected under Australian legislation and international agreements.

In 2012, the Australian Government, in consultation with relevant states, developed the *Basin Plan 2012 (Cth)* (Basin Plan) to achieve long-term sustainability for industries, communities and the environment of the MDB. The Basin Plan shares water among all users, including the environment, in a sustainable way, and is integrated across state boundaries. Implementing the Basin Plan and associated water reforms is a long-term investment to which the Australian Government and Basin States are committed.

The Australian Government has put more than \$13 billion towards implementation, including \$10 billion to recover water to meet sustainable diversion limits. A sound and consistently applied approach to compliance and enforcement across the Basin from the development and implementation of Basin Plan-compliant water resource plans (WRPs) through to compliance by individuals with their water entitlements is essential to achieving Basin Plan outcomes.

The **Murray–Darling Basin Compliance Compact** (MDBCC) is a collaborative, joint commitment by the Australian Government and Basin States. It aims to restore public confidence in water resource management in the MDB by providing transparency and accountability of surface and groundwater management and regulation, and a consistent approach to compliance and enforcement practices by governments across the MDB.

The MDBCC sets priorities for action, and commits the Australian Government and Basin States (the Parties) to work plans that will be reported on regularly and publicly. Continuous improvement will be central to the management of water resources in the MDB.

To stimulate economic activity in areas of the MDB that are affected by water reductions under the Murray–Darling Basin Plan (MDBP), the Murray–Darling Basin Co-investment Funding Scheme provides direct financial support to eligible farm and post-farmgate businesses to develop new high-value horticultural value chains in the Queensland Murray–Darling Basin (QMDB) region. The scheme is part of the Queensland Government’s High Value Horticulture Value Chains for the QMDB project and is funded by the Australian Government’s Murray–Darling Basin Regional Economic Diversification Program (MDBREDP). The project addresses the barriers and the support needed to develop new and expanded high-value horticulture value chains in the Balonne and Border Rivers district, including to assess crop suitability and develop markets.

DNRME’s Rural Water Management Plan (RWMP) was established, in part, to contribute to meeting our Murray–Darling Basin commitments, as a signatory to the Murray–Darling Basin Compliance Compact. The RWMP is bringing a renewed focus on water measurement and compliance to rural water management in Queensland. The initiatives advanced under the RWMP will deliver more transparent, sustainable and equitable rural water management systems.

Burdekin Delta

The raising of Burdekin Falls Dam is the Queensland Government's priority for further assessment as a potential means to augment and increase water supply in the Burdekin and surrounding regions. Sunwater is leading the State's planning and assessment for this proposal. Sunwater's work has concluded that there is a sufficient level of interest and forecast future demand from agricultural, urban and industrial users to warrant further investigation of a potential raising of Burdekin Falls Dam.

Burdekin Falls Dam is currently Queensland's largest water supply dam. The dam forms Lake Dalrymple with a storage capacity of 1 860 000 ML (more than three times the capacity of Sydney Harbour). The dam operates in conjunction with other storage weirs and a series of channels and pipelines to form the Burdekin Haughton Water Supply Scheme (BHWSS), which is owned and managed by Sunwater. The BHWSS has 1 080 000 ML of water entitlements associated with it, of which 990 000 ML are committed to customers, supporting a diverse mix of irrigated agriculture, grazing, mining, industry and urban population centres, including Townsville and Thuringowa.

A portion of the water released from the BHWSS is directed to the Lower Burdekin Water Authority area to supplement groundwater supplies by recharging the Burdekin delta aquifer, which has an estimated storage capacity of 1 230 000 ML. With the potential for double-cropping of many field crops, and the highest yields and sugar content for cane in Australia, there has been growing demand for water allocations in this region.

The *Water Plan (Burdekin Basin) 2007* identifies a strategic reserve of 150 000 ML of water is available from the catchment, but additional infrastructure would be required to access it. However, there are risks in the Lower Burdekin such as rising groundwater soil salinity and additional run-off of nutrients and pesticides to sensitive downstream environments (such as the Great Barrier Reef and the nearby RAMSAR-listed wetlands), that must be managed before further allocations are made available. DNRME has been progressing development of the Lower Burdekin Groundwater Strategy, to manage water-related risks to the economic productivity of the region.

Sunwater and the DSDMIP have completed studies to forecast future potential demand. Sunwater completed the preliminary business case to further investigate

long-term water supply requirements and options for raising Burdekin Falls Dam. Subsequently, Sunwater commenced the Building Queensland led Detailed Business Case. At the same time, there are feasibility assessments underway for new dams at Hells Gate (upstream on the Burdekin River) and Urannah being undertaken by local organisations with an interest in water supply issues in the region.

Any assessment of regional water supplies requires particular consideration of the water security needs of the Townsville community. The Townsville Water Security Taskforce has made recommendations to three levels of government to implement a suite of infrastructure and non-infrastructure solutions including enhancing Townsville's capacity to access water supplies from the Burdekin River when needed. The Queensland Government has committed \$225 million to invest in water security measures for Townsville.

In addition to the regular maintenance program, Sunwater is also implementing phased improvements works to enable the Burdekin Falls Dam to continue to perform safely into the future. Initial improvement works to Burdekin Falls Dam's foundation drainage systems were completed in 2017 and planning for next stage improvements to the main dam and saddle dams is progressing. Development of a detailed business case for the next stage improvements has commenced (mid 2019) for planned approval by early 2021, with construction expected to start in 2022, with the facility to accommodate a possible future raising of the dam.

As well as water supply, the Queensland Government is committed to investigating the potential to develop hydroelectricity generation capacity at Burdekin Falls Dam. The government has set aside \$100 million to invest in a renewable energy scheme if it proves feasible. Building on the pre-feasibility study completed in 2017, Stanwell and Building Queensland are developing a detailed business case to determine the most appropriate location, size and form of power generation. The business case will consider the potential for hydro generation if the dam is raised and storage capacity is increased.

Given the scope and complexity of projects currently under consideration around the Burdekin River, there are some significant risks but also great opportunities. The timing of project investigations is important, with real potential for significant cost savings and efficiencies if certain projects are progressed at or around the same time. To ensure the Queensland

Government is best positioned to take advantage of the benefits that could be realised from these projects, the asset owners, customers, stakeholders and state agencies are working collaboratively to mitigate and manage the risks and maximise the benefits to the community.

Far North Queensland

In 2018 CSIRO completed an investigation of opportunities for water resource development in key catchments in northern Australia—the Northern Australia Water Resource Assessment. The assessment evaluated soil and water resources (both surface and groundwater), identified and evaluated water capture and storage options.

The CSIRO assessment found that while local groundwater opportunities are small and localised, surface water in the Mitchell catchment could potentially support 140 000ha of year-round irrigated agricultural development, such as sugarcane, based on four hypothetical large instream dams that could release 2 800 000 ML/a for agriculture in 85% of years. Alternately, offstream water harvesting could extract 2 000 000 ML/a with 85% reliability, which would be sufficient to irrigate 200 000ha of a single dry-season crop such as cotton.

It is important to note that the CSIRO assessment is fundamentally a hydrological assessment of potential water availability that takes into account development opportunities in a context of the area of land suitable for cropping or aquaculture. This was estimated by considering the set of relevant soil and landscape biophysical attributes at each location and determining the most limiting attribute among them.

While noting that the regulatory and policy environment relevant to water-related development was considered in the assessment, the results reported by CSIRO as development opportunities are not fully reflective of the existing regulatory and policy environment, nor constrained by the inevitable logistical or market challenges of commercially viable infrastructure, including the willingness of irrigators to pay for water infrastructure or the water resource itself. CSIRO, in Chapter 4 (Opportunities for agriculture and aquaculture), reports 'It does not include water availability, cyclone or flood risk, legislative, regulatory, ecological, social or economic drivers that will inevitably constrain the actual area of land that is developed'.

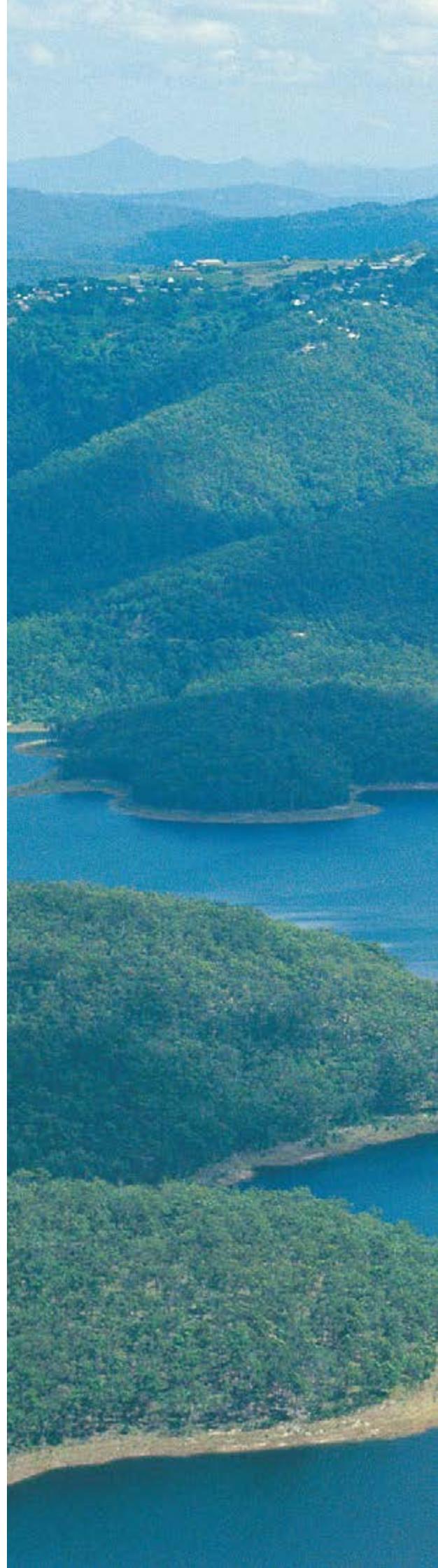
CSIRO also note that if irrigated opportunities were pursued to their fullest extent, the impacts on ecological function are not confined to the direct development footprint and would warrant attention, especially immediately downstream of development and in drier years. For more information, please refer to CSIRO's **Mitchell catchment summary**.

Despite these 'real world' limitations, opportunities for developing Northern Australia do exist and will continue to be investigated by interested sectors. No projects associated with infrastructure development in the Mitchell catchment were successful in gaining Australian Government support in either the feasibility or capital funding rounds of the NWIDF. This is a notable comment on existing interest in the viability of commercial development of the Mitchell catchment at this time, given that the NWIDF itself is an initiative of the Agricultural Competitiveness White Paper, and Our North, Our Future: White Paper on Developing Northern Australia.

6. QBWOS next steps

The Queensland Government has invested heavily in bulk water supply infrastructure over many years. Much of this infrastructure is part of water supply systems that are supporting prosperous Queensland regions. New water infrastructure can bring growth opportunities and attract investment into communities. However, it also requires significant capital and ongoing expenditure.

The QBWOS reinforces the importance of prioritising development of new infrastructure along with options to maximise the benefits of existing infrastructure and managing the costs of continuing to keep dams safe for the future. Key initiatives for 2020 and beyond include the Bulk Water Prioritisation Project infrastructure assessments, a focus on the further enhancement of our water markets and trading regimes (Water Markets and Trading Optimisation Project), and information provision and systems.





Hinze Dam

7. Guide to data and terms

7.1 Acronyms

Table 2: Acronyms

Acronym	Meaning
BCDF	Business Case Development Framework
COAG	Council of Australian Governments
CSG	Coal Seam Gas
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DAF	Department of Agriculture and Fisheries
DES	Department of Environment and Science
DLGRMA	Department of Local Government, Racing and Multicultural Affairs
DNRME	Department of Natural Resources, Mines and Energy
DOL	Distribution Operations Licence
DPC	Department of Premier and Cabinet
DSDMIP	Department of State Development, Manufacturing, Infrastructure and Planning
GAB	Great Artesian Basin
GABORA	Great Artesian Basin and Other Regional Aquifers
GABSI	Great Artesian Basin Sustainability Initiative
GAWB	Gladstone Area Water Board
GL	Gigalitres (1 000 000 000 Litres)
GBRMPA	Great Barrier Reef Marine Park Authority
ICCIP	Indigenous Councils Critical Infrastructure Program
IGABIIP	Interim Great Artesian Basin Infrastructure Investment Program
IGABDR	Improving Great Artesian Basin Drought Resilience
IROL	Interim Resource Operations Licence
LGGSP	Local Government Grants and Subsidies Program
MDB	Murray–Darling Basin
MDBCC	Murray–Darling Basin Compliance Compact
MIWB	Mount Isa Water Board
ML	Megalitres (1 000 000 Litres)
NAWRA	Northern Australia Water Resource Assessment
NDA	National Drought Agreement
NQWIA	North Queensland Water Infrastructure Agency
NWI	National Water Initiative

Acronym	Meaning
NWIDF	National Water Infrastructure Development Fund
PAF	Project Assessment Framework
QBWOS	Queensland Bulk Water Opportunities Statement
Q-CAS	Queensland Climate Adaptation Strategy
QRWQP	Queensland Reef Water Quality Project
QT	Queensland Treasury
ROL	Resource Operations Licence
RWMP	Rural Water Management Program
RWSSA	Regional Water Supply Security Assessments
RWSSE	Regional Water Supply Security Evaluation
RWSSS	Regional Water Supply Security Statements
SIP	State Infrastructure Plan
W4Q	Works for Queensland Program

7.2 Glossary

Table 3: Glossary of terms

Term	Meaning
Water related terms	
Bulk water	Raw water that is supplied from a bulk water supply system, in accordance with a water entitlement, either directly to an end-user customer or to a customer that provides treatment services and/or distribution services to end-user customers.
Bulk water entity	Bulk water providers generally provide water to local councils as the source of their drinking water supplies. On behalf of the Minister for Natural Resources, Mines and Energy, DNRME oversees Queensland's four bulk water entities: Seqwater, Sunwater, GAWB and MIWB. The Border Rivers Commission is also responsible to the Minister for managing the Border Rivers.
Bulk water supply system	Bulk water supply systems vary significantly across Queensland, but essentially comprise the natural environment (waterways and aquifers) and any associated infrastructure (from dams to offtakes) that enables that water to be distributed to retail water service providers and other customers that access the bulk supply directly. It may be contrasted with 'retail' aspects of water service provision (see 'water service', below).
Committed water	Water entitlements that have been sold or traded to a customer for the customer's use.
Level of Service	Bulk water level of service (LOS) objectives are a water service provider's targets for long-term water supply security and commonly include statements about how much water the water supply system will typically be able to supply, and the frequency, severity and duration with which water restrictions to manage supply shortfall might occur.
Priority group	Water entitlements have a reliability, defined by the relevant water plan (in terms of access conditions for water licences and unsupplemented water entitlements), given consideration of water security objectives and environmental flow objectives.
Supplemented water	Supplemented water means water supplied under an interim resource operations licence (IROL), resource operations licence (ROL) or other authority to operate water infrastructure.
Unallocated water / water reserve	Water allocations set aside in a water plan for future use or to facilitate construction of storage. Types of reservation reflect their intended purpose, and include general, strategic, town water supply or state reserve, Indigenous reserve, and strategic infrastructure reserve (water that may be granted to facilitate the development of particular water infrastructure projects).
Uncommitted water	Water entitlements that have not been committed. These entitlements are usually available for lease, sale or contract subject to transportation infrastructure constraints.
Unsupplemented water	Water that is not supplemented water.
Volumetric limit	For a water licence, means the maximum volume of water, in megalitres, that may be taken under the licence during a water year.
Water allocation	A water allocation is an entitlement created under the <i>Water Act 2000</i> . Water allocations are assets that are separate to land and may be owned and traded by non-landholders. The DNRME Water Allocation Register records ownership information on water allocations in a similar way to which details of land ownership are recorded in the Freehold Land Registry.
Water entitlement	A 'catch-all' term that is inclusive of supplemented and unsupplemented water allocations and supplemented and unsupplemented water licences.
Water licence	A water licence is an authority granted under the <i>Water Act 2000</i> to take water, interfere with water, or both interfere with and take water where these two activities are inextricably linked.
Water service	Under the <i>Water Supply (Safety and Reliability) Act 2008</i> , a water service includes: water harvesting or collection, such as dams, weirs, bores and direct extraction from watercourses, the transmission of water, the reticulation of water, and drainage infrastructure other than for stormwater drainage, water treatment and recycling.

Term	Meaning
Water related terms	
Water service provider	An entity registered as a service provider for a water service. In Queensland, water service providers include: drinking water service providers (primarily local governments), recycled water providers (who are not required to register as a service provider unless they also provide another water or sewerage service), and bulk water service providers and water authorities.
Water supply scheme	Combinations of dams, weirs, pipelines, channels and other storage or transport infrastructure, operated conjunctively in a water plan area in accordance with a DOL, ROL or IROL.
Water storage capacity (of dam or weir)	The volume of water authorised to be stored in a dam or weir, excluding the volume of any dedicated flood storage compartment for those dams that have it and excluding volume associated with fabridams no longer in service. Does not include consideration of temporary changes to full supply levels of dams for risk management or in preparation for extreme weather. Storage capacity is no indication of system yield.
Economic and financial terms	
Commercially viable	Projects demonstrated to achieve a commercial rate of return on invested funds.
Economically viable	There is a net economic benefit, that is, the economic benefits outweigh the economic costs following economic analysis (an economic analysis is a comprehensive analysis of all the costs and benefits associated with each proposed project option, including financial, environmental and social matters (typically employing cost–benefit analysis) with the objective determining the most economic use of resources).
Financial analysis	A financial analysis, conducted on a cash basis, determines whether projected revenues will be sufficient to cover costs, including an appropriate return on the capital invested.
Regional economic development	This is considered to include economic development that occurs in, or impacts on, metropolitan areas, regional urban centres, and rural and remote communities.
Infrastructure related terms	
Feasibility assessment	An analysis and evaluation of a proposed project to determine if it is feasible, with consideration of financial, commercial, legal, regulatory, technical, environmental and social impacts, project demand and practicality of the proposal.
Project proponent	An individual, group or organisation that submits or proposes a project for review and acceptance.



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