Mackay, Isaac, Whitsunday Regional Water Strategy

GW3D
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WATER RESOURCES

Contents

Tables

Figures

Abbreviations

ABARES	Australian Bureau of Agricultural and Resource Economics and Sciences
ABS	Australian Bureau of Statistics
ADA	Aquaculture Development Area
AHD	Australian Height Datum
AMTD	adopted middle thread distance
ANCOLD	Australian National Committee on Large Dams
APLNG	Australian Pacific Liquified Natural Gas
ATAP	Australian Transport Assessment and Planning
BCR	benefit cost ratio
BMA	Billiton Mitsubishi Alliance
BOM	Bureau of Meteorology
CAPEX	capital expenditure
CBA	cost benefit analysis
CEO	chief executive officer
CHPP	coal handling preparation plants
CSG	coal seam gas
CSO	community service obligation
DAF	Department of Agriculture and Fisheries
DAWE	Department of Agriculture, Water and the Environment
DES	Department of Environment and Science
DISER	Department of Industry, Science, Energy and Resources
DNRME	Department of Natural Resources, Mines and Energy
DSDILGP	Department of State Development, Infrastructure, Local Government and Planning
EA	Environmental Authority
EIS	environmental impact statement
EL	elevated level
EP	equivalent persons
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
ERA	Environmental relevant activity
FSL	full supply level
Ha	hectare

HP	high priority
IAAF	Infrastructure Australia Assessment Framework
km	kilometres
LGA	local government area
LNG	liquified natural gas
ML	megalitre
m	metres
mm	millimetres
MNES	Matters of National Environmental Significance
MP	medium priority
NA	not applicable
NPV	net present value
NRM	natural resource management
NWI	National Water Initiative
NWIDF	National Water Infrastructure Development Fund
OPEX	operational expenditure
QBWOS	Queensland Bulk Water Opportunities Statement
RDMW	Regional Development, Manufacturing and Water
SDA	State Development Area
SIP	State Infrastructure Plan
TIQ	Trade and Investment Queensland
WTP	willingness to pay

MIW Regional Water Strategy

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The MIW Regional Water Strategy is designed to:

1. Realise regional economic, social and environmental resilience (including in the face of change)

2. Support diversity and expansion of industry across the region (including diversity within agriculture)

3. Ensure value adding opportunities are explored and enabled

4. Achieve strategic market-focussed collaboration between industry and all levels of government to ensure that:
a. Existing water resources are better utilised sustainably
b. New bulk water infrastructure project assessments and investments are coordinated
c. Policy and regulatory settings enable and support existing and new industries

5. Ensure export opportunities are diversified and realised

6. Achieve long-term water security and flexibility for all water users

Removing barriers and supporting economic development across the MIW region

Region-wide coordinated agricultural expansion

Region-wide agricultural expansion can be achieved through market driven land use change. This requires information sharing and co-ordination between industry, government and bulk water suppliers.

Actions package

- Coordinate agricultural product market intelligence and regional productive capacity to inform water development and realise export opportunities
- To incentivise investment, create a 'one stop shop' information hub to market Queensland's water products and agricultural land suitability
- Incentivise agricultural investment through attraction tours and marketing
- Communicate to stakeholders, via regular updates, the status of bulk water infrastructure developments that could service the region
- Evidence based changes to local zoning precincts to incentivise agricultural expansion

Sustainable, investment friendly regulation

Duplicative (Commonwealth and State) and output-focused approaches to meeting environmental regulations can prohibit investment. Conversely, outcome-focused approaches to meeting environmental regulation incentivises innovation and sustainable investment.

Actions package

- Work with government and industry to leverage existing regulations and policy to manage water quality through market and outcome-based mechanisms (e.g. bubble licences)
- Leverage regulatory instruments that allow for the beneficial re-use of mine affected water
- Minimise duplication of State and Federal regulation, particularly for bulk water infrastructure developments

Market the region's sustainability credentials to encourage investment

The MIW regions ability to demonstrate sustainable industry and supply chains will continue to support an attractive operating environment for global companies looking to market their environmental credentials.

Actions package

- Develop an authenticated data sharing platform to consistently report social value created by mining, agriculture and aquaculture in the region
- Market, including to international consumers and investors, social and environmental value and credentials created by mining and agriculture in the region
- Advocate for consistent, nationally accepted guidance to value economic, social and environmental costs and benefits of water in different uses

Support the MIW region's existing irrigated cropping

The MIW region's irrigated broadacre cropping and sugar industry is in a period of transition. Support in the short term can help MIW broadacre farmers to realise opportunities to increase farm gate margins in the long term (i.e. Biofutures).

Actions package

- Partner with MIW growers to investigate farm gate margins and how margins change under irrigation scenarios with a view to encouraging irrigation
- Investigate the appropriateness of existing capacity building and extension activities to improve farm gate margins
- Develop new capacity building, extension and succession planning mechanisms to improve farm gate margins
- With appropriate review mechanisms, support a concession on water and energy prices for broadacre growers
- Through coordinated agricultural expansion, support transitions to higher value enterprises (i.e. Biofutures and horticulture)
- Investigate opportunities to reduce water and energy costs with renewable micro grids

Supplying water at the right time and scale to meet new demand

Growing the Bowen Food Bowl

More water to support more high value irrigated cropping near Bowen and industrial activities at the Abbot Point SDA.

Water could be supplied via:

- A pipeline from Peter Faust Dam to the Bowen area with conversion of existing water from Medium Priority to High Priority
- A new pipeline from the Elliot Main Channel to the Bowen area
- Water from Urannah Dam via pipeline to Peter Faust and then onto the Bowen area
- Undertake detailed investigations and a formal business case to determine the optimal solution

A Collinsville agricultural precinct that can meet regional needs

With supplemented water, Collinsville has 9,500 hectares of high-quality cropping land that could support high value irrigated cropping and new agricultural jobs.

- Urannah Dam is capable of supplying water that could underpin high value irrigated cropping near Collinsville, support renewable energy production and, with new water transport infrastructure, meet water needs elsewhere in the MIW region

A world class aquaculture industry

With additional water, the regions aquaculture production could double over ten years. The aquaculture industry has no end of life, is employment-intensive and could exist indefinitely.

Actions package

- Work with government and the aquaculture industry to leverage existing regulations and policy to manage water quality through market and outcome-based mechanisms (e.g. bubble licences)
- Investigate options to ensure aquaculture facilities with known expansion plans can access cost-effective water
- Promote the regions existing Aquaculture Development Areas to prospective investors

The Isaac resources hub

More water will enable expanded coal production and urban water security in the Isaac region.

Actions package

- Investigate infrastructure solutions, supply and demand, regulatory and market mechanisms to allow the regions mines to recycle, trade and sustainably reuse mine affected water
- Undertake detailed investigations and a formal business case to determine the optimal pipeline solution to supply water to miners and urban users in the Bowen Basin
- Explore alternative financing mechanisms for pipelines that supply commercial mining
- Explore the feasibility of a community service obligation to reduce Isaac Regional Council's water costs

MIW Region Water Demand

Aquaculture development area

Operating coal mine[1]

Irrigated agriculture and plantations

Agricultural Land Use[2]

Class A (crop land)

Class B (limited crop land)

High priority demand (ML)

85000
40000
10000
2000

Abbot Bay/Good Fortune Bay Fisheries

Service need 1

Abbot Point
3,000ML

Bowen
17,000ML

Service need 3

Proserpine
10,000ML

Peter Faust Dam

Blue Valley Weir

Gorge Weir

Burdekin Falls Dam

Service need 2

Collinsville
70,000ML

Bowen River Weir

Bloomsbury

Burdekin Moranbah Pipeline

Marian Weir

Mirani Weir

Kinchant Dam

Urban water security for Mackay

Mackay
12,735ML

Eungella Dam

Teemburra Dam

Dumbleton Weir

Service need 4

Bowen Basin and Isaac
23,000ML

Bowen Basin

[1] *Coal resource sites © State of Queensland (Department of Resources) 2021.*
[2] *Queensland agricultural land classes © State of Queensland (Department of Environment and Science and Department of Natural Resources, Mines and Energy) 2020.*

MIW Region Supply Options

High priority demand

Water supply scheme[1]

Unsold allocations (ML)

85000
40000
10000
2000

New infrastructure option (ML)

85000
40000
10000
2000

New pipeline option

Bowen Pipeline

Water for Bowen

Service need 1

Abbot Point

Bowen

Peter Faust Dam to Bowen Pipeline

Service need 3

Proserpine

Aquaculture Water Harvesting Storage

Peter Faust
10,500ML
High Priority A

Proserpine River Water Supply Scheme
19,945 ML (of 51,090 ML)

Bowen Broken water supply scheme
NA (mainly mining water)

Service need 2

Collinsville

Burdekin Falls Dam Raising

Urannah Water Scheme to Peter Faust Pipeline

Burdekin Falls
35,000ML
High Priority

Pioneer River Water Supply Scheme
11,617 ML (of 46,750 ML)

Urannah Water Scheme

Urban water security for Mackay

Mackay

Teemburra
12,735ML
High Class A

Eton Water Supply Scheme
19,183 ML (of 52,318 ML)

Burdekin to Moranbah Pipeline Duplication

Urannah Water Scheme to Moranbah Pipeline

Service need 4

Bowen Basin and Isaac

Connors River Dam Pipeline

Connors River Dam

Mine Water Reuse Scheme

Bowen Basin

[1] *Water supply scheme figures based on average usage of available irrigation water (2013-2019).*

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Executive Summary

The objectives of the Mackay, Isaac and Whitsunday (MIW) Regional Water Strategy (the Strategy) are to:

- Understand the extent to which access to reliable water supplies is constraining economic development in the MIW region.
- Identify water infrastructure and other opportunities (including innovative uses/outcomes) which could provide a catalyst for further economic development based on the underlying principles of sustainable development and industry best practice.
- Enhance the current knowledge base underpinning water infrastructure planning (focusing on the availability and use of water for a range of purposes) and decision making in the MIW region (driven by identified water demand or opportunity, availability and reliability, water fitness for purpose, impacts and risks).

The purpose of the Strategy is not to make recommendations regarding specific infrastructure options, but rather to identify the desired outcomes and water related needs of the MIW region and the range of both infrastructure and non-infrastructure options that could meet those needs.

Defining desired outcomes

For a strategy to be effective, it must define desired outcomes. Having clear outcomes allows opportunities and challenges to be defined against a reference point. Actions can then be tailored to realise opportunities, mitigate challenges and provide the best chance for desired outcomes to be met and undesirable outcomes to be avoided. The Project Steering Committee defined desirable outcomes for the Strategy as:

- Regional economic, social and environmental resilience (including in the face of change)
- Diversity and expansion of mining, agriculture and aquaculture across the region (including diversity within agriculture)
- Value adding opportunities are explored and enabled
- Strategic, outcome-focussed collaboration between industry and all levels of government to ensure that:
  - Existing water resources are affordable and utilised sustainably
  - New bulk water infrastructure project assessments and investments are coordinated
  - Policy and regulatory settings enable and support existing and new industries
- Export opportunities are diversified and realised
- Long-term water security and flexibility for all water users.

Approach to developing the Strategy

The Project approach included four main stages (Figure A 1):

- Project inception, data collection and gap analysis (i.e. existing water supply and use)
- Service needs analysis
- Water source analysis, options identification, and options assessment
- Deliver an action-focused Strategy.

Each stage included a review and analysis of existing material, and engagement with GW3, the Project Steering Committee and relevant stakeholders (to inform, review and guide the Strategy). Findings from each of these stages are summarised below, followed by the Strategy itself.

Figure A 1 Conceptual approach overview for the MIW Regional Water Strategy

Existing water supply and use

Water supply to the MIW region is largely controlled under three Water Plans (the Burdekin Basin, Pioneer Valley, and Whitsunday). Groundwater is the main source of water supply in Bowen and is managed by the Bowen Groundwater Management Area water sharing rules.

Large volumes of supplemented water (i.e. water regulated through dams and weirs) are currently supplied through the MIW region via the water supply schemes of Bowen Broken, Proserpine, Pioneer, Eton, and to a lesser extent Burdekin Haughton. Allocations from the supplemented water supply schemes are subject to low levels of utilisation, particularly in the irrigation sector, with usage of available water for the period 2013-2019 averaging 37 per cent, 25 per cent, and 39 per cent for the Eton, Pioneer and Proserpine water supply schemes respectively.

Allocations in these water supply schemes are predominantly owned by sugarcane growers, and consultation with the industry indicates that many growers do not believe that the incremental farm

gate revenue associated with increased production from irrigation is sufficient to justify the irrigation costs (water and energy).

Unsupplemented water supplies are also available extensively across the MIW region, particularly groundwater which formed the mainstay of water supply throughout the region prior to the development of the supplemented supply schemes. Usage data for unsupplemented entitlements is not published as a large proportion of users are unmetered, however utilisation is understood to be at similarly low levels to the supplemented water supply schemes, primarily due to irrigation costs relative to farm gate returns.

Water source analysis

There are existing unsold supplemented surface water supplies available within the region, notably 12,375 ML of high-class A water from the Pioneer, 10,500 ML of high priority (HP) allocation from the Proserpine scheme, and 35,000 ML of HP allocation in Burdekin Falls Dam. The Pioneer supply is earmarked to underpin urban supply for Mackay into the medium term, although it has yet to be secured by Mackay Regional Council.

There are also opportunities for new bulk water infrastructure development in the region that draw upon the available reserves in the relevant water plans, particularly in the Burdekin Basin:

- The proposed Urannah Water Scheme in the Bowen Broken system is a regional supply option that could deliver 103,000 ML of HP allocation for high value irrigation in Collinsville. The scheme could, via a southern or northern pipeline, also supply water to miners in the Bowen Basin, high value irrigation in Bowen, broadacre irrigation in Proserpine or industrial uses at Abbot Point[1].
- Burdekin Falls Dam Raising is currently being investigated by Building Queensland and could deliver between 150,000 to 575,000 ML of new MP supply depending on the options selected (noting that the Water Plan currently only allows for 150,000 ML).

Distribution infrastructure features heavily in the supply options given the requirement to deliver new and underutilised supply sources to their respective demand nodes. Pipeline options have been identified for supply to Bowen, Proserpine, Moranbah and surrounding areas in support of irrigated agriculture, aquaculture, urban and mining expansion. Ultimately, decisions on bulk water infrastructure are matters for the State Government.

A mine water reuse scheme is also contemplated. As of 30 June 2020, 185,570 ML was reported as being stored at 31 mine sites within the MIW region, representing a volume of water 25 per cent greater than the capacity of Teemburra Dam. Utilisation of this resource represents an opportunity to decrease pressure on existing surface water supplies and open new prospects for agriculture as mines reach end of life.

Service needs analysis

The MIW region's water related service needs represent opportunities and challenges, the evidence for which is documented in this report and heard through consultation. Service Needs, that generally represent demand for additional water, are:

[1] All of these water demands cannot be met which means there are trade-offs. The detailed business case for the Urannah Water Scheme has not identified sufficient demand in Proserpine, Bowen or Abbot Point to justify the northern pipeline expenditure.

- **Service Need 1 – Growing the Bowen Food Bowl:** Access to HP water could unlock high value irrigated cropping expansion in the Bowen area and industrial expansion at the Abbot Point SDA (including for the Port of Abbot Point).
- **Service Need 2 – A Collinsville agricultural precinct that can meet regional needs:** There are high value irrigated cropping opportunities near Collinsville but there is currently limited supplemented water supply.
- **Service Need 3 – A world class aquaculture industry:** There are opportunities for aquaculture expansion in the MIW region including within ADAs but there is currently no supplemented water supply.
- **Service Need 4 – The Isaac resources hub:** High priority water allocations and new pipeline capacity will be required for metallurgical coal expansion plans and urban water security in the Isaac region.

Four opportunities and challenges did not fit the definition of a Service Need. For example, discussions with stakeholders highlighted the importance of alignment and collaboration between strategic policy initiatives and up and downstream water dependent industries, the flow of information between these industries, investors, consumers and the community, and the role of government to incentivise sustainable investment and economic growth across the MIW region. These four opportunities and challenges are defined as Economic Enablers that support the Service Needs. They include:

- **Economic Enabler 1 – Coordinated agricultural expansion:** To support agricultural expansion and increased farm gate margins, market-driven land use change needs to be supported by market information. Water and water infrastructure needs to be available at the right time, scale, and location to support this expansion.
- **Economic Enabler 2 – Sustainable, investment friendly regulation:** Outcome-focused regulation and planning approvals can incentivise sustainable investment in industries that utilise water resources.
- **Economic Enabler 3 – Market the region's sustainability credentials to encourage investment:** The community expects key water-using industries to deliver social and environmental value in addition to commercial value. Whilst industries are adapting and innovating, coordination and information sharing can improve industries' ability to demonstrate social value creation in aggregate, and as individual entities. For businesses, social and environmental value is increasingly becoming a competitive advantage as consumers demand products that are produced sustainably. The region can therefore leverage social and environmental value generation to attract investment.
- **Economic Enabler 4 – Support existing irrigated cropping:** The irrigated broadacre cropping industry is in a period of transition with opportunities to increase farm gate margins by realising biofutures opportunities and reducing irrigation input costs. Under existing contracts, biofutures will not increase farm-gate value for cane. Should the biofutures potential of the region be realised, the increased returns of these new products could support a restructure of grower contracts.

In summary, four Economic Enablers support four location specific Service Needs (Figure A 2).

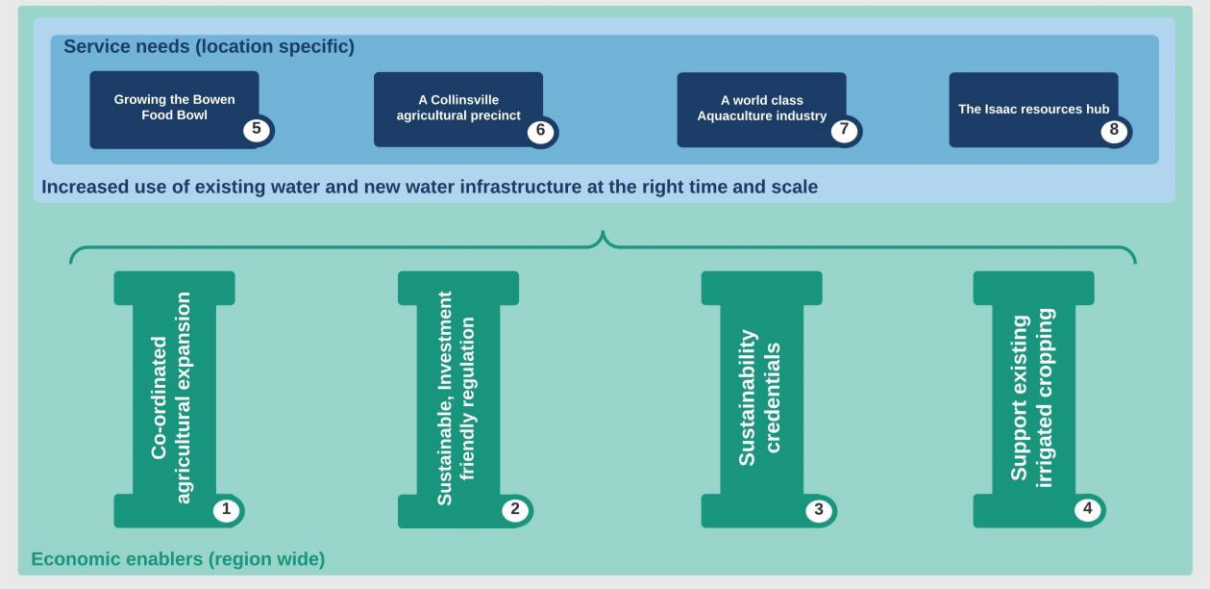


Figure A 2 MIW Regional Water Strategy Service needs map

Options identification and assessment

Specific options are required to meet the MIW region's water related service needs and realise associated benefits. The options identification process identified:

- a long list 46 non-infrastructure (i.e. policy, regulatory and advocacy) and infrastructure (i.e. water supply) options that could potentially meet the region's service needs identified in the service needs analysis,
- the option type in accordance with the State Infrastructure Plan categories, and
- whether the option was viable for short listing in the context of the defined service needs.

The outcome of this process was a short list of 41 options mapped to the MIW region's service needs for prioritisation in the options assessment process.

The Options assessment process comprised a qualitative prioritisation of all options and rapid cost benefit analysis (CBA) of relevant infrastructure options. The purpose of the prioritisation process was to inform how options could be implemented under the Strategy. The prioritisation process did not seek to exclude options. The rapid CBA assessed six infrastructure options that were short listed based on their ability to meet Service Needs identified in the service needs analysis. [2]

[2] Given the rapid nature of the CBA, the Urannah Water Scheme has not been modelled as more detailed economic analysis has been undertaken on this option as part of the detailed business case.

Regional Water Strategy

The Strategy presents actions that remove barriers to economic growth, or Economic Enablers and actions that directly support economic growth across the MIW region by meeting demand for additional water, or Service Needs.

The MIW Regional Water Strategy is presented on subsequent pages in the following format with lead organisations for each action in **bold**:

- ID
- Action (what) – a summary description of the action
- Implementation (how) – the recommended steps to implement the option
- Dependencies – presented in terms of:
  - Supported by - actions that support the action in question
  - Supports – actions that the action in question supports
  - Competes with – for infrastructure/water supply options only, the alternative water supply options that can meet the same demand (in part or in whole).
- Timing – presented in terms of:
  - Short – in the next two years
  - Medium – between two and five years
  - Long – within ten years.

Actions that support Economic Enablers

The actions for each Economic Enabler comprise policy, regulatory or advocacy actions to support the actions required to meet the Service Needs.

Economic Enabler 1 – Coordinated agricultural expansion

To support agricultural expansion and increased farm gate margins, market-driven land use change needs to be supported by market information. Water and water infrastructure needs to be available at the right time, scale, and location to support this expansion.

Outcomes achieved by meeting service need

- Export opportunities are diversified and realised
- Value adding opportunities are explored and enabled
- Market driven land use change
- Strategic, market-focussed collaboration between industry and all levels of government to ensure that new bulk water infrastructure project assessments and investments are coordinated
- Sustainable expansion of aquaculture and agriculture across the region (including diversity within agriculture)

ID	Action (what)	Implementation (how)	Dependencies	Timing
EE1-1.1a	Ensure Sunwater, together with RDMW and DAF, have visibility of market led demand intelligence and regional production capability.	**GW3** to expand representation of the MIW Agribusiness Futures Alliance Project steering committee to include officials from Sunwater in addition to existing representatives[3]. **GW3** to work collaboratively with **RDMW, Sunwater and project proponents** to ensure market intelligence informs how existing and new water resources and infrastructure can help realise export market opportunities.	Supported by: • none Supports: • EE1-1.1b • Service Needs	Short

[3] Existing representatives include GW3, Great Whitsunday Council of Mayors, Regional Development Australia (Mackay Isaac Whitsunday), Regional Councils, Regional Airports, Industry bodies, DAF, DSDILGP, RDMW, TIQ, NQBP (N.B. this list does not completely account for all machinery of government changes associated with the recent Queensland election)

ID	Action (what)	Implementation (how)	Dependencies	Timing
EE1-1.1b	Ensure market intelligence information captured by the Agribusiness Futures Alliance Project is connected to future water infrastructure business cases to determine the risk adjusted returns to growers and project proponents.	The **Agribusiness Futures Alliance Project steering committee** should identify, and where appropriate register, as a stakeholder for consultation with proponents undertaking water infrastructure business cases and/or assessments in the region (e.g. Hells Gate Dam).	Supported by: • EE1-1.1a Supports: • Service Needs	Short
EE1-1.2a	Support outside investment by ensuring agricultural investors have access to information on land and water availability by advocating to create a 'one stop shop' information hub to market Queensland's water products. This information, designed to attract investment to the region (and Queensland), will complement the existing AgTrends Spatial mapping tool.	Targeted towards investors that are more familiar with water products in the Murray-Darling Basin, **GW3** should advocate to RDMW and Sunwater for a 'one stop shop' information hub to market Queensland's water products. For example, a Queensland water allocation has the same attributes (i.e. defined in statute, perpetual tradeable etc.) as an entitlement in the southern Murray Darling Basin but are generally much cheaper to purchase. This 'one stop shop' should be coupled with information on available land and soils.	Supported by: • None Supports: • EE1-1.2b • EE1-1.2c • All Service Needs	Short
EE1-1.2b	Support outside investment by ensuring agricultural investors have access to information on land and water availability by holding investment attraction tours that showcase, to big agribusiness and existing growers in the region, the region's strengths including water reliability, available land, climate for	The **Agribusiness Futures Alliance Project steering committee** should oversee and facilitate investment attraction tours that showcase the region but also provide information on what the private sector sees as the risks or barriers to investment which will inform other actions. For example, a commonly cited risk for agricultural	Supported by: • EE1-1.2a Supports: • EE1-1.2c • All Service Needs	Short

ID	Action (what)	Implementation (how)	Dependencies	Timing
	growing a variety of crops, good soils, access to supply chains and sustainable agriculture etc.	investors is availability of water. This action should include collaboration to align with DSDILGP's activities in relation to biofutures.		
EE1-1.2c	Advocate for strategic changes to local zoning precincts, specifically where there is good quality agricultural land and restrictions on land use and parcel sizes.	With information from option EE1-1.2a and EE1-1.2b, the **Agribusiness Futures Alliance Project steering committee should oversee an** investigation of where disaggregated land use zoning might be preventing large scale agricultural investment. **GW3** should then use this intelligence to advocate for evidence-based changes to local zoning precincts to incentivise agricultural expansion.	Supported by • EE1-1.2a • EE1-1.2b Supports • All Service Needs	Medium
EE1-1.3	Ensure stakeholders and industry remain informed of the status of any bulk water infrastructure developments.	**GW3** to lead, but work collaboratively with RDMW, Sunwater, the North Queensland Water Infrastructure Authority, and other project proponents to communicate to stakeholders, via regular updates, the status of bulk water infrastructure developments that could service the region.	Supported by • EE1-1.1a • EE1-1.1b Supports • All Service Needs	Short

Economic Enabler 2 – Sustainable, investment friendly regulation

Outcome-focused regulation and planning approvals can incentivise sustainable investment in industries that utilise water resources.

Outcomes achieved by meeting service need

- Strategic, outcome-focussed collaboration between industry and all levels of government to ensure that policy and regulatory settings enable and support existing and new industries
- Reduced regulatory burden for all parties leading to increased private investment and new development
- Supply options and water use are environmentally sustainable
- Sustainable expansion of mining, aquaculture and agriculture across the region (including diversity within agriculture)
- Reform that appropriately manages environmental risk whilst incentivising investment, innovation and least cost achievement of environmental standards.

ID	Action (what)	Implementation (how)	Dependencies	Timing
EE2-1a	In line with the Queensland Department of Environment and Science's (DESs) recent release of the *Point Source Water Quality Offsets Policy 2019*, investigate the appropriateness of an outcome focused approach to allow the MIW regions existing and new Environmental Authority (EA) holders to efficiently and flexibly mitigate their water quality impacts.	**GW3** to liaise with DES to investigate, understand and communicate to industry, existing regulatory pathways that could allow local businesses to flexibly manage environmentally relevant activities (ERAs) that impact on water quality (e.g. activities that contribute pollutants and salinity). This could include for example, amalgamating EAs and meeting aggregated requirements with a bubble licensing scheme.	Supported by • None Supports • All Service Needs	Medium
EE2-1b	In line with the *Waste Reduction and Recycling Act 2011*, understand the potential for mine water to be approved for reuse as a beneficial resource.	For mining, **GW3** to liaise with DES to investigate, understand and communicate to industry, approval requirements that would allow for the beneficial re-use of mine affected water.	Supported by • None Supports • Service Need 4	Medium
EE2-1c	Streamline the environmental approvals	**GW3** should advocate to the Queensland Office of	Supported by • None	Medium

ID	Action (what)	Implementation (how)	Dependencies	Timing
	pathway for bulk water infrastructure which is currently subject to State and Commonwealth legislation and can be duplicative which slows investment, economic growth and jobs[4].	the Coordinator General and DAWE, to remove duplicative conditions for bulk water infrastructure development. Specific areas of duplication that could be further streamlined include: • consistency in the assessment methods for listing threatened species. • the process for conducting bilateral assessments[5] • the water trigger (under section 24D of the EPBC Act).[6]	Supports • All Service Needs	

[4] Duplication may in part, be resolved by any amendments to the EPBC Act arising from the independent Samuel review (2020). Samuel (2020) recommends that the Commonwealth give responsibility for granting approvals to the states. This is under the proviso that state governments can demonstrate compliance and maintain accreditation with Commonwealth Government National Environmental Standards. The purpose of the National Environmental Standards is to ensure Matters of National Environmental Significance (MNES) are protected by each state government's approval processes.

[5] The bilateral agreement between the Commonwealth of Australia and the State of Queensland relating to environmental assessment (the assessment bilateral agreement) allows the Commonwealth Minister for the Environment to rely on specified environmental impact assessment processes of the State of Queensland in assessing actions under the EPBC Act.

[6] The water trigger allows the impacts of proposed coal seam gas and large coal mining developments on water resources to be comprehensively assessed at a national level.

Economic Enabler 3 – Market the region's sustainability credentials to encourage investment

The community expects key water-using industries to deliver social and environmental value in addition to commercial value. Whilst industries are adapting and innovating, coordination and information sharing can improve industries' ability to demonstrate social value creation in aggregate, and as individual entities. For businesses, social and environmental value is increasingly becoming a competitive advantage as consumers demand products that are produced sustainably. The region can therefore leverage social and environmental value generation to attract investment, utilising existing standards that consumers support and understand to leverage preferential market access and payments.

Outcomes achieved by meeting service need[7]

- Regional economic, social and environmental resilience (including in the face of change)
- Sustainable expansion of mining, aquaculture and agriculture across the region (including diversity within agriculture)
- Export opportunities are diversified and realised
- Value adding opportunities are explored and enabled

ID	Action (what)	Implementation (how)	Dependencies	Timing
EE3-1a	Explore the feasibility of an authenticated data sharing platform (e.g. block chain supported) to improve reporting on social value creation at a region-wide level. **GW3** should advocate for funding to support an independent and impartial third party to facilitate coordination amongst individual private entities and support information sharing on social value. In the absence of a legislative requirement, this will require voluntary participation. Participants are likely to benefit from improved community support, traceability,	Initially, **GW3** should define the desired outcomes, participants, metrics, anonymity, timesteps, return on investment and platform for any such data sharing platform and reporting. **GW3**, the **local NRM group** or **industry bodies** are all examples of organisations that would be well placed to support information sharing on water use between industry players.	Supported by • EE3-1b Supports • None	Medium

[7] The below sub-options can be delivered independently but may also benefit from being delivered in coordination. Furthermore, both options are related to economic enabler 2 in that they are focused on achieving and reporting on social and environmental outcomes. To this end, any evolutions to the environmental regulatory environment that result in a transition to outcome-based regulation should be considered by these options.

ID	Action (what)	Implementation (how)	Dependencies	Timing
	marketing and branding opportunities, particularly within the MIW region.			
EE3-1b	**GW3** to advocate, including through a potential renewed NWI, for consistent, nationally accepted guidance to value economic, social and environmental costs and benefits of water in different uses. Water use benefits and impacts can then be identified, measured and communicated across all consumptive and non-consumptive uses.	**GW3** to advocate to RDMW, the National Water Grid Authority and the Australian Department of Agriculture, Water and the Environment. Specifically, material should focus on methodological guidance and appropriate dollar per unit values for the different costs and benefits attributable to various water uses. Similar guidance is provided for other publicly provided services, for example in the Australian Transport Assessment and Planning (ATAP) Guidelines[8].	Supported by • None Supports • EE3-1a	Medium

[8] The ATAP Guidelines provide a comprehensive framework for planning, assessing and developing transport systems and related initiatives. This includes guidance on specific parameters values for use in economic analysis.

Economic Enabler 4 – Supporting existing irrigated cropping

The irrigated broadacre cropping industry is in a period of transition with opportunities to increase farm gate margins by realising biofutures opportunities and reducing irrigation input costs.

Outcomes achieved by meeting service need

- More efficient and productive use of the region's bulk water resources
- Electricity and water prices are affordable for all users
- The value and cost of water is considered in production and consumption decisions
- Having consistent regional priorities
- Attract outside investment and support the region's economic growth
- Diversify the region's agricultural production
- Value adding opportunities are explored and enabled

ID	Action (what)	Implementation (how)	Dependencies	Timing
EE4-1.1a	Consistent with the recommendation in the Regional Agribusiness Supply Chains Report commissioned by GW3, **GW3** should establish a new, collaborative partnership with the broadacre cropping and sugar industry, and in particular canegrowers, with an aim to build relationships and an understanding of major challenges faced by industry.	A key focus of the proposed **MIW broadacre grower's partnership** should be on understanding current drivers for underutilisation of irrigation water by canegrowers.	Supported by • None Supports • EE4-1.1b • EE4-1.2	Short
EE4-1.1b		Under the same **MIW broadacre grower's partnership**, examine whether existing capacity building, extension and succession planning mechanisms are increasing farm gate margins in the broadacre cropping and sugar industries.	Supported by • EE4-1.1a Supports • EE4-1.2	Short
EE4-1.2	Through the proposed **MIW broadacre grower's partnership**, develop new capacity building, extension and succession planning mechanisms to ensure growers can access resources to understand and maximise the value of their water in production.	Any extension program should only be developed where the findings from EE4-1.1a and EE4-1.1b deem such a program to be relevant and valuable. Specific actions under this program may include increasing awareness of publicly available tools such	Supported by • EE4-1.1a • EE4-1.1b Supports • None	

ID	Action (what)	Implementation (how)	Dependencies	Timing
		as ABARES' *farmpredict*, which allows farmers to forecast farmgate profits under various irrigation profiles.		
EE4-2.1a	In recognition of the strategic economic importance of the irrigated broadacre cropping industry in Mackay and Proserpine, and its potential to support biofutures initiatives, **GW3** to advocate to RDMW and Treasury for a concession on water prices to temporarily increase farm gate margins. This then could support the industry as it transitions to higher value modes of production.	Specifically, a further reduction in water prices, beyond the 15 per cent reduction committed to by the Queensland Government for broadacre growers prior to the 2020 election to align with the 50 per cent reduction provided for fruit and vegetable growers. Any concession should include review mechanisms. These mechanisms are intended to proactively account for any changes to irrigated broadacre crop margins and the impact this has on grower's capacity to pay a market price for water.	Supported by • None Supports • None	Short
EE4-2.1b	For the reasons outlined in EE4-2.1a, **GW3** to advocate for a time-constrained concession on energy prices to temporarily increase farm gate margins.	The concessional energy tariff should consider and better reflect existing irrigated broadacre crop margins and grower's capacity to pay. Any concession should include both event and time-based review mechanisms. These mechanisms are intended to proactively account for any changes to irrigated broadacre crop margins and the impact this has on grower's capacity to pay a market price for energy.	Supported by • None Supports • None	Short

ID	Action (what)	Implementation (how)	Dependencies	Timing
EE4-2.2	Through the proposed **MIW broadacre grower's partnership**, calculate the sugarcane production capacity in the Mackay and Proserpine regions under a scenario where existing water resources are fully utilised (noting that full utilisation may not always be feasible given annual rainfall, production fluctuations and allocations held in excess of requirements).	**GW3** to engage an independent and impartial third party to conduct the analysis. Provide this information to officials involved in developing the biofutures industry.	Supported by • EE4-1.1a • EE4-1.1b Supports • All Service Needs	Short
EE4-3	**GW3** to advocate for and support policies that will facilitate opportunities for the irrigated broadacre cropping industry to increase farm-gate margins.	Refer to the program of policy and non-infrastructure options proposed to meet Economic Enabler 1. Specifically, any transition should focus on market driven land use change that can drive increased farm gate margins[9].	Supported by • Economic Enabler 1 Supports • All Service Needs	Short
EE4-4.1	Through the proposed **MIW broadacre grower's partnership**, encourage growers to explore energy efficiency improvements at the farm level.	Specifically, provide information to growers on audits made available under the Energy Savers Plus Program Extension designed specifically for agricultural customers. Participants of this program can receive a co-contribution grant of up to 50 per cent towards the cost of implementing audit recommendations, up to $20,000. For example, a previously completed audit of a sugarcane farm in the Mackay area identified	Supported by • EE4-1.1a • EE4-1.1b Supports • None	

[9] Should the biofutures potential of the region be realised, the increased returns of these new products could support a restructure of grower contracts.

ID	Action (what)	Implementation (how)	Dependencies	Timing
		energy savings of between 19 and 30 per cent by upgrading the farms on-farm pumping systems.		
EE4-4.2a	To reduce pumping related energy costs within the Eton Water Supply Scheme, **GW3** in collaboration with Sunwater, should investigate the feasibility of installing renewable energy systems and micro grids, such as solar through public finance.	In the first instance, understand opportunities to obtain concessional finance offered by the Clean Energy Finance Corporation and/or the Northern Australia Infrastructure Facility.	Supported by • EE4-4.1 Supports • EE4-4.3	Short
EE4-4.2b		Explore opportunities to leverage feed-in tariffs, or financial incentives (i.e. renewable energy certificates) provided under the Federal Government's Renewable Energy Target program.	Supported by • EE4-4.1 Supports • EE4-4.3	Short
EE4-4.3	Consider the installation of renewable energy systems to reduce pumping costs at the bulk supply level.	Pending the outcome of EE4-4.2a and EE4-4.2b, **GW3** to advocate for Sunwater to consider the installation of solar energy systems to reduce pumping costs at the bulk supply level.	Supported by • EE4-4.2a • EE4-4.2b Supports • None	Medium

Actions that support Service Needs

The actions described in the below tables include a mix of non-infrastructure and infrastructure options. Generally, actions are unique to the Service Need that they are supporting. However, in some instances, specific infrastructure options may be able to service more than one Service Need. Furthermore, the timing and sequencing of decisions to proceed with one infrastructure option will likely impact the need for, timing, capacity and sequencing of other infrastructure options. For example, the Urannah Water Scheme is a regional solution capable of meeting multiple service needs concurrently. Other infrastructure options (e.g. Burdekin to Moranbah pipeline duplication) are localised solutions capable of meeting specific service needs. Progressing water infrastructure projects are the responsibility of project proponents, working collaboratively with government (state and in some cases federal), Sunwater, industry and other stakeholders including customers.

GW3s role in these decisions should be to consistently represent and advocate for the preferences of its stakeholders. Specifically, this means understanding the volume and reliability of water demanded by individual stakeholders and connecting this information to Sunwater, RDMW and other relevant parties. Connecting contemporary demand estimates to the decision making processes will help ensure that the right infrastructure is delivered at the right time to meet market led water demands.

Service Need 1 – Growing the Bowen Food Bowl

Access to HP water could unlock new, high value irrigated cropping in the Bowen area and industrial expansion at the Abbot Point SDA (including for the Port of Abbot Point).

Outcomes achieved by meeting service need

- Export opportunities are diversified and realised
- Value adding opportunities are explored and enabled
- Strategic, outcome-focussed collaboration between industry and all levels of government to ensure that new bulk water infrastructure project assessments and investments are coordinated
- Information on water availability supports water dependent investment in the region
- Sustainable expansion of industry, aquaculture and agriculture across the region (including diversity within agriculture)

ID	Action (what)	Implementation (how)	Dependencies	Timing
SN1-1	Through the MIW Agribusiness Futures Alliance Project steering committee**, GW3** to advocate for policies that will support investment in, and expansion of, the region's agricultural production and industry.	Refer to the program of policy and non-infrastructure options proposed to meet Economic Enabler 1. Specifically, actions should focus on information provision that can support water supply at the right time, scale and location, attract investment, and	Supported by • Economic Enabler 1 Supports • SN1-3a • SN1-3b • SN1-3c	Short

ID	Action (what)	Implementation (how)	Dependencies	Timing
		enable market driven land use change.		
SN1-2	**GW3** to engage with RDMW through the MIW Agribusiness Futures Alliance Project steering committee as part of the Whitsunday Water Plan review to ensure industry needs are considered.	**GW3** to prepare a submission to the formal public consultation process conducted as part of the Whitsunday Water Plan review stating that there is demand for up to 20,000 ML of HP water to support new agriculture and industrial expansion.	Supported by • Economic Enabler 1 Supports • SN1-3a • SN1-3b • SN1-3c	Short
SN1-3a	Convert water in Peter Faust Dam from MP allocation to HP allocation and construct a new pipeline to Bowen.	**GW3** to advocate to Sunwater and RDMW to investigate the option further including the development of a business case if warranted.[10] [11].	Supported by • SN1-1 • SN1-2 Supports • None Competes with • SN1-3b	Long
SN1-3b	Construct a new pipeline that extracts water from the Elliot Main Channel or a new pipeline from Burdekin River to supply unsold HP allocation to Bowen.	**GW3** to advocate to Sunwater to investigate the option further including the development of a business case if warranted	Supported by • SN1-1 Supports • None Competes with • SN1-3a	Long
SN1-3c	Construct Urannah Dam and a pipeline to Bowen via Peter Faust Dam.	**Bowen River Utilities** have prepared a Detailed Business Case for the Urannah Water Scheme. The "Bowen Basin productive water supply" initiative was included as a priority initiative on the Infrastructure Australia Infrastructure Priority List	Supported by • SN1-1 Supports • SN1-3a • SN1-3b Competes with • None	Long

[10] It should be noted that any significant purchase of MP allocations for conversion to HP may have impacts to the production of sugar cane in the Proserpine scheme, and hence proposed purchase and conversions should be discussed with Canegrowers Proserpine.

[11] To meet the stated demand, this option would require an amendment to the high priority cap in the Whitsunday Water Plan, the viability of which requires further investigation.

ID	Action (what)	Implementation (how)	Dependencies	Timing
		2021. Bowen River Utilities will progress the project to construction if the required investment criteria are met. Financial closure and environmental approvals by the Queensland and Commonwealth Governments are required for the project to proceed.		

Service Need 2 – A Collinsville agricultural precinct that can meet regional needs

There are high value irrigated cropping opportunities near Collinsville but there is currently no supplemented water supply.

Outcomes achieved by meeting service need

- Export opportunities are diversified and realised
- Value adding opportunities are explored and enabled
- Strategic, outcome-focussed collaboration between industry and all levels of government to ensure that new bulk water infrastructure project assessments and investments are coordinated
- Information on water availability supports water dependent investment in the region
- Sustainable expansion of mining, aquaculture and agriculture across the region (including diversity within agriculture)

ID	Action (what)	Implementation (how)	Dependencies	Timing
SN2-1	Through the MIW Agribusiness Futures Alliance Project steering committee**, GW3** to advocate for policies that will support investment in, and expansion of, the region's agricultural production and industry.	Refer to the program of policy and non-infrastructure options proposed to meet Economic Enabler 1. Specifically, actions should focus on information provision that can support water supply at the right time, scale and location, attract investment, and enable market driven land use change.	Supported by • Economic Enabler 1 Supports • SN2-2	Short
SN2-2	Construct the Urannah Water Scheme	**Bowen River Utilities** have prepared a detailed business case for the Urannah Water Scheme. The "Bowen Basin productive water supply" initiative was included as a priority initiative on the Infrastructure Australia Infrastructure Priority List 2021. . Bowen River Utilities will progress the project to construction if the required investment criteria are met. Financial closure and environmental approvals by the Queensland and	Supported by • SN2-1 Supports • None Competes with • None for this service need	Long

ID	Action (what)	Implementation (how)	Dependencies	Timing
		Commonwealth Governments are required for the project to proceed.		

Service Need 3 – A world class aquaculture industry

There are opportunities for aquaculture expansion in the MIW region including within ADAs but there is currently no supplemented water supply.

Outcomes achieved by meeting service need

- Regional economic, social and environmental resilience (including in the face of change)
- Export opportunities are diversified and realised
- Value adding opportunities are explored and enabled
- Strategic, outcome-focussed collaboration between industry and all levels of government to ensure that new bulk water infrastructure project assessments and investments are coordinated
- Expansion of aquaculture across the region

ID	Action (what)	Implementation (how)	Dependencies	Timing
SN3-1	**GW3** to advocate for policies that will support investment in, and expansion of, the region's aquaculture industry.	Refer to Economic Enabler 2. In the context of aquaculture, this includes investigating outcome-focused mechanisms that allows industry to flexibly manage environmentally relevant activities (ERAs) that impact on water quality (e.g. activities that contribute pollutants and salinity).	Supported by • Economic Enabler 2 Supports • SN3-2 • SN3-3 • SN3-4	
SN3-2	Secure unsold HP allocation in Peter Faust Dam and construct a pipeline to the Proserpine aquaculture facilities.	**GW3** to advocate to Sunwater and RDMW to investigate the option further including the development of a business case if warranted.	Supported by • SN3-1 Supports • None Competes with • SN1-3a	Long
SN3-3	Construct Urannah Dam and pipeline to Proserpine via Peter Faust Dam.	**Bowen River Utilities** have prepared a detailed business case for the Urannah Water Scheme. The "Bowen Basin productive water supply" initiative was included as a priority initiative on the Infrastructure Australia Infrastructure Priority List 2021. Financial closure and	Supported by • None Supports • SN3-2 • SN3-4 Competes with • None	Long

ID	Action (what)	Implementation (how)	Dependencies	Timing
		environmental approvals by the Queensland Government are required for the project to proceed.		
SN3-4	Extension of the Elliot Main Channel or a new pipeline from Burdekin River to supply unsold HP allocation to the Whitsunday ADA.	Pending the outcome of other water supply options being considered by aquaculture companies**,** **GW3** should advocate for Sunwater to investigate the viability of this option. This option should be considered in conjunction with opportunities for expansion of high value irrigated agriculture in the Bowen area. The option has the potential to meet both service needs.	Supported by • SN3-1 Supports • None Competes with • None	Long

Service Need 4 – The Isaac resources hub

High priority water allocations and new pipeline capacity will be required for metallurgical coal expansion plans and urban water security in the Isaac region.

Outcomes achieved by meeting service need

- Strategic, outcome-focussed collaboration between industry and all levels of government to understand, and potentially establish, approval conditions that enable and support existing and new industries
- Supply options and water use are environmentally sustainable
- Expansion of mining across the region
- Long-term water security and flexibility for all water users

ID	Action (what)	Implementation (how)	Dependencies	Timing
SN4-1.1	To make better use of existing water, undertake a pre-feasibility study to test the idea and secure funding partners for a more detailed feasibility study on a mine affected water reuse scheme (including for CSG water). Conceptually, the reuse scheme could install gathering lines to consolidate supplies into local "sub-regional" storages for subsequent redistribution to increase water reliability through wet and dry cycles in the Bowen Basin.	**GW3**, in collaboration with mining companies, Sunwater, RDMW and DES, commission a feasibility study to: • Map conceptually, the social, environmental and economic benefits of taking water off mine-sites, storing it, reusing it in other, non-potable uses (including agriculture) and repatriating it to mines during dry times. The mapping exercise should identify potential beneficiaries and use cases (e.g. could this water be used to improve reliability of irrigation allocations in the Nogoa-Mackenzie scheme, thereby creating an opportunity to access NWIDF funding). • Confirm adequate modelled reliability to facilitate substitution for surface water supplies.	Supported by • Economic Enabler 2 Supports • SN4-1.1 • SN4-1.3	Short

ID	Action (what)	Implementation (how)	Dependencies	Timing
		• Estimate capex per ML of supply for the various sub-regional storage locations. • Consider barriers and pathways to use, including water quality and mine site environmental authority conditions. • Assess commercial frameworks for water disposal and on-supply services. • Understand options to integrate the reuse scheme with existing supply sources and distribution infrastructure) to maximise scheme efficiency and address current supply and demand imbalances, including in neighbouring water supply schemes such as the Nogoa-Mackenzie. The options process should also examine the potential to, in the future, repurpose existing distribution infrastructure to mines to service other uses including irrigated agriculture. • Consider the long term ownership arrangements for allocations for miners that leave the Bowen Basin.		

ID	Action (what)	Implementation (how)	Dependencies	Timing
		• Quantify the value of the opportunity. • Explore funding sources for a more detailed feasibility study.		
SN4-1.2	Advocate for approvals that will support expansion of the region's mining industry.	Refer to Economic Enabler 2. In the context of mining, this includes investigating, and potentially obtaining, approvals that allow mine affected water to be beneficially re-used.	Supported by • Economic Enabler 2 Supports • SN4-1.3	Short
SN4-1.3	Develop a secondary market to trade mine affected water.	Pending the outcomes of SN4-1.1 and SN4-1.2, **GW3** to advocate to the relevant government department to develop a market that allows mines to trade their mine-affected water with other mines. Such a market will need to be designed carefully and will likely benefit from a central market operator, similar to approaches used in electricity markets.	Supported by • SN4-1.1 • SN4-1.2 Supports • None	Medium
SN4-2	Advocate for a CSO to reduce the cost Isaac Regional Council pays for water.	**GW3** in consultation with Isaac Regional Council should provide the Queensland Government with evidence of the current water supply security and price risk challenges[12]. Advocacy for a CSO should present evidence separately for current costs associated with existing infrastructure and any future costs associated with new pipeline capacity and	Supported by • None Supports • None	Short

[12] Specifically, the fact that Isaac Regional Council does not hold its own water allocations and therefore has little control of supply security and price. A large proportion of existing supplies are sourced under legacy agreements with mining companies which in some cases have expired, and miners are openly stating that they are seeking to terminate urban supply arrangements. This leaves the Council exposed to both volume and price risk.

ID	Action (what)	Implementation (how)	Dependencies	Timing
		distribution infrastructure to service towns throughout the Isaac LGA.		
SN4-3.1	Investigate new ways of financing commercial bulk water pipelines that supply their mining customers	**GW3,** working in collaboration with mining companies and Sunwater (or an alternative agency if appropriate) to explore alternative financing options for new bulk water pipelines that addresses the up-front costs, risk sharing, circularity and timing problems that are preventing investment in these types of assets. For example, in Newcastle, the coal industry has used convertible notes to incentivise shared infrastructure investment with varying timing and capacity requirements, and multiple counterparties for coal handling assets. Convertible notes allow investors to provide a loan to a development vehicle, which converts to asset equity at a discounted price once the asset is built. A similar instrument may prove useful in the Bowen Basin.	Supported by • None Supports • SN4-3.2a • SN4-3.2b • SN4-3.2c	Medium
SN4-3.2a	Secure unsold HP allocation from Burdekin Dam and construct Burdekin to Moranbah Pipeline Duplication.	**GW3** should advocate for Sunwater to investigate the viability of this option.	Supported by • SN4-3.1 Supports • None Competes with • SN4-3.2b • SN4-3.2c	Long

ID	Action (what)	Implementation (how)	Dependencies	Timing
SN4-3.2b	Construct Urannah Dam and pipeline to the Bowen Basin.	**Bowen River Utilities** have prepared a detailed business case for the Urannah Water Scheme. The "Bowen Basin productive water supply" initiative was included as a priority initiative on the Infrastructure Australia Infrastructure Priority List 2021. Financial closure and environmental approvals by the Queensland Government are required for the project to proceed.	Supported by • SN4-3.1 Supports • None Competes with • SN4-3.2a • SN4-3.2c	Long
SN4-3.2c	Construct Connors River Dam and pipeline.	A detailed business case and EIS has previously been completed for Connors River Dam. Demand for water from the project needs to be confirmed for the project to proceed.	Supported by • SN4-3.1 Supports • None Competes with • SN4-3.2a • SN4-3.2b	Long

1. Introduction

1.1. Objectives and purpose

The objectives of the Mackay, Isaac and Whitsunday (MIW) Regional Water Strategy (the Strategy) are to:

- Understand the extent to which access to reliable water supplies is constraining economic development in the MIW region.
- Identify water infrastructure and other opportunities (including innovative uses/outcomes) which could provide a catalyst for further economic development based on the underlying principles of sustainable development and industry best practice.
- Enhance the current knowledge base underpinning water infrastructure planning (focusing on the availability and use of water for a range of purposes) and decision making in the MIW region (driven by identified water demand or opportunity, availability and reliability, water fitness for purpose, impacts and risks).

The purpose of the Strategy is not to make recommendations regarding specific infrastructure options, but rather to identify the desired outcomes and water related needs of the MIW region and the range of both infrastructure and non-infrastructure options that could meet those needs.

1.2. Defining the Mackay, Isaac Whitsunday region

The MIW region is located on the central east coast of Queensland and includes the Whitsunday Islands. The region comprises the three local government areas of Mackay, Isaac and Whitsunday, and the major regional centre of Mackay (Figure 1). It covers around 90,354 square km, or five per cent of Queensland's total land area.

Figure 1 The MIW region

1.3. Approach to developing the Strategy

The Project approach included four main stages (Figure 2):

- Project inception, data collection and gap analysis (i.e. existing water supply and use)
- Service needs analysis
- Water source analysis, options identification, and options assessment
- Deliver an action-focused Strategy.

Each stage included a review and analysis of existing material, and engagement with GW3, the Project Steering Committee and relevant stakeholders (to inform, review and guide the Strategy). Findings from each of these stages are summarised below, followed by the Strategy itself.

Figure 2 Conceptual approach overview for the MIW Regional Water Strategy

1.4. Stakeholder engagement

An overview of stakeholder engagement activities completed during the delivery of this Strategy are provided in Figure 2. These activities were completed in order from A to E and included:

- Internal service needs workshop (with Steering Committee)
- External service needs and options identification workshops (with industry and community stakeholders)
- Internal options identification workshop (with Steering Committee)
- Internal options assessment workshop (with Steering Committee)
- Presentation of draft findings (with Steering Committee)
- Targeted conversations (with all stakeholders throughout engagement).

Stakeholder groups engaged through the delivery of the Strategy are summarised below. This included a Steering Committee appointed by GW3 and industry and community stakeholders. A full stakeholder engagement plan is included in Appendix C – Stakeholder engagement.

1.4.1. Steering Committee

The Project Steering Committee were consulted at every stage of the Strategy development process (Figure 2). Steering Committee members included:

- Kylie Porter, CEO, GW3
- Tonia Wilson, Project Manager, GW3
- Jason Devitt, Chair, Whitsunday Isaac Mackay Water Alliance and Director Engineering and Commercial Infrastructure, Mackay Regional Council
- Paul Walmsley, General Manager, Department of Agriculture and Fisheries (DAF) (Observer Status)
- Stephen Smith, Regional Director, DAF (Observer Status)
- Sam Tarlinton, Regional Director (Water Services), Regional Development, Manufacturing and Water (RDMW) (Observer Status)
- William Weaver, General Manager Central, Sunwater
- Dale Williams, Grower representative and Chair of Community Water Board
- Bonny O'Neal, Manager of Water Planning, BHP
- Rob Cocco, CEO, Regional Development Australia (Mackay Isaac Whitsunday)
- Kerry Latter, Director, Canegrowers
- Tom Wallwork, Ex-Sunwater North Queensland Manager, Eton Water Scheme
- John Cotter, Director, Bowen River Utilities
- Steven Ford, General Manager, Pioneer Valley Water
- Gary Murphy, Director Water and Waste, Isaac Regional Council
- Troy Pettiford, Chief Operating Officer Whitsunday Water, Whitsunday Regional Council.

1.4.2. Industry and community stakeholders

A range of industry and community stakeholders were consulted in formulating the Strategy, including:

- Agribusiness
- Mining and manufacturing businesses
- Industry bodies
- Indigenous representatives
- Bulk water entities
- Local Government
- Relevant State Government departments
- Natural Resource Management groups.

The stakeholders were engaged in group workshops and individual conversations to provide feedback on how water availability and reliability impacts their interests, future trends and their potential future needs.

1.5. Structure of this report

The remaining sections of the report are as follows:

- **Section 2 – Existing water supply and use:** Presents the MIW region's existing water supply by Water Plan Area and documents current and historic usage relative to supply.
- **Section 3 – Water source analysis:** Identifies existing and potential water sources within the MIW region that could meet demand from different service needs.
- **Section 4 – Service need analysis:** Presents service needs for the Mackay, Isaac and Whitsunday regions and for the MIW region as a whole.
- **Section 5 – Options identification:** Presents an initial long list of options that is filtered and short listed based on each options ability to meet on of the previously identified service needs from Section 4.
- **Section 6 – Options assessment:** Presents and documents the options assessment process and presents the results in terms of prioritised options. No options are excluded by this process.
- **Section 7 – Regional Water Strategy:** Presents the Regional Water Strategy in terms of actions that relate to short listed and prioritised options that aim to maximise the value of water in the MIW region.

2. Existing water supply and use

Outcomes of this chapter

Water supply to the MIW region is largely controlled under three Water Plans (the Burdekin Basin, Pioneer Valley, and Whitsunday). Groundwater is the main source of water supply in Bowen and is managed by the Bowen Groundwater Management Area water sharing rules.

Large volumes of supplemented water (i.e. water regulated through dams and weirs) are currently supplied through the MIW region via the water supply schemes of Bowen Broken, Proserpine, Pioneer, Eton, and to a lesser extent Burdekin Haughton. Allocations from the supplemented water supply schemes are subject to low levels of utilisation, particularly in the irrigation sector, with usage of available water for the period 2013-2019 averaging 37 per cent, 25 per cent, and 39 per cent for the Eton, Pioneer and Proserpine water supply schemes respectively.

Allocations in these water supply schemes are predominantly owned by sugarcane growers, and consultation with the industry indicates that many growers do not believe that the incremental farm gate revenue associated with increased production from irrigation is sufficient to justify the irrigation costs (water and energy).

Unsupplemented water supplies are also available extensively across the MIW region, particularly groundwater which formed the mainstay of water supply throughout the region prior to the development of the supplemented supply schemes. Usage data for unsupplemented entitlements is not published as a large proportion of users are unmetered, however utilisation is understood to be at similarly low levels to the supplemented water supply schemes, primarily due to irrigation costs relative to farm gate returns.

2.1. Legislative framework for water supply and use

Water in Queensland is governed under the *Water Act 2000*, which forms the legislative basis for the planning, allocation, and use of water throughout Queensland. The *Water Act 2000* applies a framework to the management of water that is made up of the following primary mechanisms:

- Water Plans and Water Management Protocols (previously known as Resource Operations Plans) that provide for allocation of water to users and the environment
- Water allocations, licences and permits that collectively form the entitlements which allow users to access water, and
- Resource Operations Licences (ROLs) and Distribution Operations Licences (DOLs) which provide the approval and rules for water service providers to operate water storage and distribution infrastructure.

Given that water use is governed by Water Plans with geographical boundaries that are based on drainage basins, it is appropriate to examine water availability and use within the MIW region by the Water Plans that it overlays. The MIW region cuts across four Water Plans including:

- Burdekin

- Whitsunday
- Pioneer Valley, and
- Fitzroy.

All the above plan areas are examined below with the exception of the Fitzroy. Whilst there is a degree of interaction between the Fitzroy and the MIW region it is limited to the control of the water supply for Clermont (Theresa Creek Dam falls under the Fitzroy Water Plan) and extraction of water from the Nogoa Mackenzie scheme via the Bingegang Pipeline which is jointly owned by Billiton Mitsubishi Alliance (BMA) and Anglo American. The pipeline has a capacity of approximately 10,000 ML per annum which is not material in the overall scheme of water usage in the MIW region, and information relating to the use of the water is not publicly available.

Whilst Water Plans exist across most areas of Queensland, there are a few notable exceptions, and within the MIW region Bowen falls into this category. Water availability in Bowen is dominated by groundwater, which is governed under a standalone set of water sharing rules for the Bowen Groundwater Management Area.

Water Entitlements: Allocations and Licenses

In Queensland 'water entitlements' is used as a general term that applies to all forms of rights to take water from the environment, including allocations and licenses.

Water licences are an old style of water entitlement based on a historical common law right of the occupier or owner of the land to take water. The *Water Act 2000* provides a framework that enables the separation of water entitlements from land, with these entitlements referred to as allocations. Allocations have a title separate from land and can be bought and sold independently.

RDMW are progressively converting all licences to allocations. Within the MIW region all supplemented water supplies exist as allocations, whilst the conversion of unsupplemented water supplies from licences to allocations has only been partially completed.

As with surface water supplies, access to groundwater is governed under the water planning framework enabled by the *Water Act 2000*. Under this framework, any new entitlements can only be obtained where there is unallocated water available in a reserve in the relevant water plan area. Access to these reserves is managed by RDMW who periodically release water from them through a public process (normally a tender).

Supplemented and Unsupplemented Water

Water supplies that are regulated through the capture and release of water from dams and weirs are referred to as supplemented water supplies. Groundwater can also be supplemented where regulating dams and weirs are constructed to increase the infiltration of surface water into an aquifer.

Water that occurs naturally as river flows or in aquifers without human intervention are referred to as unsupplemented water supplies.

2.2. Water supply

2.2.1. Burdekin Water Plan Area

The Burdekin Water Plan Area has the largest water supply scheme in Queensland in the form of the Burdekin Haughton Water Supply Scheme, and includes Burdekin Falls Dam. It is the second largest catchment neighbouring the Great Barrier Reef, and spans several climatic regions supporting a range of industries including mining, energy, sugarcane production, grazing and tourism (DNRME, 2019). Water available in the plan area is provided in Table 1.

Table 1 Water Availability in the Burdekin Water Plan Area

Entitlement Type	Entitlement Numbers				Nominal Entitlement	
	All	Volumetric	Area	Other	Volume (ML)	Area (HA)
Water Licences	475	336	20	119	110,534	1,459
Unsupplemented Water Allocations	45	45	0	0	41,082	0
Supplemented Water Allocations	844	844	0	0	1,114,521	0

Source DNRME, 2019

Burdekin Falls Dam provides most of the water taken from the catchment to users in the Burdekin Haughton scheme, and only a small portion is provided to the MIW region through the Burdekin Moranbah Pipeline. The pipeline conveys 22,600 ML of HP allocation 218km from Gorge Weir to the Moranbah Terminal Storage. This water supplies several mining companies, Dyno Nobel, Isaac Regional Council, and stock and domestic customers along the pipeline alignment. A portion of the water is then on-supplied to other areas east and south of Moranbah via the Sunwater owned Eungella Eastern Extension and Eungella Southern Extension pipelines, and to Caval Ridge and Peak Downs via the BMA owned Caval Ridge Pipeline.

Although the largest scheme within the Water Plan, Burdekin Haughton is not the sole scheme within the Burdekin plan area, the other scheme being the Bowen Broken. Unlike Burdekin, the Bowen Broken scheme is contained entirely within the MIW region, beginning with Eungella Dam in the Mackay Council area, and extending down the Broken river into the Whitsunday Council region.

Eungella Dam is the primary headworks for the Bowen Broken scheme with a storage capacity of 112,400 ML. Water is pumped directly from Eungella to Moranbah via the Sunwater owned Eungella Water Pipeline (15,000 ML per annum) and by BMA through their privately owned Eungella Pipeline (6,200 ML per annum). The scheme supplies water via the Broken and Bowen rivers, extending downstream to the Bowen River Weir where water is extracted by Sunwater via the Collinsville Pipeline (5,710 ML per annum) and Glencore via the privately owned Newlands Pipeline (3,940 ML per annum). Water is also released from the weir for river access by irrigation and stock and domestic customers.

Water Plan Reserves

Water Plans typically provide reserves, which are unallocated volumes of water that can be made available for release to users. Reserves are usually classified as either general or strategic.

General reserves can be accessed by any party providing they meet certain criteria set by RDMW when public releases of reserve volumes are undertaken. General reserves are often released as unsupplemented supply and taken as water harvesting (water taken from a river when the flow rate reaches a predetermined level) or overland flow (water taken from runoff before it reaches the river), with groundwater being taken from bores, wells, or spears.

Strategic (or State) reserves can only be accessed by a limited number of parties, typically those who have been classified as coordinated projects under the *State Development and Public Works Organisation Act 1971* or projects declared as having regional significance under the *Water Act 2000*. Surface water strategic reserves are typically accessed via infrastructure that creates a supplemented supply.

There is a relatively large amount of unallocated water still available in the Burdekin Basin as outlined in Table 2, indicating that there is still room for a significant amount of water resource development within the catchment. Some of these reserves are held for specific purposes, such as the 150,000 ML held for raising of Burdekin Falls Dam and the 8,744 ML that is specially reserved for Sunwater in the Bowen Broken system. Other reserves are more general in nature and can be accessed for any purpose providing they meet the relevant access criteria. An example is the 150,000 ML available as a strategic reserve in the Bowen Broken, which is currently being targeted by the Urannah Dam development that has been declared a Coordinated Project.

Table 2 Unallocated Water Available in the Burdekin Basin Water Plan

Reserved Purpose	Mean Annual Volume by Sub-Catchment Area (ML)							
	Lower Burdekin	Haughton	Bowen	Broken	Belyando-Suttor	Cape Campaspe	Upper Burdekin	Total
General Reserve	50,000	5,000	0	0	130,000	5,000	10,000	200,000
Strategic Reserve – State Purposes	0	0	0	0	9,200[13]	5,000	10,000	35,000
Strategic Reserve – Raising Burdekin Falls Dam	150,000		0	0	0	0	0	150,000

[13] Adani has secured 10,800ML of strategic reserve from the Belyando Suttor sub-catchment of the Burdekin Basin Water Plan area. This water is planned to be taken via a water harvesting facility located just downstream of the junction of the Belyando and Suttor Rivers on the border of the GW3 area.

Reserved Purpose	Mean Annual Volume by Sub-Catchment Area (ML)							
	Lower Burdekin	Haughton	Bowen	Broken	Belyando-Suttor	Cape Campaspe	Upper Burdekin	Total
Strategic Reserve – Bowen and Broken Infrastructure Reserve	0	0	150,000		0	0	0	150,000
Sunwater Reserve	0	0	8,744		0	0	0	8,744
Total								**543,744**

Source DNRME, 2019

2.2.2. Whitsunday Water Plan Area

The Whitsunday Water Plan Area lies on the east coast of Queensland and covers approximately 2050 km^2. It includes the sub-catchments of the Proserpine, Andromache and O'Connell rivers, Kelsey Creek/Lethe Brook, Thompson Creek and part of Six-Mile Creek.

Rainfall in the plan area is highly seasonal and varies considerably due to the influences of tropical cyclones and the inter-tropical convergence zone (DNRME, 2019).

Whilst one of the smaller water plan areas with respect to both supplemented and unsupplemented volumes available, water is an important part of the economic success of the Whitsunday area, supporting towns, industry, tourism, fishing, and agriculture, including sugar cane, beef and aquaculture. Water available in the Whitsunday Water Plan Area is summarised in Table 3 and Table 4.

Table 3 Entitlements in the Whitsunday Water Plan Area

Entitlement Type	Entitlement Numbers				Nominal Entitlement	
	All	Volumetric	Area	Other	Volume (ML)	Area (ha)
Water Licences	245	167	68	10	25,579	2,137
Supplemented Water Allocations	178	178	0	0	62,876	0

Source DNRME, 2019

Table 4 Unsupplemented Entitlements in the Whitsunday Water Plan Area

Water Classification	Volume Based Entitlements		Area Based Entitlements		No. of Entitlements with no Volume or Area Specified
	No. of Licences	Total Nominal Entitlement (ML)	No. of Licences	Total Area Based Entitlement (HA)	
Surface Water	47	7,377	68	2,317	10
Groundwater	120	18,202	0	0	0

Source DNRME, 2019

All supplemented water allocations are provided from the Proserpine scheme. The scheme has 92 customers, and delivers water to the townships of Bowen, Proserpine, Airlie Beach and Midge Point. Irrigation customers include the Kelsey Creek Water Board and the Six Mile Creek Water Board, who are Distribution Operation Licence holders supplying water to their own cooperatives. Water is used predominantly for sugar cane.

The only bulk water infrastructure in the scheme is Peter Faust Dam, which has a capacity of 491,000 ML. A groundwater management area has been established around the town of Proserpine. Groundwater in the remainder of the Whitsunday Water Plan Area is not licensed and is managed through landholders notifying RDMW about their groundwater works. This means there are no volumetric limits on these groundwater users.

The Whitsunday plan was established with the general and strategic reserves volumes outlined in the Initial Reserve column of Table 5. According to the Minister's Performance Assessment Report (DNRME, 2019), the general reserve was intended for the release of up to 9,500 ML in the Kelsey Creek/Lethe Brook and Thompson Creek sub-catchments and 19,000 ML in the O'Connell River and Andromache River sub-catchments.

Table 5 Unallocated Water Available in the Whitsunday Water Plan

Reserve Purpose	Initial Reserve	Remaining Reserve
General Reserve	28,500	26,800
Strategic Reserve	1,500	1,500

Source DNRME, 2019

In 2014, all 28,500 ML was made available to the market under a tender process in which the reserve price was not disclosed. No tenders were received that met the reserve, and hence no water was released. A second release process was subsequently undertaken in 2015 utilising a fixed price of $115 per ML, and this resulted in the sale of 1,700 ML. The Remaining Reserve column in Table 5 represents the volume of reserve that is available today following the outcomes of the 2015 tender.

2.2.3. Pioneer Water Plan Area

The Pioneer Water Plan Area covers approximately 2,400 square km and includes the Pioneer River and the Cattle, Finch Hatton, Owens, Sandy, Bakers and McGregor creeks. The Pioneer Valley is located west of the Central Queensland coastal city of Mackay. The area includes the Eungella National Park and the main urban centres of Mackay, Walkerston, Eton, Mirani and Marian. The

Pioneer River commences in the Pinnacle Ranges below Mount McBryde near Pinevale and flows in a northerly direction into the Pioneer Valley. At Mirani the river flows to the east before reaching its mouth and discharging into the Coral Sea at Mackay (DNRME, 2019).

Rainfall is highly variable within the plan area with hot, wet summers and mild, dry winters. Mean annual rainfall ranges from 1200 mm to 2000 mm per annum.

The Pioneer Water Plan encapsulates one of the largest sugar growing areas in Australia, and accordingly sugar cane growers are the primary beneficiaries of water supply in this region. Water is also used across the plan area to support towns, industry, tourism, grazing, and small pockets of irrigated horticulture crops. Water available in the plan area is provided in Table 6 and Table 7 below. Table 7 provides a more detailed breakdown of the water licences volumes that are provided as a single figure in Table 6.

Table 6 Entitlements in the Pioneer Water Plan Area

Entitlement Type	Entitlement Numbers			Nominal Entitlement		
	All	Volumetric	Area	Other	Volume (ML)	Area (ha)
Water Licences	431	402	0	29	34,312	0
Supplemented Water Allocations	943	943	0	0	141,037	0
Unsupplemented Water Allocations	520	520	0	0	62,088	0

Source DNRME, 2019

Table 7 Unsupplemented Licenses in the Pioneer Water Plan Area

Water Classification	Volume Based Entitlements		Area Based Entitlements		No. of Entitlements with no Volume or Area Specified
	No. of Licences	Total Nominal Entitlement (ML)	No. of Licences	Total Area Based Entitlement (Ha)	
Surface Water	164	12,810	0	0	29
Groundwater	238	21,502	0	0	0

Source DNRME, 2019

There are two supplemented water supply schemes in the Pioneer Water Plan Area, these being the Pioneer and Eton.

The major storage of the Pioneer scheme is Teemburra Dam with a capacity of 147,500 ML, supported by Dumbleton, Mirani, and Marian Weirs downstream. Teemburra releases water downstream into Teemburra Creek, Cattle Creek, and Palm Tree Creek.

The Pioneer scheme has a total of only seven customers, which understates the importance of the scheme that forms the backbone of urban water supply for Mackay and makes supply available to the Pioneer Valley Water Co-operative Limited (PVWater) who holds a Distribution Operations Licence to

supply water to 250 irrigation customers. PVWater distributes to irrigation customers in the riparian areas of Palm Tree Creek, Cattle Creek below Tanallo, and the Pioneer River, together with four reticulation supply areas, being Palmyra, Palm Tree Creek, Septimus and Silver McGregor.

The Eton scheme secures water from the Pioneer River during high flow events through water harvesting, with water pumped into Kinchant Dam and subsequently distributed via 35 km of open earth channels that transport water to various sections of the scheme with a further 130 km of pipeline delivering water to circa 350 (predominantly sugar cane) customers. The headworks of the scheme are owned and operated by Sunwater, but the distribution system was transferred to local management in 2020 and is now owned by Eton Irrigation Cooperative Limited.

The Pioneer Valley contains substantial groundwater resources that have been fundamental to the development of irrigated agriculture in the region. 4,650 groundwater extraction bores are utilised for agricultural, industrial, and urban supplies. Of these, an estimated 2,905 are in use for domestic water supply and 1,466 as irrigation bores. Thirty-seven industrial bores are utilised by sugar mills and other industries with the remaining 231 bores in the district nominated as stock watering bores (Department of Natural Resources and Water, 2005).

The Pioneer Water Plan has established reserves within the Pioneer sub-catchments 1 to 8, and within the Sandy Creek sub-catchment 12. These are outlined in Table 8, and the location of each sub-catchment is provided in Figure 3. There has been no release process undertaken in the Pioneer since the current plan was established in 2002.

Table 8 Unallocated Water Available in the Pioneer Water Plan

Reserve Purpose	Initial Reserve	Remaining Reserve
General – Surface Water Sub-Catchments 1 to 8	10,500	10,500
General – Surface Water Sub-Catchment 12	4,000	4,000

Source DNRME, 2019

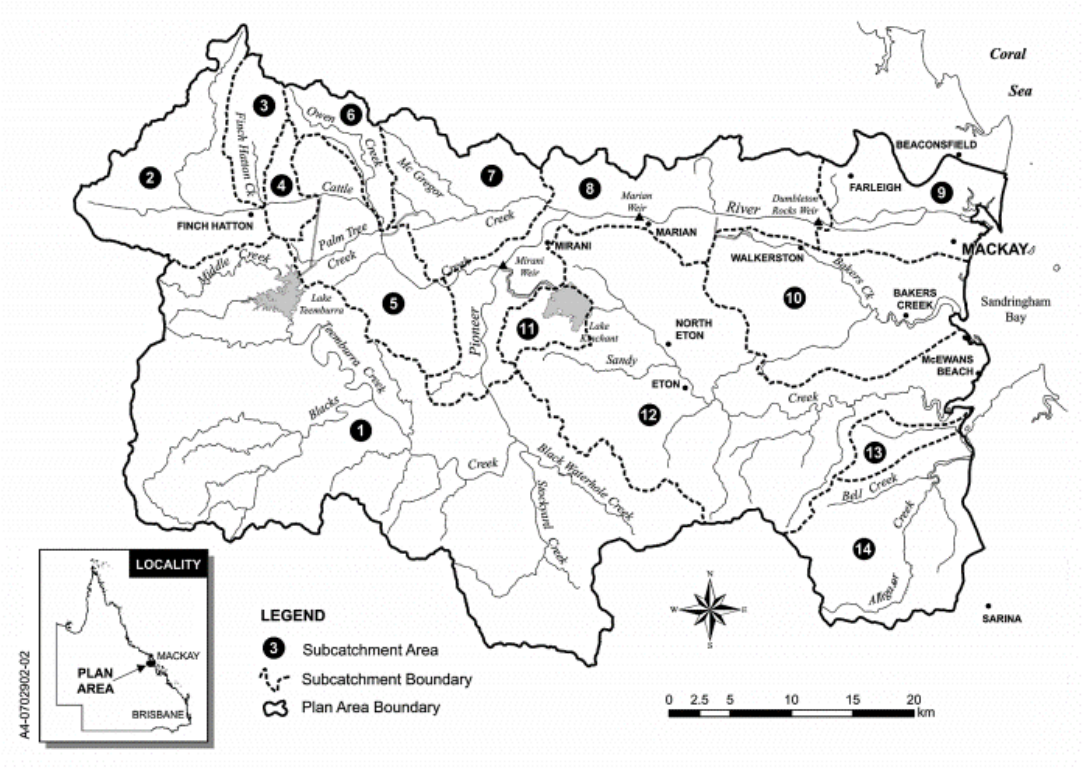


Figure 3 Pioneer Sub-Catchment Areas.

Source DNRME, 2019

2.2.4. Bowen Groundwater Management Area

The Bowen Groundwater Management Area overlies the area of alluvial floodplain associated with the lower reaches of the Don River and Euri Creek catchments. The lower reaches of these catchments are located to the west and south of Bowen (Department of Natural Resources, Mines & Energy, 2019).

The Bowen groundwater area is divided into 14 zones for management purposes. The zones are defined based on hydrological characteristics (notably aquifer yield and water quality) that may affect water availability.

Volumes of entitlements within the Bowen Groundwater Management Area are not published, however demand for water in the area is well documented. Increased pressure on groundwater supplies leading to over-pumping and subsequent seawater intrusion in the area has been documented in reports by the Commonwealth Department of Agriculture, Fisheries and Forestry in 2001 and by DNRME in 2004.

2.3. Water use and trade

When assessing the potential need for additional water supplies to support the growth of any industry sector, it is appropriate to first consider the level of utilisation of existing water supplies. In some instances, there may be an opportunity to better utilise existing resources, particularly if there are constraints or barriers in place that prevent water from being utilised to its full potential.

Identification of latent capacity in supply systems and strategies for removing barriers that are impeding the ability of the MIW region to harness the economic benefits associated with water is fundamental to any strategy seeking to address a water related service need.

The following section examines data relating to the uptake and use of both supplemented and unsupplemented water supplies within the MIW region.

Permanent versus Temporary Trade

Water allocations can be traded between water users on either a permanent or temporary basis.

Permanent trade of an allocation represents the transition of ownership of that allocation between parties, such that the title is transferred into the new owner's name providing them with the right to take water into perpetuity (pending availability). This is the same principle as the sale of land, with both allocations and land having their own title.

Temporary trade represents the sale of water available in a single water year that becomes available through the allocation. In this instance the title of the allocation remains in the name of the seller. This transaction can be thought of as taking a lease over land for a year; the purchaser has access to the property, but ownership remains with the seller.

2.3.1. Supplemented water use and trade

Data available from Sunwater's annual statistics has been collated and analysed to compare average volumes of water made available to customers through announced allocations against the volumes of water delivered or consumed. The graphs below show the utilisation data for the four key water supply schemes contained within the MIW region of Pioneer, Eton, Proserpine, and Bowen Broken. Utilisation is expressed as a percentage and represents the total amount of water delivered to or consumed by a particular customer segment relative to the total amount of water that was made available to that customer segment in each water year. Note that the Sunwater figures presented below generally relate to loss allocation that Sunwater holds to cover evaporation and seepage losses.

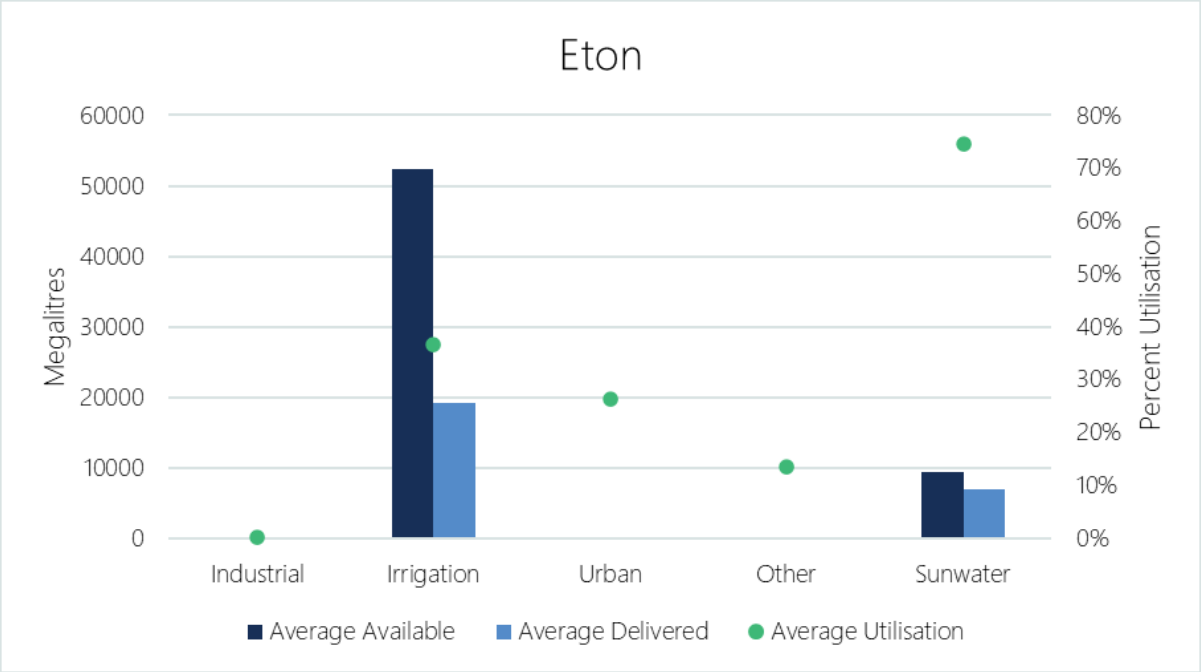


Figure 4 Eton Water Supply Scheme Utilisation 2013-2019

Source Sunwater, 2019

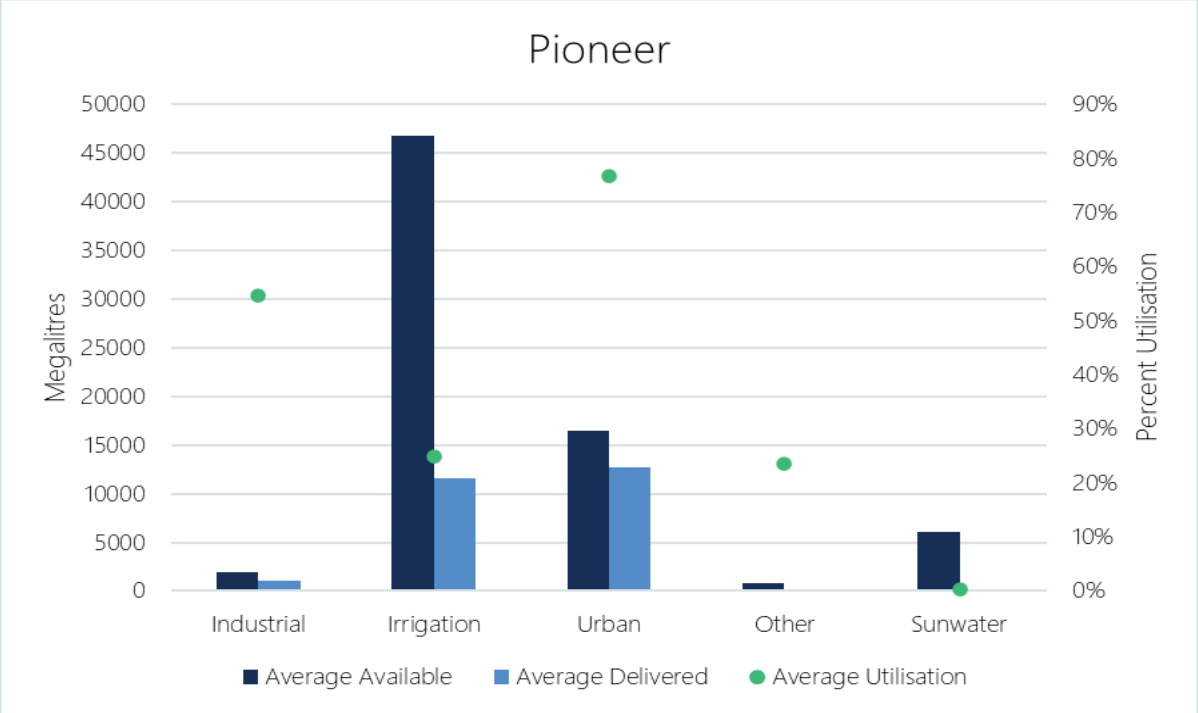


Figure 5 Pioneer Water Supply Scheme Utilisation 2013-2019

Source Sunwater, 2019

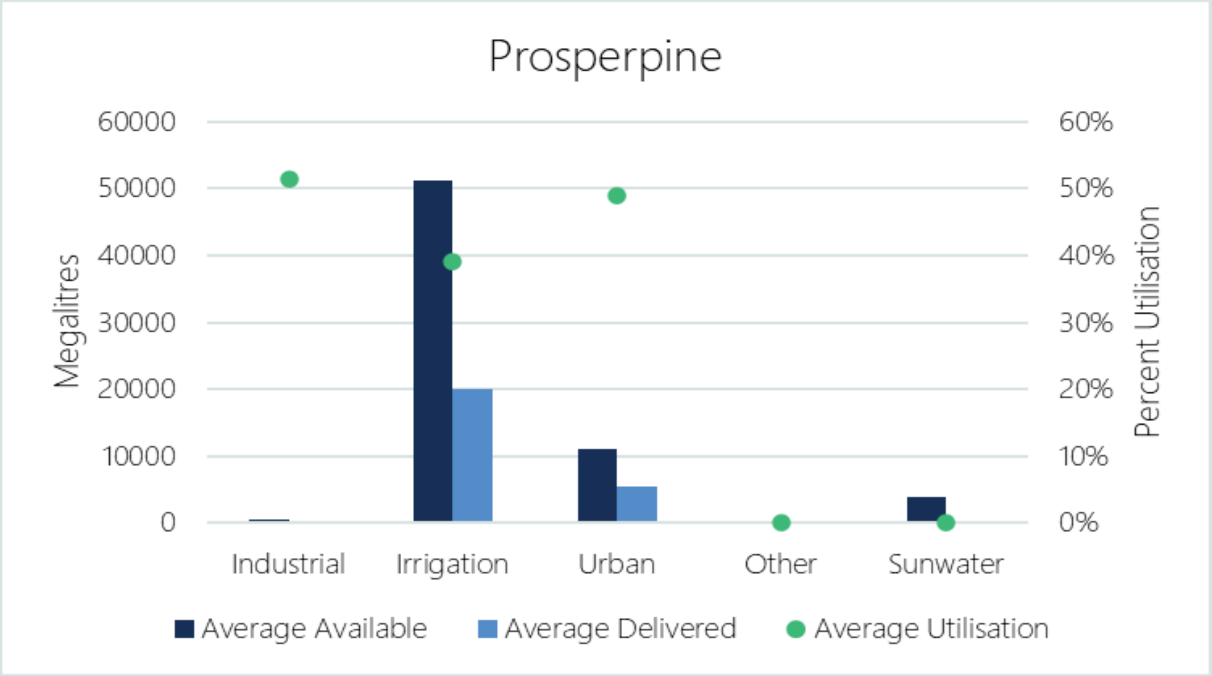


Figure 6 Proserpine Water Supply Scheme Utilisation 2013-2019

Source Sunwater, 2019

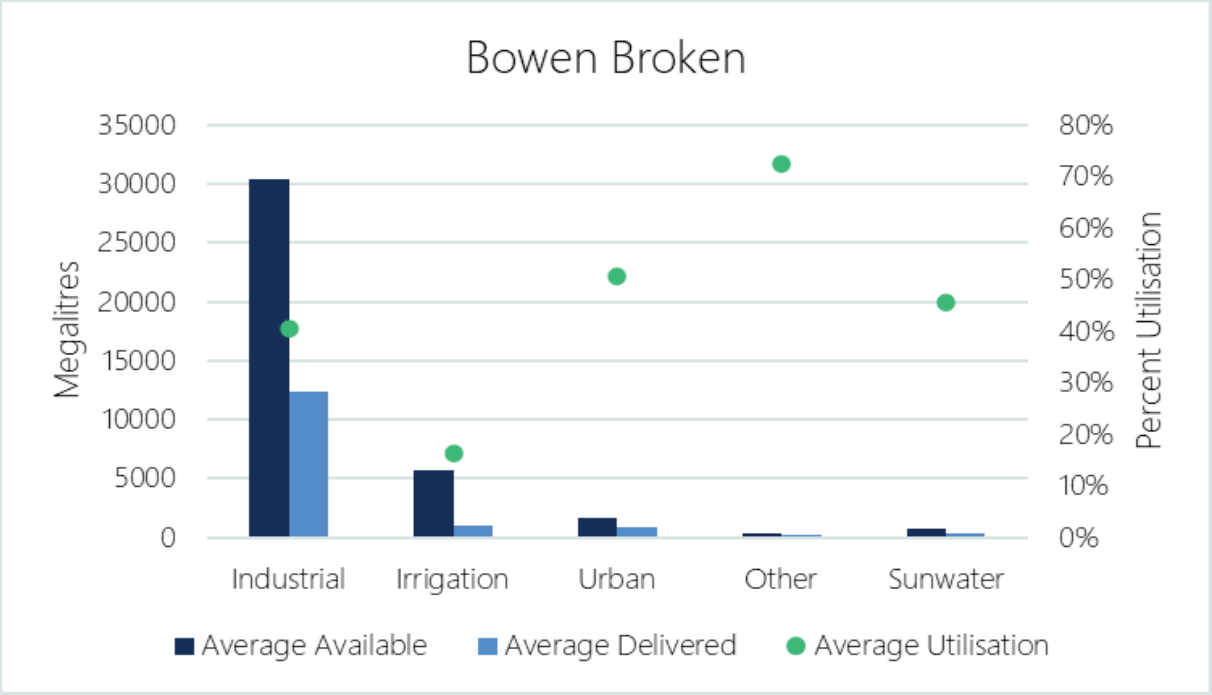


Figure 7 Bowen Broken Water Supply Scheme Utilisation 2013-2019

Source Sunwater, 2019

As the graphs illustrate, most water supplied to the Eton, Pioneer and Proserpine water supply schemes is held by irrigation customers with average utilisation figures across the most recent seven

years of data of 37 per cent, 25 per cent and 39 per cent respectively[14]. Utilisation by urban customers is variable, however in the water supply schemes where supply volumes are higher (Pioneer and Proserpine) so too is utilisation as these water supply schemes provide the primary supply source for Mackay and the towns of Bowen, Proserpine, Airlie Beach and Midge Point.

The irrigation utilisation figures are low by comparison to nearly all other water supply schemes in Queensland. Discussions with irrigation customers and their representative bodies suggest that sugar cane growers are operating toward the limit of their margins given the current cost of both water and electricity which is required to distribute water on-farm. Many growers are effectively subsistence farming, and there is anecdotal evidence suggesting that some growers choose not to irrigate because they believe that marginal cost of every ML of water applied exceeds the marginal benefit. The Pioneer and Eton schemes were originally designed as supplementary supplies that bolster natural rainfall and hence dryland farming in these areas is not uncommon, however production opportunities are lost when irrigation water is not applied. The Ergon agricultural Tariff 62 will expire on 30 June 2021[15].

The Bowen Broken scheme contrasts heavily against other water supply schemes in the MIW region due to the majority of water being held by the industrial sector which is comprised almost exclusively of coal mining companies. Utilisation figures for this scheme for this primary customer group are also low, but for very different reasons to the coastal sugar cane water supply schemes.

Mining customers seek to hold sufficient allocations to meet their forecast maximum demand requirements in any year and have a very low appetite for risk relating to water availability because it is a critical input to their production process. Whilst critical, it is also relatively low cost by comparison to other production inputs and revenue, and hence most miners chose to hold allocations that are in excess of their average requirements as a hedge against drought conditions. In addition, most miners will (either by choice or by regulation through conditions of their mining licence) capture run-off from site and reuse this water in their production process, thereby further bolstering supply and reducing the dependency on external supply sources.

Supplemented water – permanent trade

Permanent trade figures for supplemented supplies across the MIW region reflect the generally low level of utilisation and associated lack of demand for access to long term entitlements. A summary of permanent trade data available from the Business Queensland web site is provide in Figure 8 below. Percentage figures represent the amount of allocations traded each year relative to the total amount of allocations available in each scheme.

[14] MIW area sugarcane normal year irrigation requirement is approximately 4 to5 ML ha. Currently average use is 1.2 ML/ha (perss comm).

[15] The recommended alternative T44 will increase electricity charges for PVWater by 60 per cent.

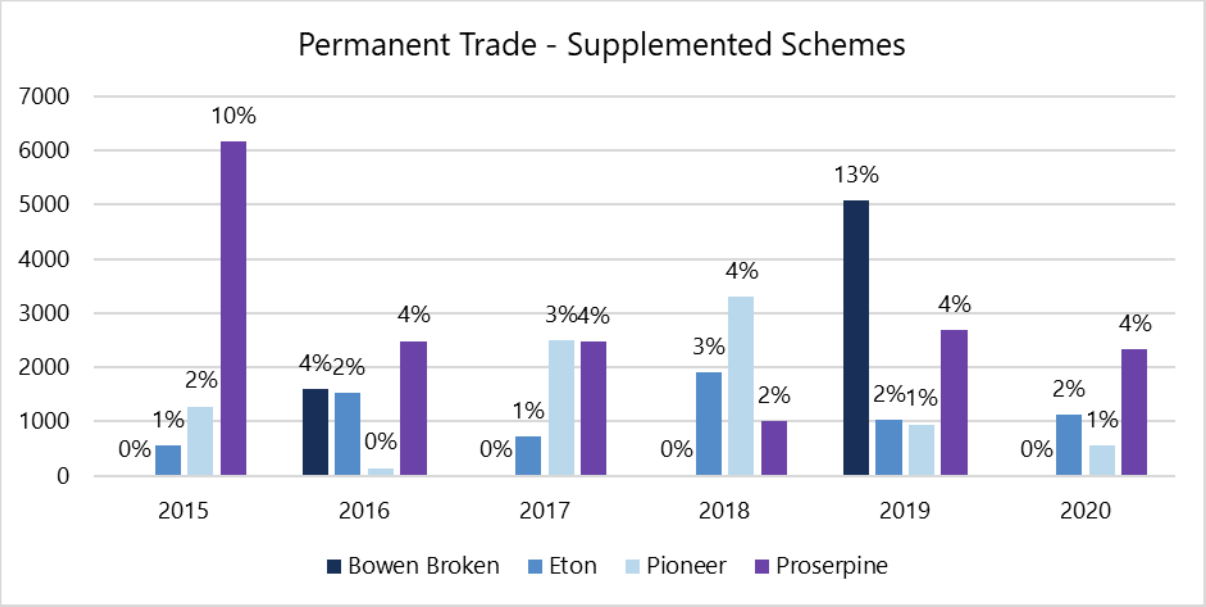


Figure 8 Supplemented Supply Scheme Permanent Trades

Source Business Queensland, 2020

Eton and Pioneer both averaged two per cent permanent trading over the six-year period of available data. This is consistent with utilisation data in these water supply schemes, and also reflects comments by stakeholders that in water supply schemes such as Eton there are sugar cane growers seeking to exit the industry but are unable to do so simply because they cannot sell their allocations and have an ongoing obligation to pay their Part A (fixed bulk water) and Part C (fixed distribution) charges.

Proserpine exhibits consistently higher permanent trades in percentage terms than the other water supply schemes, although the reasons for this activity are not well understood. It is worth noting that usage prices in Proserpine are less than half of Eton, with the 20/21 Part A prices for MP allocation set at $13.26, as opposed to $31.36 for High B allocation at Eton which provides a lower input cost for the same crop. However, the price is comparable to the Part A charges in Pioneer of $14.81 where usage is extremely low at 25 per cent and trading in percentage terms is on average only half of the activity observed in the Proserpine scheme.

Table 9 Fees and charges for MIW Water Supply Schemes for 2020/21[16]

Tariff Group	Charge		$/ML
Eton Water Supply Scheme			
Bulk Water High Priority B	Fixed	Part A	31.36
	Variable	Part B	4.05
Bulk Water – Local Management Supply High Priority B	Fixed	Part A	31.36
	Variable	Part B	41.05

[16] Note that HP prices are not published by Sunwater for any of the MIW schemes other than Eton. All MP prices quoted are for irrigation customers who are subject to the Rural Water Pricing Direction set by the QCA, i.e. lower bound pricing. Customers who are non-irrigation users are not subject to the Direction and pay upper bound prices unless otherwise stated in legacy supply contracts. Upper bound prices are not published by Sunwater.

Tariff Group	Charge		$/ML
Bulk Water – Local Management High Priority A	Fixed	Part A	117.49
	Variable	Part B	4.05
Pioneer River Water Supply Scheme			
Pioneer Valley Water Co-operative Ltd (PVWater)	Fixed	Part A	14.81
	Variable	Part B	3.13
Proserpine River Water Supply Scheme			
River	Fixed	Part A	13.26
	Variable	Part B	3.02
Kelsey Creek Water Board	Fixed	Part A	12.14
	Variable	Part B	3.02
Bowen Broken Rivers Water Supply Scheme			
River	Fixed	Part A	12.50
	Variable	Part B	6.95

Source Pioneer Valley Water, 2021

The charges in the table above for PVWater are the Sunwater charges only. The charges from PVWater to their customers are provided in Table 10 below.

Table 10 Pioneer Valley Water Cooperative Limited Charges 2020/21

Area	Access Charge ($/ML)	Usage Charge ($/ML)
Riparian	36.50	3.13
Palmyra	49.30	33.85
Silver McGregor Pipeline Creek	 49.45 47.05	 43.58 43.58
Septimus	56.75	54.72
Palm Tree Creek Pipeline Cattle Creek	 59.75 40.80	 7.54 4.30

Permanent trades in the Bowen Broken scheme are relatively large and sporadic, reflecting the nature of trading between the miners which is infrequent but tends to occur in large volumes that are associated with allocations transferring between new mines opening and older mines being decommissioned (rather than simply trading the water entitlement itself). It should be noted that movement between miners who hold term allocations (similar to a lease) from Sunwater are not reflected in the trade data, as Sunwater retains ownership of these entitlements and simply changes

contracted volumes between parties. This applies to all water transported via the Eungella Water Pipeline and the Burdekin to Moranbah Pipeline.

Supplemented water – temporary trade

Temporary trade data largely reflects the trends identified in the permanent trade data from the cane growing water supply schemes, with seasonal trade volumes particularly low in Eton and Pioneer and far larger volumes changing hands in the Proserpine scheme.

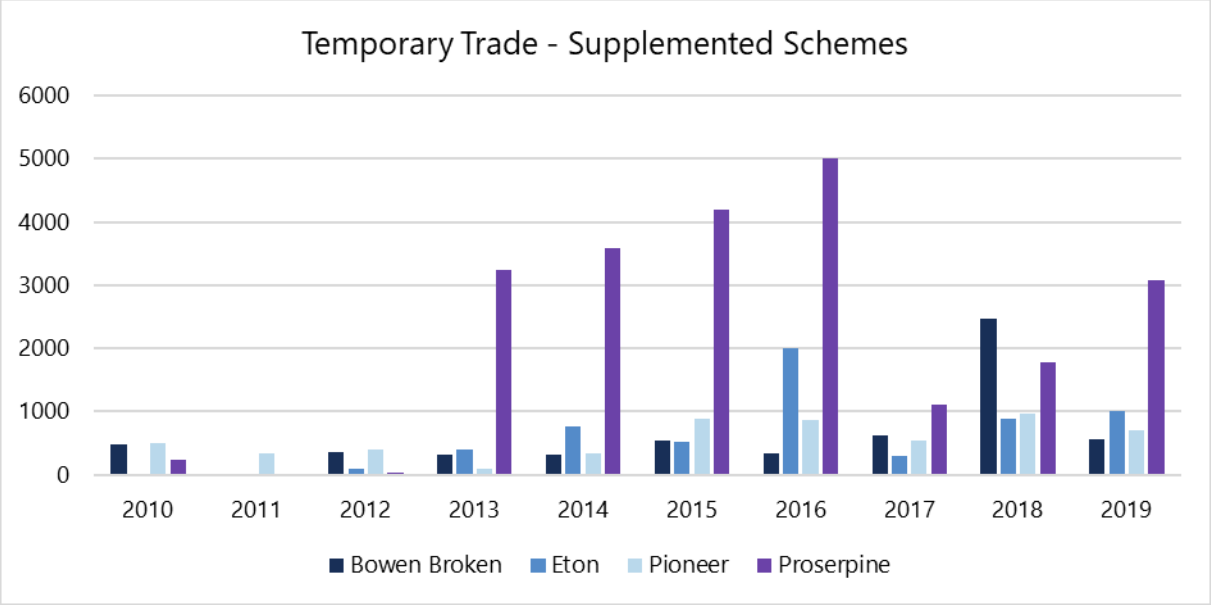


Figure 9 Supplemented Temporary Trade

Source Sunwater, 2019

With the exception of 2018, temporary trade volumes are also low in the Bowen Broken. The exact source of the 2018 anomaly cannot be identified as trading details are not provided by Sunwater, although the most likely cause is temporary water being sourced for construction purposes while longer term supplies are being secured. The approach of commencing mine construction without having long term supplies secured was previously thought to be too high risk for miners, but in recent years this notion has been turned on its head by several coal mining companies in both the northern Bowen and Galilee Basins.

2.3.2. Unsupplemented water use and trade

Utilisation data for unsupplemented allocations is not publicly available. This is largely because a high proportion of unsupplemented water users are unmetered, and hence utilisation data for large parts of Queensland does not exist. RDMW is currently implementing the Rural Water Management Program which includes proposals for strengthening non-urban water measurement to address issues associated with the lack of information regarding unsupplemented water use.

Unsupplemented water – permanent trade

Business Queensland provides records of all permanent trades of entitlements recorded in Queensland, however the data available within the MIW region is limited almost exclusively to the Pioneer, with the exception of one year of data available for trade of surface water in the Bowen

Broken. Permanent trading data for unsupplemented surface and groundwater supplies are provided in Figure 10 and Figure 11. The graphs highlight that the majority of trades occur in conjunction with property (and hence business) transfers rather than allocations being sold alone, which underscores the lack of activity in the water market within the region generally.

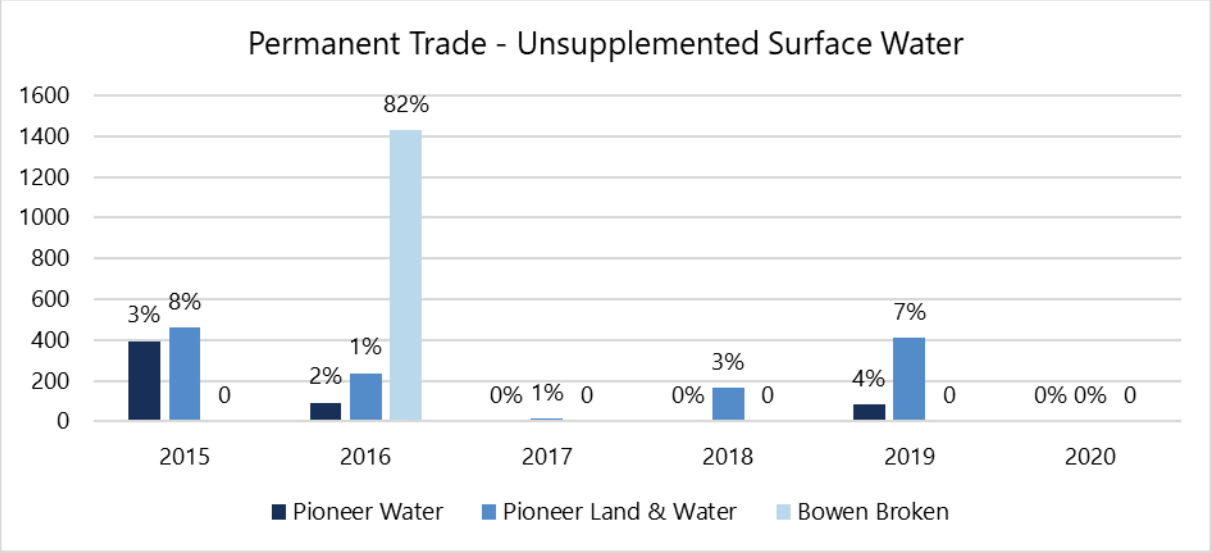


Figure 10 Unsupplemented Surface Water Permanent Trade

Source Business Queensland, 2020

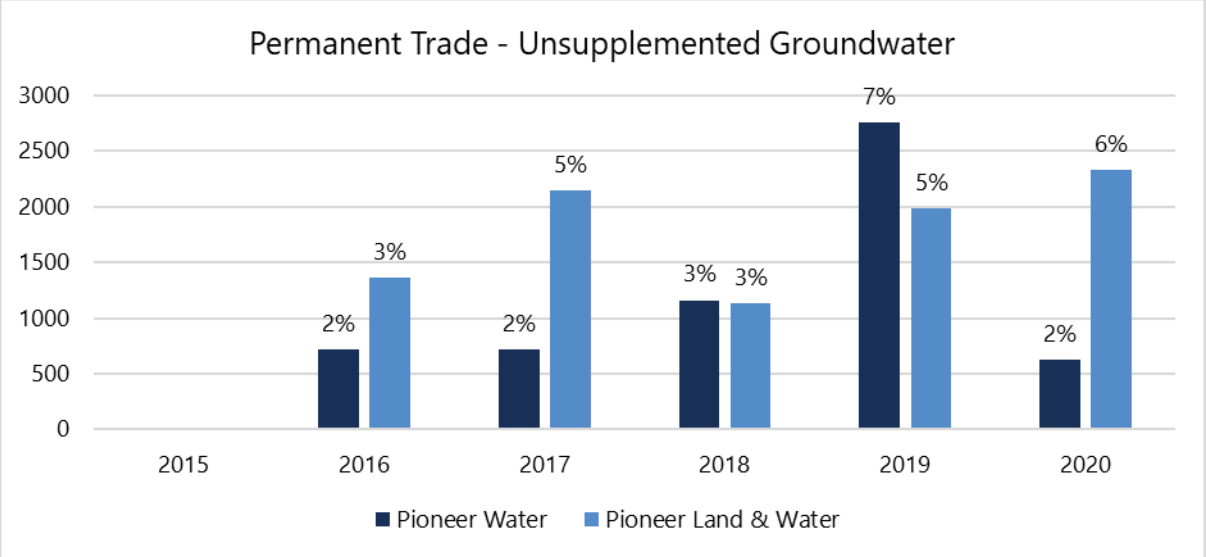


Figure 11 Unsupplemented Groundwater Permanent Trade

Source Business Queensland, 2020

Trades in the Pioneer have been captured as both pure water sales and sales that have been undertaken as a package with the transfer of land. The data provides a clear contrast against supplemented allocations where trade percentages average 2 per cent for the Pioneer scheme over a similar period, with a far more active market in unsupplemented water. This is likely to relate to cheaper usage charges, with unsupplemented water attracting a charge of 4.80 dollars per ML, around a quarter of the combined Part A and Part B charges for surface water in the same scheme.

2.4. Potential future demand

Potential future demand for water in the MIW region is a core component of understanding water related service needs.

2.4.1. Mackay region water demand

With respect to agriculture, the water utilisation data presented in Section 2.3 clearly shows that available water supplies are not being fully utilised, and whilst affordability of water and electricity are key issues that need to be addressed if the sugar sector is to prosper, there is no identified need for additional water supply to support agriculture in the area. There are no known existing proposals to introduce alternative crops into the Mackay area.

The Mackay Regional Water Supply Security Assessment was undertaken by the Department of Energy and Water Supply (DEWS) in collaboration with Mackay Regional Council in 2017. The assessment concluded that with an adopted annual population growth rate of 1.57 per cent from 2014 to 2036, Mackay and Sarina combined will increase from 128,7000 equivalent persons (EP) in 2015 to 173,300 EP by 2036.

Mackay Regional Council has estimated current average water use per person at 280 Litres/EP/day. Using this data as the basis of forecast water consumption, Council's current water allocation could be fully utilised by 2028 assuming that Sarina was solely supplied from the Mackay reticulation network. The projected average urban water demand for Mackay's reticulation networks is shown in Figure 12.

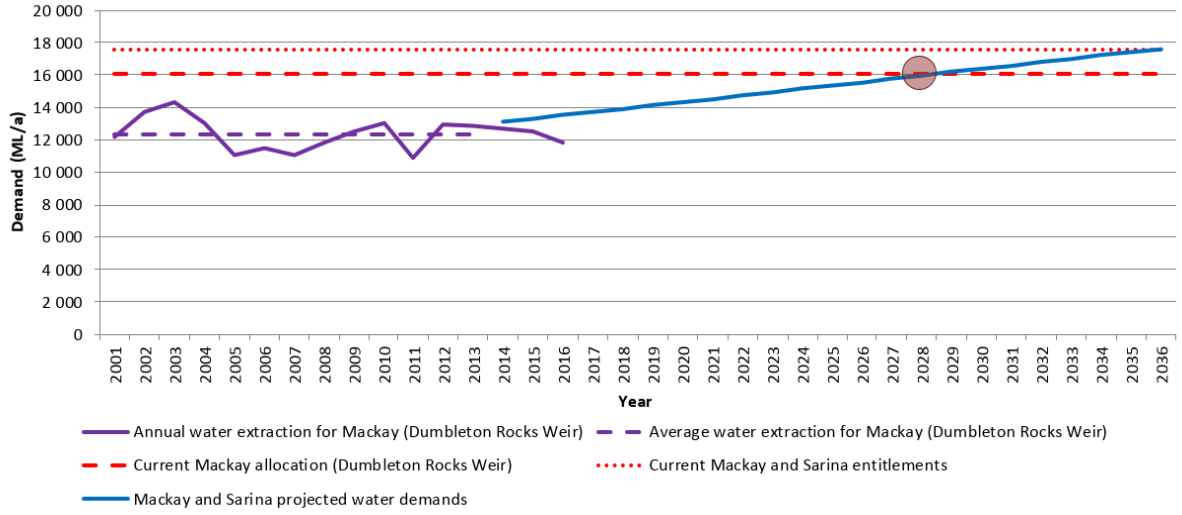


Figure 12 Projected average urban water demand for Mackay

Source Department of Energy & Water Supply, 2017

Sunwater holds 12,735 ML of unsold high-class A water allocation which is likely to meet Mackay's urban supply requirements in the medium term. The (then) Department of Energy and Water Supply undertook stochastic modelling to determine the risk of supply interruptions that could be incurred assuming varying levels of demand and utilisation of Sunwater's uncommitted high-class A allocations. Modelling indicated that there are no instances of Dumbleton Rocks Weir (where Council supply is sourced) reaching minimum operating volume in the modelling simulation period. However, this assumes full access to Sunwater's uncommitted allocations and an ongoing low level of utilisation

by irrigation customers in the scheme. Given that GW3 is actively seeking to increase the uptake of available allocations by the sugar industry in the Pioneer (together with Eton and Proserpine), consideration should be given to the impact of heavier utilisation of the Pioneer system, and the potential requirement for additional supply options to meet urban demand in the Mackay Regional Council area. This issue is considered further in Section 4.6.3.

2.4.2. Whitsunday region water demand

A number of studies into water demand for the Whitsunday region have been undertaken in recent years and have been reviewed and updated most recently by the Urannah Water Scheme preliminary and detailed business cases. The Urannah Water Scheme is seeking to proactively develop irrigation, mining, and renewable energy initiatives through the construction of Urannah Dam on the Broken River. The current strategy identified in the draft Detailed Business Case for the Urannah Water Scheme is to utilise up to 103,000 ML of HP water on the following basis:

- 70,000 ML of HP supply to enable the development of the Collinsville Irrigation Scheme, consisting of circa 9,500 Ha of high value horticulture
- 30,000 ML of supply to industrial customers, most notably coking coal mines under development in the Bowen Basin
- A pumped hydroelectric facility of up to 1,200 megawatts which will utilise the dam as the lower reservoir from which water will be pumped to an upper reservoir using solar power during daylight hours and released to generate hydro power in periods of peak demand.

Beyond the large opportunity presented by the Urannah Water Scheme there are also a number of smaller discrete but high potential demands for water across the Whitsunday area including:

- *Water for Bowen* – As outlined in Appendix B, Water for Bowen has taken a number of forms in recent years to address various levels of forecast demand for agriculture in Bowen and growth in the Abbot Point State Development Area (SDA). Whilst a number of water supply projects have been considered for Bowen, there has been a consistent call for additional water supply from existing established growers seeking high security water to underpin expansion in irrigated agriculture in the order of 17,000 ML per annum. Good quality agricultural land combined with a relatively dry and warm climate provide a perfect opportunity for the expansion of the existing horticulture industry in the area. Opportunities for expansion are likely to focus on export markets, which in turn would require processing facilities that will add to the level of demand for water.
- *Aquaculture* – Proserpine is Tassal Group's largest prawn farm, with more than 270 Ha of land-based pond systems across the site already in operation, and approvals for further expansion in coming years. Tassal is known to be seeking an additional 5,000 ML of HP allocation in the short term to facilitate expansion of their operations in the area, increasing to 10,000 ML in the longer term.
- *Abbot Point* – North Queensland Bulk Ports may require additional volumes of water to support an increase in coal exports through the terminal pending the level of growth activity experienced in the Galilee Basin. North Queensland Bulk Ports have also been examining options for hydrogen production, although the current concept is for green hydrogen that would be created from desalinated seawater and therefore not require external water supply.

Whitsunday Council are not seeking additional water supply for urban purposes at this point in time. As outlined in Appendix B, existing surface and groundwater supplies are regarded as adequate for urban needs based on likely population growth forecasts until around 2036.

2.4.3. Isaac region water demand

The key drivers for water demand in the Isaac Council area are clearly divided into two categories; growth in coal mining projects that dominate industry across the area, and urban demand that is directly correlated to supporting the mining industry.

Bowen River Utilities commissioned a water demand assessment for the mining sector in the Bowen Basin in support of the Urannah Water Scheme preliminary business case. The assessment was a desktop exercise that examined water demand using two methodologies. The first was a regression analysis based on historical production, and the second was utilisation of coal growth forecasts by the Mineral Council of Australia. In both cases coal tonnages were forecast and historical water usage patterns overlain to obtain a view on future water demand. On a regional basis, the review identified a potential for a demand of between 30,600 ML per annum to 42,520 ML per annum over the next 20 years (2040).

More recently several interviews have been held with mining companies by both Bowen River Utilities to support their detailed business case and as part of the North Region Demand Study undertaken by Synergies and commissioned by Sunwater. The engagement was undertaken with mining companies who have known demands for planned mine developments. The work also identified a number of forecast mine closures in the region that will release supplement water supplies back to the market. Both of these more recent studies have identified a net increase in water demand in the Bowen Basin of circa 20,000 ML.

This updated figure correlates with data collected from mining companies undertaken as part of the service need analysis and has been adopted as the figure for mining demand for the purpose of this Strategy. At present there is no supply source available to meet this demand. Burdekin Falls Dam contains 35,000 ML of uncommitted HP allocation, however there is no available transport capacity in the Burdekin to Moranbah Pipeline. There is circa 3,000 ML of allocation unsold in the Eungella Water Pipeline.

Isaac Regional Council has developed demand forecasts for the towns that are currently dependant on supply from mining companies, and this data is summarised in Table 11. For the purposes of identifying the service need, both the net increase and the total annual forecast demand should be considered given the supply risks currently associated with Council's legacy supply agreements.

Whilst supply volumes are a key issue for Council, so too is distribution of allocations to key demand locations. For example, Dysart and Middlemount are currently supplied via BMA's Bingegang Pipeline. Whilst Dysart had no supply restrictions in place at the time of writing, supply to Middlemount was capped at 500 ML/a due to other mining related demands. This volume of supply is not sustainable for the current population, and ongoing dependency on pipeline infrastructure owned by mining companies where urban supplies are contingent on mine requirements represents a high risk to urban water security.

A more detailed assessment of the current status of water supply for each of the towns in the Isaac Regional Council area is provided in Appendix B.

Table 11 Forecast water demand for selected Isaac Regional Council towns

Town	Average annual water demand 2016 to 2020 (ML/a)	Forecast annual water demand by 2036 (ML/a)	Net Increase (ML/a)
Moranbah	2805	3869	1064
Dysart	962	1512	550
Middlemount	564	855	291
Glenden	543	941	398
TOTAL	**4874**	**7177**	**2303**

3. Water source analysis

Outcomes of this chapter

There are existing unsold supplemented surface water supplies available within the region, notably 12,375 ML of high-class A water from the Pioneer, 10,500 ML of HP allocation from the Proserpine scheme, and 35,000 ML of HP allocation in Burdekin Falls Dam. The Pioneer supply is earmarked to underpin urban supply for Mackay into the medium term, although it has yet to be secured by Mackay Regional Council.

There are also opportunities for new bulk water infrastructure development in the region that draw upon the available reserves in the relevant water plans, particularly in the Burdekin Basin:

- The proposed Urannah Water Scheme in the Bowen Broken system is a regional supply option that could deliver 103,000 ML of HP allocation for high value irrigation in Collinsville. The scheme could, via a southern or northern pipeline, also supply water to miners in the Bowen Basin, high value irrigation in Bowen, broadacre irrigation in Proserpine or industrial uses at Abbot Point.
- Burdekin Falls Dam Raising is currently being investigated by Building Queensland and could deliver between 150,000 to 575,000 ML of new supply depending on the options selected (noting that the Water Plan currently only allows for 150,000 ML).

Distribution infrastructure features heavily in the supply options given the requirement to deliver new and underutilised supply sources to their respective demand nodes. Pipeline options have been identified for supply to Bowen, Proserpine, Moranbah and surrounding areas in support of irrigated agriculture, aquaculture, urban and mining expansion.

A mine water reuse scheme is also contemplated. As of 30 June 2020, 185,570 ML was reported as being stored at 31 mine sites within the Bowen Basin, representing a volume of water 25 per cent greater than the capacity of Teemburra Dam. Utilisation of this resource represents an opportunity to decrease pressure on existing surface water supplies and open new prospects for agriculture as mines reach end of life.

3.1. Surface water sources

Existing supply options

The location and pattern of water resource development within the Mackay, Isaac and Whitsunday Region has been influenced largely by the rural and resources sectors, in particular the sugar industry and coal mining. There are nine major storages located in the Region. Weirs have been constructed on the Pioneer River at Mirani, Marian and Dumbleton Rocks and Burdekin River at Gorge Weir and Blue Valley while Peter Faust Dam, Kinchant Dam, Burdekin Falls Dam and Eungella Dam have been built on the Proserpine River, Sandy Creek, Burdekin River and Broken River respectively.

The largest storage is Burdekin Falls Dam, which has a capacity of some 1,860,000 ML. Eungella Dam is utilised primarily for mining supply with two pipelines extracting water from the dam directly, and also

operates in conjunction with Bowen River Weir and the Gattonvale Offstream Storage downstream to provide water for mining and irrigation purposes. Peter Faust Dam is a 'multipurpose' storage providing additional water for irrigation and urban development, while protecting the town of Proserpine and the highly developed agricultural areas from major flooding. Teemburra Dam operates as a system with the three weirs on the Pioneer River, to provide water for irrigation, urban and industrial purposes. Finally, Kinchant Dam with a storage capacity of 62,800 ML harvests water from the Pioneer River and acts as the headworks for the Eton Water Supply Scheme. This water infrastructure is shown in Figure 13 and is further described below.

Figure 13 Existing and Potential Surface Water Sources

3.1.1. Pioneer River Water Supply Scheme

Teemburra Dam

The Teemburra Dam is owned and operated by Sunwater. It is located approximately 6 km south west of Pinnacle, on Teemburra Creek at AMTD 20.5 km approximately 50 km west of Mackay. Teemburra

Creek is a tributary of the Pioneer River which flows into the Coral Sea at Mackay. The dam receives inflow from a catchment area of 67.45 km2 and has a storage capacity of 147,600 ML.

The dam consists of a main embankment on Teemburra Creek and two saddle dams located at low sections on the perimeter of the reservoir. The main dam is a 57 m high and consists of a concrete-faced rockfill embankment. The spillway is located on the right abutment of the main embankment and consists of an uncontrolled concrete ogee crest structure and an unlined stepped chute. Both saddle dams are zoned earth fill embankments with central clay cores.

The main dam regulates flows into Teemburra Creek; Saddle Dam two supplies water into the Palm Tree Creek pipeline.

Teemburra Creek is a headwater creek of Blacks Creek and Palm Tree Creek (a further headwater creek of Cattle Creek). Both Blacks and Cattle Creeks flow into the Pioneer River. The primary outlet works are located at Saddle Dam two and deliver water to the adjacent Cattle Creek Valley to primarily supply irrigation demand. The Palm Tree Creek Pipeline delivers water to a regulating valve outlet on Palm Tree Creek from the toe of the Saddle Dam. This Pipeline runs 1.8km from the Saddle Dam to the Palm Tree Creek outlet and is about 180m lower in elevation than the reservoir. Water is then conveyed via Palm Tree Creek to Cattle Creek, approximately 8km downstream of the outlet works.

The dam was designed by Department of Natural Resources, State Water Projects, and was constructed by Thiess Contractors over the period from 1994 to 1997. Teemburra Dam supplies water for the Pioneer Valley irrigation system and also for urban and industrial purposes in the region.

The Pioneer River Water Supply Scheme was developed primarily to provide a reliable supply of water for urban, industrial and agricultural uses around Mackay and districts. The Teemburra Dam is one of a number of storages (Teemburra Dam, Mirani Weir, Marian Weir, and Dumbleton Rocks Weir) which comprise the Pioneer River Water Supply Scheme.

Dumbleton Rocks Weir

Dumbleton Rocks Weir was constructed by Mackay Regional Council to provide an urban water supply and has been subsequently upgraded twice as part of the Pioneer River Water Supply Scheme in 1993 and 1997. It is located on the Pioneer River at AMTD 16.5km and has a storage capacity of 6,110 ML. It is a mass-concrete structure with a fish lock. The spillway is 146m wide.

The main raw water supply to Mackay is sourced from the river water intake situated on the southern side of the Pioneer River at the Dumbleton Weir.

Marian Weir

Marian Weir is located on the Pioneer River at AMTD 32 km, about 16 river km upstream of Dumbleton Rocks weir, the main water supply for Mackay City. It has a storage capacity of 3,980 ML.

Marian Weir was constructed in 1952 to supply Marian Sugar Mill and irrigators in the region. It is owned and operated by Sunwater. The triangular shaped weir is 5.18 m high, 186 m long. In February 1954, the left bank of the weir was washed away in a flood. It was then repaired by extending the weir further to the left bank by about 67 m. The axis of the extended weir is angled to the original axis.

Mirani Weir

Mirani Weir was built after Marian Wier to provide additional yield for downstream irrigators and provide a pumping pool for diversions to Kinchant Dam. It is owned and operated by Sunwater.

Mirani Weir is situated on the Pioneer River at AMTD 45.7 km. It is a mass-concrete structure with a 120m-wide spillway and outlet works with a capacity of 300 ML per day. The weir has a storage capacity of 2,730 ML.

Available Supply

As outlined in section 2, Sunwater holds 12,735 ML of unsold high-class A water allocation in the Pioneer which is likely to meet Mackay's urban supply requirements in the medium term.

3.1.2. Eton Water Supply Scheme

Kinchant Dam

Kinchant Dam is owned and operated by Sunwater. The dam is situated approximately 30 km west of Mackay at AMTD 9.4 km on Sandy Creek (North Branch). Kinchant Dam has a storage capacity of 62,800 ML. The dam was constructed in stages commencing in 1974 with the current state of development being completed in 1986. The purpose of the dam is to supply irrigation water to the Eton Irrigation Area.

The main embankment is constructed of earth and rockfill. A small saddle dam is located near the right bank of the dam. Irrigation releases are made through an outlet on the right bank to the Oakenden Main Channel. During flooding, controlled releases are made through this outlet into an overflow channel which discharges into Sandy Creek (North Branch), uncontrolled releases are made via an emergency spillway located on the left bank which discharges into a tributary of Sandy Creek.

The dam is designated a High Hazard Dam in accordance with the Australian National Committee on Large Dams (ANCOLD) Guidelines. Sunwater has recently performed a dam safety upgrade for the dam.

Available Supply

There is no unsold water available in the Eton scheme, although as outlined in section 2 utilisation is low and there are opportunities for both temporary and permanent trade to support transition to alternative water uses.

3.1.3. Proserpine Water Supply Scheme

Peter Faust Dam

The Peter Faust Dam is owned and operated by Sunwater. The dam was constructed in conjunction with downstream levees and creek modifications to provide some flood attenuation benefits to the township of Proserpine and surrounding communities.

Peter Faust Dam is a 530m long and 56m high earth and rockfill structure with a storage capacity of 491,400 ML. The dam became operational in 1990. The inlet works consist of an inlet tower and a 2,400 mm conduit. Its outlet has been blanked off. The outlet works consist of three offtakes connected to the inlet conduit; two for the river outlet and one for the Kelsey Creek Pipeline.

The Dam's ungated spillway is located on the right-hand side of the dam wall. It consists of a curved approach channel benched out of the riverbank, an ogee type crest, and a straight concrete-lined outlet chute that ends at a plunge pool. The spillway and the dam wall are designed to temporarily

hold water well above spillway control level, so that the discharge of extreme inflows is kept below 98,000 ML/d to mitigate downstream flooding.

Available Supply

There is 10,500 ML of unsold HP allocation available in the Proserpine scheme which could be used to service aquaculture demands in the Proserpine area or high value horticulture in Bowen. As the volume is inadequate to meet both requirements consideration could be given to purchase of unutilised MP allocation and conversion to HP. This conversion is allowed for under the Water Plan with an exchange ratio of 1.3:1 when converting A1 MP allocation to HP (e.g. 130ML of A1 MP allocation can be converted to 100ML of HP allocation). However, there is an upper limit cap for the volume of HP water that can be held in the Proserpine scheme of 22,000 ML which has already been reached and would need to be amended before this conversion could occur.

3.1.4. Bowen Broken Water Supply Scheme

Eungella Dam

Eungella Dam is situated on Broken River, 40 km west of the township of Eungella and 133 km west of Mackay. The dam is owned and operated by Sunwater. Urban and industrial water is delivered via two pipelines from Eungella Dam.

The dam wall is a 46m high and 276m long earth and rock-fill embankment with an uncontrolled concrete ogee crest spillway and a concrete-lined sideways chute. River releases are made through a conduit and two cone dispersion valves located at the valve house immediately downstream of the embankment.

The dam was commissioned in 1969, has a storage capacity of 112,400 ML and has a relatively small catchment.

Bowen River Weir

The Bowen River Weir was constructed in 1982 to help meet the industrial water requirements of a thermal power station at Collinsville and the town water requirements of Collinsville and Scottsville. It is owned and operated by Sunwater.

Bowen River Weir is located about 25km south of Collinsville on the Bowen River at AMTD 94.4km, about 88km downstream from Eungella Dam. It has a storage capacity of 943 ML. The weir was constructed to provide a pump pool for the Newlands and Collinsville Pipelines, and to capture flows from the Bowen and Broken Rivers as well as releases from Eungella Dam.

The weir's abutments are a combination of mass-concrete, tiered sheet piling, and rock gabions and mattresses. It has a 55m-long, centrally located, mass-concrete spillway and its outlet has dual penstocks which is used to supply downstream irrigation customers.

Gattonvale Off-stream Storage is located on the left bank of the Bowen River adjacent to the weir and was commissioned in 2005. It holds 5232ML, and its purpose is to augment the Bowen River Weir storage and improve reliability of the existing allocations in this section of the scheme.

Available Supply

There is no unsold allocation available in the Bowen Broken scheme.

3.1.5. Burdekin Haughton Water Supply Scheme

Burdekin Falls Dam

Burdekin Falls Dam is owned and operated by Sunwater. It is situated at AMTD 159.3 km on the Burdekin River and by road, approximately 200 km south-south-east of Townsville. The dam is the Burdekin Haughton Water Supply Scheme's main storage and Queensland's largest dam with a storage capacity of 1,860,000 ML.

The main wall is a mass concrete gravity structure which is 876m long and 52m high. The Burdekin Falls Dam system includes three saddle dams: Mt Graham South, Mt Graham North, and Left Bank. The dam has a catchment of 114,200km2. The 22,400ha Lake formed by the dam is called Lake Dalrymple. It covers 22,400ha starting 50km upstream of the dam wall.

The purpose of the dam is to supply water for irrigation and development in the lower Burdekin basin in conjunction with the existing storages of Clair Weir, Gorge Weir and Blue Valley Weir which are all located on the Burdekin River and downstream of the Burdekin Falls Dam. The construction of the dam extended from 1982 to 1987.

Gorge Weir

The Gorge Weir is owned and operated by Sunwater. It was completed in 1953 and is located at 127.5 km AMTD; 31.8 km downstream of Burdekin Falls Dam. The weir is 391m long and 7.7m high. Its wall is a mass concrete structure with a storage capacity of 9,095 ML. When the Burdekin to Moranbah Pipeline was constructed Gorge Weir was utilised as the pumping pool for extraction of water from the Burdekin River.

The right abutment of the Weir is modified to accommodate the Gorge Weir Pump Station, which is part of the Burdekin to Moranbah Pipeline.

Burdekin to Moranbah Pipeline

The Burdekin to Moranbah Pipeline was constructed to both increase and improve reliability of water supplies for the mines in the Bowen Basin. It is a 218 km long pipeline extending from Gorge Weir on the Burdekin River to the Moranbah Terminal Storage. The pipeline was originally designed with a capacity of 17,000 ML per annum although has been augmented such that it is able to transport 22,600 ML per annum.

Blue Valley Weir

Blue Valley Weir sits on the Burdekin River at 115.9 km AMTD; 11.6 km downstream of Gorge Weir and just downstream of the Bowen River. The Weir was completed in 1963. It has a storage capacity of 3,820 ML, but its storage is slowly silting up. The outlet is inoperable. All flows are passed over the weir.

Available Supply

There is 35,000 ML of unsold and uncommitted HP allocation available in Burdekin Falls Dam.

New supply options

Access to new water allocations is governed under the water planning framework enabled by the *Water Act 2000*. Under this framework, any new entitlements can only be obtained where there is unallocated water available in a reserve in the relevant water plan area.

Within the Burdekin Basin Water Plan there is a general reserve of 55,000 ML for the Lower Burdekin and Haughton, a strategic reserve of 35,000 ML for state purposes, a strategic reserve that preserves capacity in the water plan for a future raising of Burdekin Falls Dam of 150,000 ML, a strategic reserve of 150,000 ML for the Bowen Broken, and a further 8,744 ML strategic reserve for Sunwater in the Bowen Broken. These considerable reserves provide opportunities for the development of significant water supply infrastructure within the Burdekin Basin Water Plan area.

Within the Whitsunday Water Plan there is a general reserve of 26,800 ML and a strategic reserve of 1,500 ML. The Whitsunday Water Plan therefore constrains significant development within the plan area.

Within the Pioneer Water Plan there is a general reserve of 10,500 ML and 4,000 ML for water sub catchment 1 to 8 and 12 respectively. The Pioneer Water Plan therefore constrains significant development within the plan area.

A total of 11 water storage or water transport infrastructure projects have been identified which have the potential to provide additional water supply within the region. Some of the studies previously carried out for these sites predate the relevant Water Plan accordingly the infrastructure has the potential to fail to meet plan objectives. Details of these options and the supplies they could provide are contained below.

Burdekin Falls Dam Raising

Burdekin Falls Dam is located approximately 210 km by road south-east of Townsville at AMTD 159.3 km on the Burdekin River. The dam is owned and operated by Sunwater and comprises a mass concrete main dam and four earth and rock-fill saddle dams. The dam was completed in 1987 and the reservoir stores 1,860,000 ML of water at the design Full Supply Level (FSL) of Elevated Level (EL) 154.0 Australian Height Datum (AHD) with a yield of 1,140,000 ML per annum. Burdekin is the largest water storage dam in Queensland.

In 2017 as the Burdekin Falls Dam approached full commitment of its allocation, the Queensland Government determined that the timing was appropriate to investigate dam raising options. A feasibility study for the raising was completed in May 2017 by AEC Group on behalf of the Department of State Development, Manufacturing, Infrastructure and Planning. The study identified a potential opportunity to raise Burdekin Falls Dam, but recommended that economic, financial, and environmental considerations be investigated in more detail.

In October 2018, Sunwater undertook a preliminary business case for the raising indicating that current supply capacity is "inadequate to support development and growth in North Queensland for the next generation". A demand assessment was undertaken in the preliminary business case indicating that a raising of between 2 m (150,000 ML) and 6 m (575,000 ML) could be required. The preliminary business case recommended that a detailed business case be undertaken through which a more rigorous demand assessment would be conducted and an optimised level for the raising identified.

Building Queensland commenced the detailed business case for the raising in February 2020 and, at the time of writing, is scheduled to complete the study for approval by the Queensland Government in November 2021.

Burdekin Moranbah Pipeline and Eungella Southern Extension Pipeline Duplication

The Burdekin to Moranbah Pipeline is a 218km long pipeline extending from Gorge Weir on the Burdekin River to the Moranbah Terminal Storage. The pipeline was originally designed with a capacity of 17,000 ML per annum with the ability to augment the pipeline to 22,600 ML per annum through augmentation of the pipeline's four pump stations. The augmentation was triggered during the construction process and hence the pipeline was commissioned in 2007 at full capacity.

The Eungella Southern Extension transports water south from the Moranbah Terminal Storage following (and located within) the Powerlink easement before terminating at Lake Vermont Mine. The pipeline is approximately 70 km long and has a design capacity of 2,550 ML per annum.

Recent demand from several coal mining projects under development south of Moranbah has given rise to early stage discussions with mining companies regarding the potential duplication of the Eungella Southern Extension in order to move available allocations from the Moranbah Terminal Storage to the respective mine sites. The total volume of demand in the area is known to exceed the available volumes of unsold water available from Sunwater, and there is an opportunity to increase supply into the Bowen Basin through the duplication of the Burdekin Moranbah Pipeline given the availability of unsold HP allocation in Burdekin Falls Dam.

At the time of writing, no formal development activities have commenced on either of these projects.

Connors River Dam and Connors to Moranbah Pipeline

The key features of the Connors River Dam and Pipelines project is the construction and operation of a dam (yield 49,500 ML per annum HP and 5,000 ML per annum MP) on the Connors River approximately 110km east of Moranbah and a 133km pipeline from the dam to Moranbah. The Project would also provide reliable water supplies to the towns of Nebo and Moranbah.

The Project was included in the Program of Works, Statewide Water Grid Regional Water Infrastructure Projects approved by the Governor in Council on 13 December 2007. This program directs the designated proponents of the projects (Sunwater in the case of the CRD&P) to undertake all necessary investigations in order to obtain environmental approvals and prepare a business case for their respective designated regional water projects. In June 2008, under arrangements with the State Government, Sunwater took over direct funding of the Project's Business Case investigations. Sunwater submitted the Environmental Impact Statement (EIS) for the project to the Coordinator-General for review and public consultation in early 2010 and on 20 April 2012 the Commonwealth approved the EIS.

Sunwater had completed the design and an Early Tenderer Involvement process and selected preferred tenderers on construction packages. Sunwater discontinued activities on the Connors River Dam and Pipelines Project in July 2012 due to insufficient demand. Although it is understood Sunwater does not anticipate proceeding with the project in the short term, it has retained the project information including detailed design, approvals and agreements necessary for its development. The project would likely need a sufficient number of customers (mines) to require demand before it could be restarted.

The estimated cost in 2012 for the Connors River Dam was $585 million and the Connors to Moranbah Pipeline $584 million.

Urannah Water Scheme

The Urannah Water Scheme is centred around a new dam to be located at 36km AMTD on the Broken River downstream of the junction with Urannah Creek, approximately 64km South East of Collinsville. The dam will have a yield of up to 103,000 ML and a storage capacity of 1,000,000 ML. Up to 1200 megawatts pumped hydro energy with solar and wind precincts up to 1,500MW are contemplated. A 9,500 Ha irrigation scheme is planned at Collinsville, along with a pipeline to connect water supply to industrial customers in the Bowen Basin, (Utilities, 2020). The Urannah Water Scheme is proposed to include a new Urannah Dam with instream distribution to Collinsville, new pipelines from Urannah Dam to Peter Faust and Eungella dams, and duplication of the existing pipeline from Eungella Dam to Moranbah.

The Detailed Business Case for the project has recently been completed and is under review by the Queensland Government. The project has been declared a Coordinated Project by the Department of State Development, Infrastructure, Local Government and Planning. At the time of writing a terms of reference for the EIS, which is required for the project to proceed, was open for public consultation until 29 January 2021.

The Urannah project is currently forecast to cost circa $2.8 billion and generate 1,200 jobs through construction and 650 long term operational jobs (Utilities, 2020). The development could make use of the strategic reserve available within the Burdekin Basin Water Plan.

The "Bowen Basin productive water supply" has been included as a priority initiative in the Infrastructure Australia Infrastructure Priority List 2021. Whilst Urannah Dam is not specifically mentioned, the proponent is listed as Bowen River Utilities and provides the following problem statement:

A constrained water supply is limiting the growth of agricultural, industrial and mining productivity in and adjacent to the Bowen Basin. Increasing the water supply can unlock additional agricultural land and facilitate a more robust water trading market with potential flow-on price reductions for mining and industrial water users.

There is also an integrated opportunity to explore pumped hydro storage within the local Renewable Energy Zones and increase resilience for the Whitsunday region's urban water supply.

The 2019 Infrastructure Australia Audit states water infrastructure could help to unlock economic opportunities when supported by evidence-based assessments that consider potential benefits, costs and risks for industry, local communities and the environment.

The potential initiatives to meet the need are listed as non-infrastructure options such as demand management, upgrading or making better use of existing water infrastructure assets, and new pipeline, weir and/or dam infrastructure if there is sufficient demand.

Water for Bowen

The Water for Bowen project was designed to transport up to 60,000 ML per annum of water from the Burdekin Haughton Water Supply Scheme to Bowen for industrial, urban and agricultural use. Approximately half of the water was anticipated to be supplied to urban and industrial users with the remainder supplied to agricultural users. The project involved the construction of a new transport

system planned to extend south from the Burdekin River, along the coastal plain to Bowen and surrounds.

The proposed infrastructure includes:

- approximately 106km of open channel (including 12.7km of the existing Elliot Main Channel)
- three main pipelines — the Bowen Main Pipeline, the Mount Buckley Main Pipeline and the Abbot Point Main Pipeline
- reticulation pipelines servicing rural users (Inkerman, Rocky Ponds, Gumlu, Guthalungra 1 & 2) and a reticulation network throughout Bowen and surrounds, and
- five pump stations, two balancing storages and other associated infrastructure items such as control valves and air vents.

The Project was identified as a key project necessary to support several development initiatives in the region. The most relevant State Government strategic planning initiatives at that time were:

- Northern Economic Triangle Infrastructure Plan 2007–2012
- Statewide Water Policy
- Program of Works, Statewide Water Grid, Regional Water Infrastructure Projects.

In 2006 a Foundation Customer process was instigated to provide funding for the next stage and to provide greater certainty regarding demand. At that time, Foundation Customer demand was found to be 59,025 ML per annum. A substantial proportion of the identified Foundation Customer demand (34,050 ML per annum) was the State Government acting as a proxy for future industrial demand associated with the Abbot Point SDA.

During the development and design phase of the project, projected urban and industrial demand for water in the area significantly reduced, with the cancelling of several proposed developments particularly at the Port of Abbot Point. During the same period, the estimated cost of construction of the project increased significantly.

During 2010, Sunwater conducted additional demand surveys, and used this data to scope and design several smaller capacity variations to the project. With decreased demand and increased cost, Sunwater determined that the project was not commercially viable, and the project was discontinued from further development.

Water for Bowen Pipeline

In 2017 a new project aimed at providing large volumes of water for irrigated agriculture emerged in the form of the Water for Bowen Pipeline Project, an initiative of the privately owned Bowen Pipeline Company. The project included the progressive development of a pipeline corridor from the Burdekin River at Ayr through to Gumlu, Guthalungra, and on to Bowen. The 90km pipeline was planned to follow Queensland Government owned corridors in the form of the Bruce Highway and the North Coast Line.

The project was targeting the delivery of 80,000 to 100,000 ML per annum of new water supply to the Bowen area. Work on the project appears to have been suspended in recent times, and the future for the development is unclear. There is limited documentation available describing the design, costs, or economic assessment of the proposed infrastructure.

Marian Weir Raising

A raising of Marian Weir has previously been identified as having the potential to supply additional water for the cane industry and meeting urban water demand. The proposal would include raising the weir's full supply level by 1.6 m to increase the capacity from its existing 3,980 ML to 6,330 ML providing an additional 5,000 ML per annum of HP water. An Ogee crested weir was proposed for raising however, other options of weir sections such as broad crested weir and/or putting gates on the top of the crest could also be examined.

Kinchant Dam Raising

The Kinchant Dam was originally designed to be able to be raised. A number of investigations to raise Kinchant Dam have been performed over the past few decades. In 2009 an investigation focused on raising to achieve an additional 8,000 ML per annum HP yield. This equated to raising the full supply level by 1.86 m. The concept design assumed the current water harvesting capacity from Mirani Weir.

The investigation however identified the highly variable nature of the foundation conditions of Kinchant Dam along with the high proportion of fines within the dam filters and that it will be much more challenging and costly than previously thought to raise and it was considered likely there would be better alternatives for supplying future demand than raising Kinchant Dam.

Sandy Creek Weir

The Sandy Creek weir site is located on Sandy Creek at AMTD 3.6 km in the tidally affected reach. The catchment area of Sandy Creek at the weir site is approximately 465 km^2. The site is located just upstream of the North Coast Railway crossing of Sandy Creek, and about two km south west of Chelona.

Kinchant Dam is located upstream of the weir site on a tributary of Sandy Creek. Most of the Eton Water Supply Scheme area is within the catchment area of the potential weir. The water supplies available from a potential weir capacity up to 4,725 ML. This had previously been assessed as providing up to 4,375 ML per annum of yield.

A mass concrete crest founded at reasonable depths has been proposed for the site. There is however a reasonable degree of uncertainty as to whether a suitable foundation level is available within economic levels. Two levels of weir development were considered with and without 2 m high shutters.

The reserve available with the Pioneer Water Plan provides some opportunity to enable the development of the Sandy Creek Weir.

Black's Creek Dam

Blacks Creek Damsite is located on Blacks Creek at AMTD 66.1 km, about 3.5 km upstream of its confluence with Black Waterhole Creek. Downstream of the confluence the stream name changes to Pioneer River. The catchment area of Blacks Creek Damsite is 505 km^2. Teemburra Dam is located within the catchment area of Blacks Creek Damsite.

The catchment is bounded to the west and south by the Clarke Range, Denham Range and Connors Range. The catchment contains large areas of State Forest and is generally uncleared. There is little or no cultivation in the catchment, although some cattle grazing is practiced.

Potential storages with capacities up to 547,000 ML providing up to 75,000 ML per annum of additional HP yield have previously been investigated. A 1974 feasibility study recommended an earth

and rock-fill dam embankment on the right abutment with cut off and concrete spillway. However, given the advances in dam technology since that time other dam types should be considered for the site including a Roller Compacted Concrete dam.

The proposed Blacks Creek dam is unlikely to meet the Water Allocation Security Objectives and Environmental Flow Objectives of the Pioneer Water Plan and there is inadequate reserve defined in the current Plan to facilitate its development. Accordingly, without significant amendments to the current Pioneer Water Plan the Blacks Creek Dam could not be developed.

3.2. Groundwater sources

Available groundwater reserves across the MIW region are extremely limited. There are no available groundwater reserves within the Burdekin, Pioneer, or Whitsunday Water Plan areas.

There is 750 ML available from a general reserve in the non-alluvial aquifers of the Isaac Connors Groundwater Management Area (Figure 14) within the Fitzroy Water Plan. This resource could benefit water users in the Isaac Council area. The volumes are relatively inconsequential for the mining sector as a whole but could deliver a meaningful portion of the water required for urban water supply in the region. RDMW do not have any current plans or a nominated timeframe to undertake a release for this relatively small reserve.

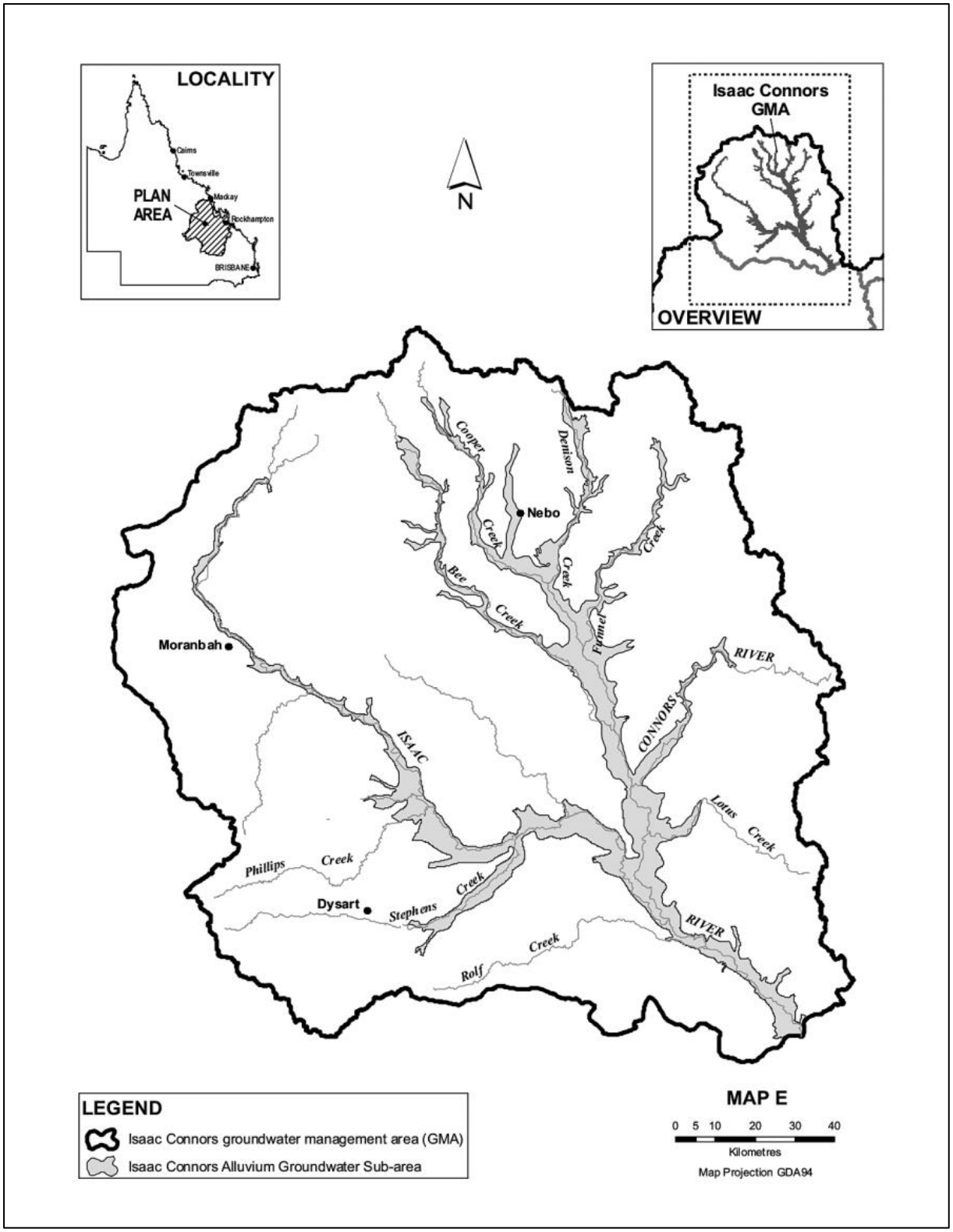


Figure 14 Isaac Connors Groundwater Management Area

Source Water Plan (Fitzroy Basin) 2011

The Bowen Groundwater Management Area sits outside of the existing Water Plans and is subject to a standalone set of water sharing and seasonal assignment rules. As outlined in section 2.2.4, there is

concern regarding over allocation in the Bowen groundwater system, and RDMW are not making any additional volumes of water available.

3.3. Recycled water sources

3.3.1. Coal Seam Gas Water

During the formation of coal, large quantities of gas are generated and stored within the internal surfaces of the coal seams and are held in place by water pressure (Towler, 2016). To extract it, wells are drilled through the coal seam and the water pressure is reduced by bringing water to the surface. The water that is created as a by-product of coal seam gas (CSG) extraction is known as CSG water, 'produced water' or 'associated water'. The quality of CSG water varies greatly; however, it is generally rich in salts and other minerals.

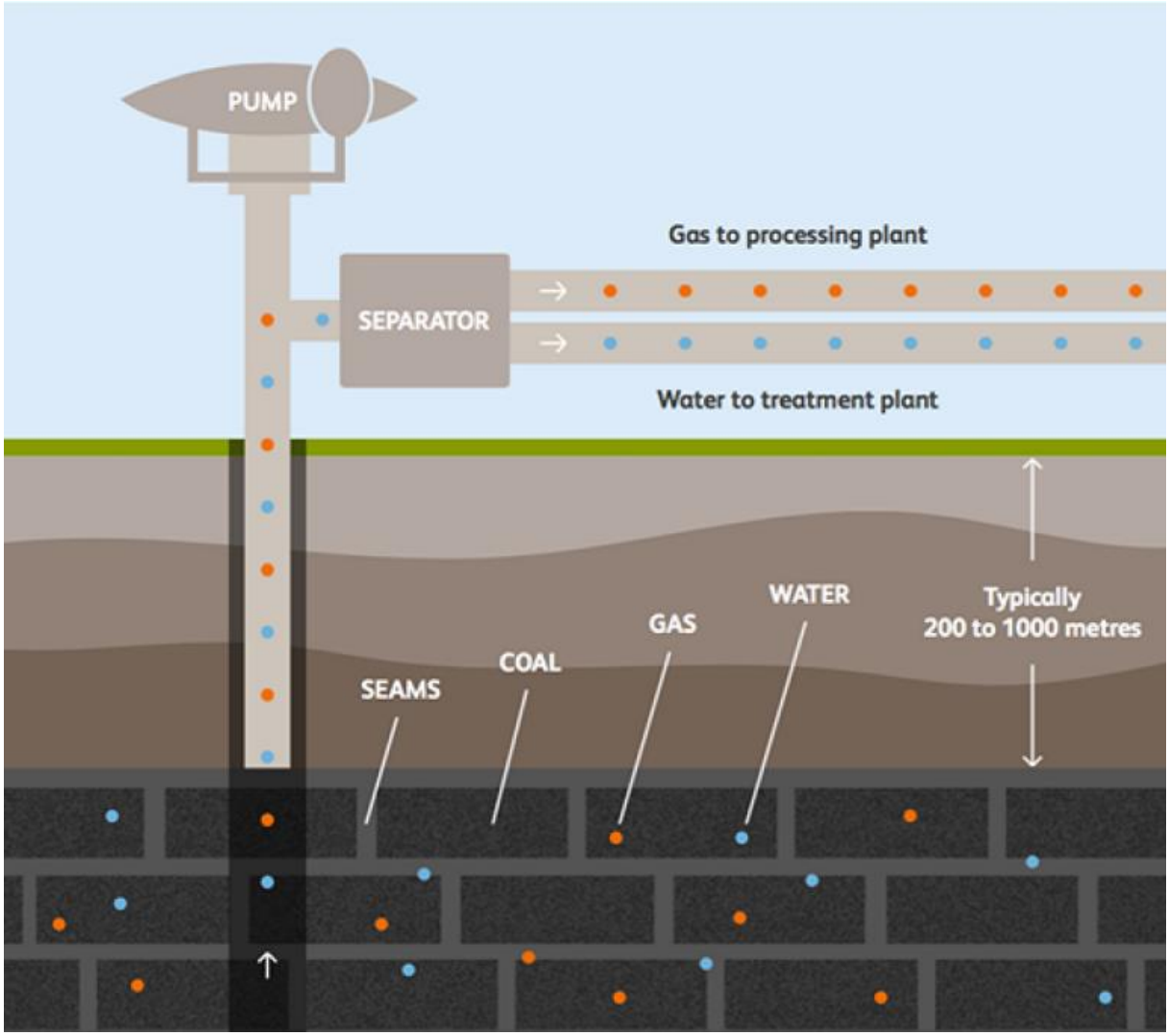


Figure 15 Coal seam gas and water extraction

Source APLNG, 2020

Coal seam gas water has the potential to form another supply source within the MIW region, with the most likely recipient of supply being coal miners. Several underground coal mining companies are already producing CSG water in conjunction with their operations and are utilsing this water as a

supplement to surface water supplies for dust suppression and in the operation of their coal handling preparation plants (CHPP).

Whilst underground coal miners create a small amount of CSG water, it is the gas companies that are likely to generate more substantial volumes to support use by third parties. Arrow Energy's Bowen Gas Project is seeking to commercialise gas reserves in Arrow's petroleum tenures that cover an area of approximately 8,000 square km within Arrow's gas exploration acreage. These tenures are located approximately 150 km south-west of Mackay, with the bulk of the area extending from Glenden in the north to Blackwater in the south. Gas is planned for transport to the Arrow liquified natural gas (LNG) facility at Gladstone via the Arrow Bowen Gas Pipeline. The location of Arrow's gas reserves and the Bowen Gas Pipeline alignment are provided in Figure 16.

Preliminary CSG water production forecasts presented in the Bowen Gas Project EIS indicate that the approximate volumes to be produced by the Project could vary over time between 15 and 30 ML per day (5,000 to 10,000 ML per annum). The information available through the EIS indicates that water will be reverse osmosis treated to enable beneficial reuse, however the location of the gathering and treatment facilities is not stipulated in the EIS documents.

It should be noted that the water production forecasts of CSG companies have historically been inaccurate. QGC forecast water production volumes from their Wooleebee facility in the Surat Basin of up to 100 ML per day (with a treatment facility and disposal pipeline constructed to match), but in operation has never exceeded 25 ML/day and is decreasing. Care should therefore be taken with production volume forecasts. It is for this reason that Arrow Energy are unlikely to ever guarantee any given volume of water supplied, although if water is sought from them it is likely that they will seek a guarantee that the water will be taken given that a build-up of treated water on-site will eventually impact their production.

The Environmental Authority (EA) for Arrow's Moranbah Project (EPPG00699613) states that CSG water may be transferred to a third party for use in construction or dust suppression activities providing that water quality limits are met. The permit conditions are specific regarding the intended use of the water, which is limited to construction and dust suppression. If the supply were to be fed directly into the raw water storages of mines in the area and used for additional purposes such as the CHPP, a review of CSG licence conditions may be required to facilitate the transfer.

Table 12 Arrow CSG water quality release limits

Water Quality Characteristic	Unit	Limit	Limit Type
pH	pH units	6.0 to 9.0	
Sodium Adsorption Ratio	Ratio	8	80th Percentile
		14	Maximum
Total Dissolved Solids	Mg/L	3000	Maximum
Total Petroleum Hydrocarbons	Mg/L	10	Maximum

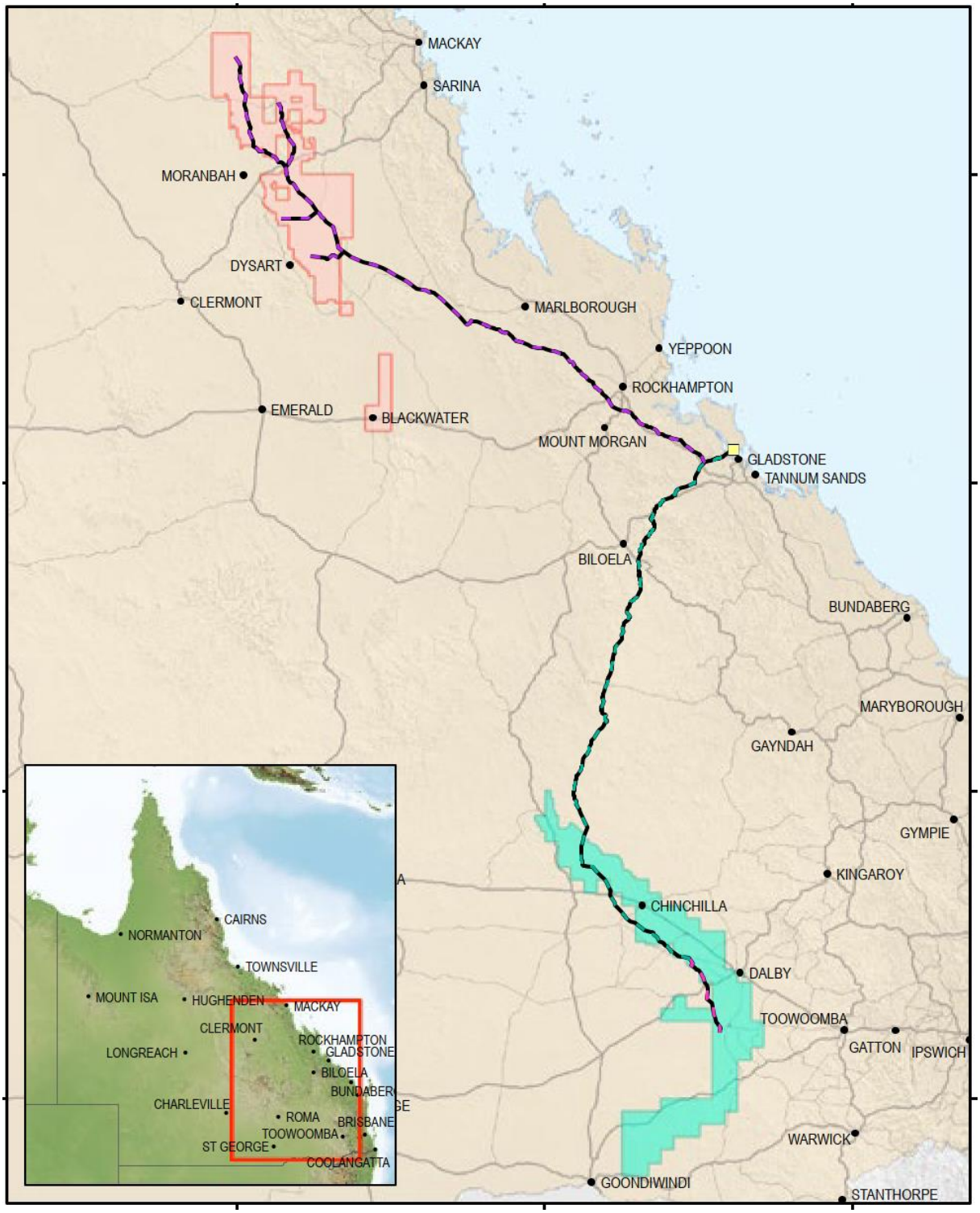


Figure 16 Arrow Energy Gas Reserves and Pipeline Alignments

Source APLNG, 2010

3.3.2. Mine Affected Water

Mine affected water includes pit water, processing plant water, rainwater and run-off from mining sites. The collection and use of mine water is typically regulated under the EA conditions for each mine site, with approval conditions having been tightened dramatically over the past decade.

Interviews undertaken with mining companies during the course of this study suggested that there is likely to be several hundred gigalitres of water stored throughout the Basin. Such volumes of water are far greater than those being imported into the Basin from regulated surface water supply sources.

In response to this information an enquiry was placed with the Department of Environment and Science (DES) who track mine water volumes being reported by coal mines in accordance with EA conditions. DES has confirmed that there are 31 coal mines located in the MIW region that provided a water inventory to the Department. The total water inventory for these mines as of 30 June 2020 was approximately 185,570 ML. For context, this volume is 25 per cent greater than the storage capacity of Teemburra Dam.

3.3.3. Mine and Coal Seam Gas Water Reuse

The quantity of available mine affected water, and to a lesser extent CSG water, make this combined resource an obvious target as a water supply. Interviews undertaken with larger mining companies suggest that it already forms a significant component of supply for mining operations throughout the Bowen Basin, however there are limitations associated with retaining and managing water supplies on a site-by-site basis. Some mining companies have also expressed a desire to move away from surface water supplies in order to reduce their environmental footprint, with targets for reduction in surface water sources already being implemented. These mines will need an alternative supply source in order to reduce their surface water extraction and are willing to invest in storage and reuse infrastructure to meet these objectives.

Whilst miners have successfully managed smaller isolated supplies locally, there has been limited success in trading of mine affected water to create a broader reuse scheme. In recent years some miners have sold small volumes of mine affected water to other mining companies, mostly to facilitate early phase construction activities rather than forming part of a long-term supply strategy. There are a number of factors that have prevented the long-term commercial on-supply of mine affected water in the past. These factors are discussed below.

Variability of Available Volumes

The availability of mine affected water is largely dependent on rainfall. This makes mine affected water subject to a high degree of risk from a reliability viewpoint, which in turn makes it difficult for new mines to obtain finance when relying on mine affected water as the basis of their supply. For this reason many new mines will typically seek to meet their entire water supply requirement from external supply sources, notably from Sunwater, despite the fact that a large amount of their water requirements will ultimately be met through reuse of mine affected water throughout the life of their operations.

The opposite problem occurs when conditions are wet, with volumes building beyond on-site storage capacity. Most mine EA's allow for discharge of water from site during flood conditions (and therefore lost to productive use), but smaller rainfall events do not create adequate flow in receiving watercourses to allow discharges. Under these circumstances on-site storage volumes can increase, potentially beyond manageable levels. An example of the actions being taken by a mining company

to manage increasing volumes of mine affected water is the pipeline Peabody Energy is developing to connect the Coppabella mine with their Moorvale and Millennium assets. Millennium is no longer operational; the water is not being moved there for consumption, but rather to access existing unutilised storage capacity and facilitate redistribution at a later date should the operational mines require it.

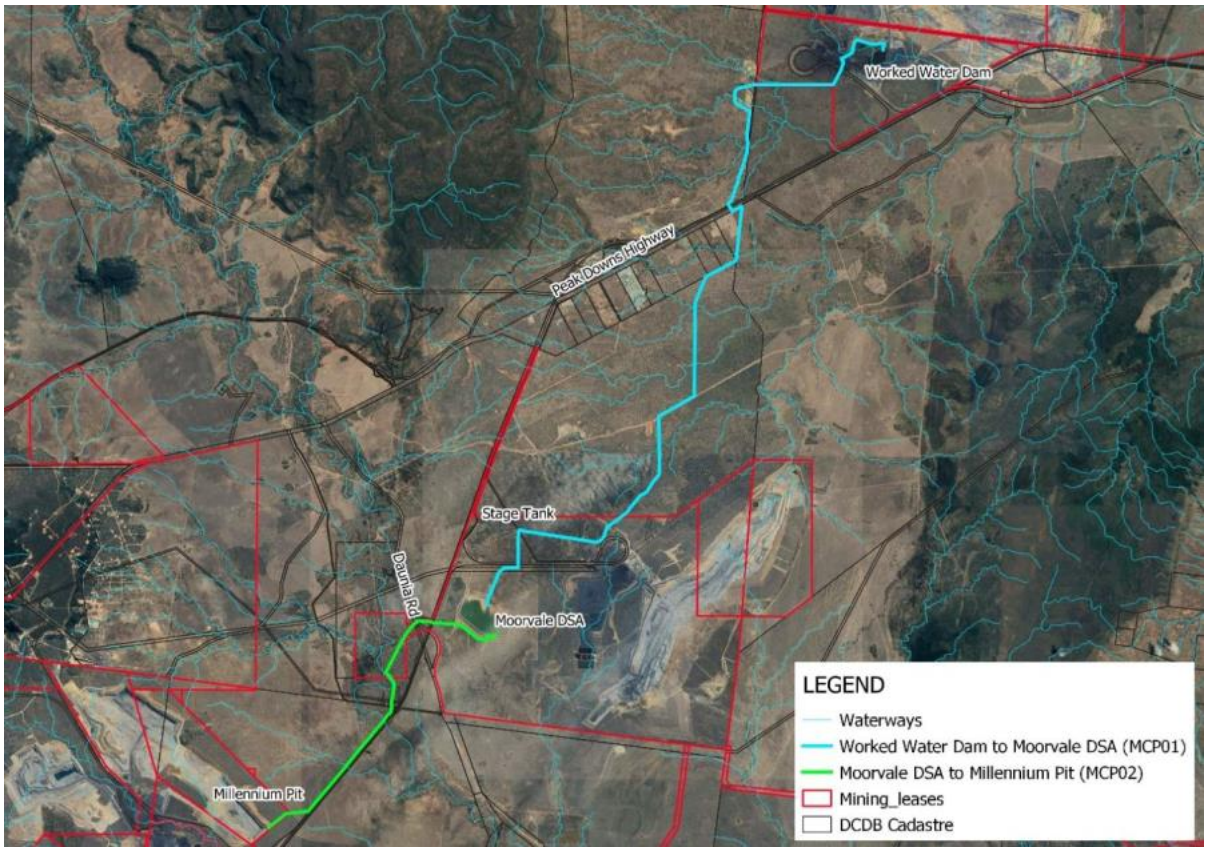


Figure 17 Peabody's Coppabella to Millennium Pipeline

Source Peabody Energy, 2020

Water Quality and Environmental Approval Conditions

Mine affected water is typically subject to elevated salinity and alkalinity levels associated with coal chemistry and is often turbid as a consequence of contact with disturbed areas such as coal stockpiles, waste rock dumps, access roads, laydown areas, and other exposed areas of land. Given the potential for environmental impacts that could be associated with the release of this water into the environment, reuse of the water is typically regulated under the site EA. A typical example of reuse conditions for a coal mine in the Bowen Basin is provided in Figure 18.

C25	**Water reuse** Mine affected water may be piped or trucked or transferred by some other means that does not contravene the conditions of this environmental authority and deposited into artificial water storage structures, such as farm dams or tanks, or used directly at properties owned by the environmental authority holder or a third party for the purpose of: a) supplying stock water subject to compliance with the quality release limits specified in **Table 9: Stock Water Release Limits**; or b) supplying irrigation water subject to compliance with quality release limits in **Table 10: Irrigation Water Release Limits**; or c) supplying water for construction and/or road maintenance in accordance with the conditions of this environmental authority.

Figure 18 Example water reuse conditions from a Bowen Basin coal mine EA

Source Department of Environment and Science, 2021

To that extent, mine affected water has similar regulatory issues to CSG water; in the above example water from the relevant mine cannot be on-sold to another mining company for the purpose of operating their CHPP. The existing restrictions in relation to the uses of mine affected water and the variation in the nature of approval conditions between mines are key impediments in the development of a market for the use of this resource.

Commercial Terms

As previously outlined, mining companies typically require a certain level of security from their water supply in order to underpin mine investment. In the case of surface water supplies from dams, this comes in the form of modelled reliability generated from catchment-based rainfall and runoff models. In the case of produced water, that reliability is normally obtained through contractual arrangements between the supplier and the recipient of the water.

Given the variability of mine affected water volumes that are largely weather dependent and the implications for mines if they do not obtain their required volume of supply, mining companies are generally reluctant to provide any form of warranty regarding supply volumes, particularly over the longer term. Whilst some of the larger miners may be able to draw on a network of storages to minimise the risk of failure to supply, miners are generally not in the water supply business and are not interested in taking risk for commercial returns that are relatively minor by comparison to revenues attached to coal production.

3.3.4. Potential for a Centralised Mine Water Reuse Scheme

To overcome the supply / demand imbalance associated with the management of mine affected water in smaller isolated storages, there is the potential for a centralised scheme where a network of distribution pipelines are created to join disparate supplies into a central 'grid' system. A central management agency could administer the grid, accept excess supplies from operational mines, and create a new supply product to support both new and existing mining projects. This product would offer a greater supply reliability than isolated pits and could potentially be further bolstered by the addition of surface water into the network to boost reliability through drought periods.

Over the longer term, as mines reach end of life, a centralised supply scheme could be repurposed to support new industry in the region. Irrigated agriculture could potentially form a key pillar of economic growth in the Isaac Regional Council area as mining dissipates. The creation of sustainable

water supply infrastructure through repurposing of voids by mining companies in lieu of traditional remediation works may provide the source of capital from which a long-term irrigation supply scheme may be developed.

Case Study: Beneficial Reuse of Coal Seam Gas Water in the Surat Basin

The Queensland Gas Corporation (now owned by Shell) developed a beneficial reuse scheme in collaboration with Sunwater for the utilisation of associated water generated through their Surat Basin CSG operations. Associated water is treated through reverse osmosis to a standard suitable for transfer into adjacent river systems where Sunwater operates regulated water supply schemes. Sunwater then distributes the water to irrigation customers ensuring that the full volume of transferred water is taken out of the system within the boundaries of the supply scheme. This extraction process avoids environmental flow impacts associated with sending a continuous stream of water into ephemeral watercourses.

Beneficial reuse schemes have been deployed at QGC's two primary production hubs located near Chinchilla and Wandoan in the Surat Basin, with water transferred for reuse into the Chinchilla Weir and Dawson Valley water supply schemes respectively. A strict regulatory regime exists that controls the quality of water transferred to the relevant watercourses, with Queensland Gas Corporation holding permits for the process *Environmental Protection (Waste Management) Regulation 2000*. The Resource Operations Plans that control the water sharing and operational rules for the water supply schemes were also amended to facilitate the process, and there are several other regulations and guidelines that govern the reuse process.

Each of the reuse schemes has the capacity to supply up to 100 ML per day, greatly increasing the volume of water available for irrigation. A number of new businesses and expansion of existing farms have occurred as result of these beneficial reuse schemes, demonstrating the prospective benefits of converting a wastewater stream into a valuable economic resource.

Figure 19 - QGC's Wooleebee Water Treatment Plant

Source PPO Projects (2015)

The logical choice for the central agency would be Sunwater. Sunwater have access to existing pipeline corridors that could be expanded for the placement of new water distribution infrastructure, and have the skill sets and resources in place to develop and operate the grid[17].

A feasibility study into a centralised mine and CSG water reuse scheme would be required in order to progress this initiative further. The scope of the study would need to include:

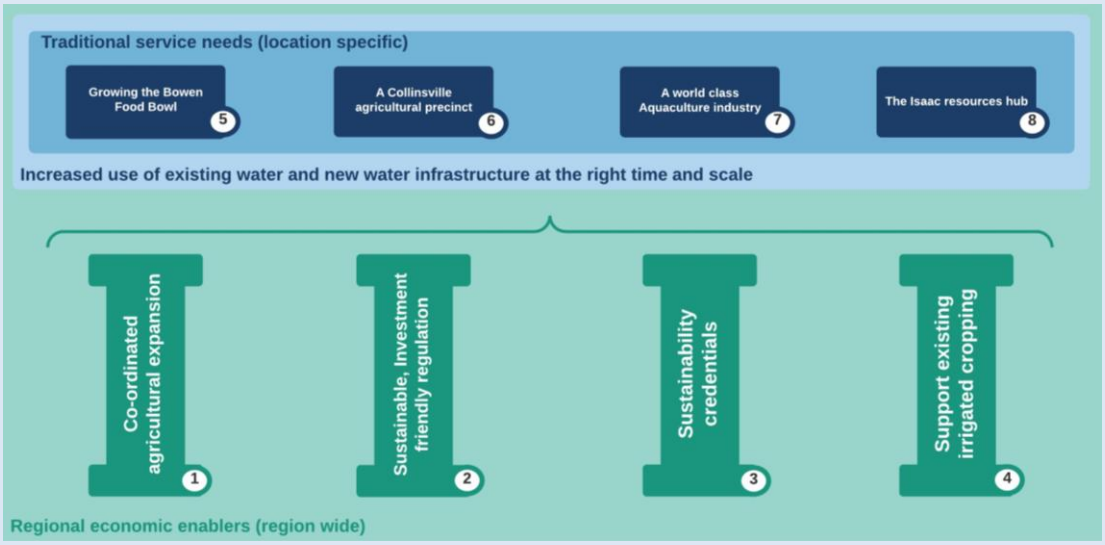
- Existing supply availability and preferred options for staging or roll-out of network capacity
- Commercial framework and key contractual principles between miners and Sunwater for disposal and on-supply including confirmation of counterparty risk associated with meeting legal requirements relating to mine affected water
- Required amendments to regulatory frameworks, notably Environmental Authorities and the *Environmental Protection Act 1994* to facilitate on-supply through the grid and enable mine rehabilitation activities to focus on creation of water infrastructure
- Modelled reliability of water products and potential for integration with surface water products to maximise combined supply availability
- Assessment of commercial and economic viability
- Potential for long term transition of supply sources to irrigated agriculture post mine closure including assessment of land and crop suitability and supply chain logistics

[17] It is expected that Sunwater's existing network would not be utilised for mine water distribution unless its customers were agreeable to such an arrangement.

4. Service needs analysis

Outcomes of this chapter

This chapter defines eight water related service needs. Specifically, four region wide Economic Enablers, support four location specific Service Needs. Economic Enablers are focused on alignment between objectives of strategic policy initiatives and up and downstream water dependent industries, the flow of information between these industries, investors, consumers and the community, and government's ability to enable these industries by supporting outcome-based approaches to meeting regulation and being a conduit of information. Service Needs generally represent demand for additional water at a specific location.



4.1. Defining a service need

A service need describes the rationale for change. The concept is used extensively in infrastructure decision making and aims to ensure decision makers understand a region's needs before arriving at a solution or options to meet those needs. Service needs are expressed as opportunities and challenges which are contextualised by a region's socio-economic profile, strategic government objectives and policies, current and future supply relative to demand, and ultimately desired outcomes. This structured approach underpins how the MIW region's water related service needs, described in section 4.6, are defined. Options and actions in the Strategy are ultimately recommended based on how well they address a particular service need.

4.2. Defining desired outcomes

For a strategy to be effective, it must define desired outcomes. Having clear outcomes allows opportunities and challenges to be defined against a reference point. Actions can then be tailored to realise opportunities, mitigate challenges and provide the best chance for desired outcomes to be met

and undesirable outcomes to be avoided. The Project Steering Committee defined desirable outcomes for the Strategy as:

- Regional economic, social and environmental resilience (including in the face of change)
- Diversity and expansion of mining, agriculture and aquaculture across the region (including diversity within agriculture)
- Value adding opportunities are explored and enabled
- Strategic, outcome-focussed collaboration between industry and all levels of government to ensure that:
  - Existing water resources are better utilised sustainably
  - New bulk water infrastructure project assessments and investments are coordinated
  - Policy and regulatory settings enable and support existing and new industries
- Export opportunities are diversified and realised
- Long-term water security and flexibility for all water users.

4.3. Regional comparative advantages

The MIW region's comparative advantages stem from various sources, including:

- its strategic location and access to various export markets
- its mining and agricultural resource base
- access to strategic infrastructure, and
- skill profile of the region's workforce.

Reliable water is necessary to continue to support these comparative advantages and is a key consideration in framing the MIW region's water related service needs and options to meet these needs.

- The MIW region boasts a diverse agricultural industry which contributes over $1.3 billion to the Queensland economy and 10 per cent of the total gross value of agricultural production in Queensland. Agriculture will continue to be a key water dependent industry, with winter horticulture, sugarcane and livestock underpinning agricultural value. Agricultural composition has remained relatively stable with a modest transition around Mackay from sugarcane to rice (ABARES, 2019).
- The MIW region also has a developing aquaculture industry. The MIW region is well suited to aquaculture, currently recording the second highest yield by area in the state (measured in tonnes per Ha). This development is expected to continue as wild-caught fisheries struggle to keep pace with global demand for seafood protein (RDA MIW, 2019).
- The MIW region is home to both the Bowen and Galilee basins, representing the largest coal mining deposits in Australia (DSDILGP, 2020). The Bowen Basin is Australia's largest metallurgical coal reserve with over 200 million tonnes of coal extracted annually (Queensland Government, 2020). The Mining industry (including mining equipment, technology, and service industries) is the largest contributor to regional economic output ($19.4 billion or 46.3 per cent of total regional

economic output and approximately 20 per cent of regional jobs). Mining requires access to reliable, HP water allocations.

- The MIW region has the potential to supply feedstock and house processing and transport facilities for the biofutures sector. Potential products include biofuels and other bio-based products such as chemicals, plastics, textiles, synthetic rubber, cosmetics and detergents as well as future foods. Biofutures can offer an alternate market for broadacre crops produced in the MIW region such as sugarcane (TIQ, 2020).
- Manufacturing and other key industries support and stem from mining and agricultural operations in the MIW region, both of which can be expected to continue.
- There are available and reliable water resources to support water dependent economic growth. This includes underutilised supplemented water allocations across the Eton, Pioneer, Proserpine and Bowen Broken water supply schemes, unsold HP water allocation in the Pioneer (12,280 ML), Proserpine (10,500 ML) and Burdekin (35,000 ML) water supply schemes, and a strategic reserve for infrastructure in the Burdekin Water Plan Area (DNRME, 2019).
- The Abbot Point SDA was declared in 2008 and encapsulates 16,885 Ha of land. The SDA is a key economic advantage for the region as it provides a centre for potential development and export opportunities with a legislative framework in place to prioritise and expedite new industrial projects. The SDA is supported by the MIW region's access to deep ports, competitive rail system, and three regional airports. The region has ideal positioning as a gateway to the Asia-Pacific and close economic ties with expanding Asia-Pacific markets (DSDILGP, 2019).
- The Whitsunday Coast is a gateway to the '74 island wonders' and to a large section of the Great Barrier Reef. Australia's tourism industry continues to grow as new markets emerge, particularly in Asia where the emerging Indian, Malaysian and Chinese middle-class is driving much of the industry's income growth. The recent pandemic has impacted the tourism industry, but this is expected to return providing economic value and supporting other key industries including retail trade and construction.
- Climate change, monthly rainfall volatility and a reliance on seasonal rainfall across the MIW region means planning and utilising water resources effectively can create significant advantages to water security and industry confidence (Queensland Government, 2019).

4.4. Policy context

Water management and use, water infrastructure and regional economic development operate within a complex policy and institutional framework. These policies can present challenges but also opportunities for the Strategy. The list of policies and government objectives in Table 13 all interface with the MIW region's water dependent sectors and have been considered in the service needs analysis and as part of the Strategy.

Table 13 Related policies and government objectives

Policy area	Relevant policies (agency)	Relevance to MIW Regional Water Strategy
Water	Queensland Bulk Water Opportunities Statement (RDMW)	The Queensland Bulk Water Opportunities Statement (QBWOS) outlines the Queensland Government's objectives for bulk water supply. These objectives are:

Policy area	Relevant policies (agency)	Relevance to MIW Regional Water Strategy
		• safety and reliability of dams and urban water supplies • use existing water resources more efficiently • support infrastructure development that provides a commercial return to bulk water providers • consider projects that will provide regional economic benefits. Purposefully, there is significant overlap between QBWOS's objectives, and the objectives and desired outcomes defined in section 4.2. For this reason, in most cases, the Strategy reflects objectives laid out in the QBWOS.
	Water Plans (RDMW)	Water Plans are established under the *Water Act 2000* and provide the rules for sharing of water between consumptive use and the environment in each catchment. The water planning framework is addressed in detail in section 2.1.
	Water markets and trade	Water allocations and licences are the two main water products in Queensland. The relevant Resource Operations Plan (ROP) outlines rules for trading and other dealings such as changing the location of an allocation or amalgamating allocations. Water markets in Queensland, particularly in the MIW region do not benefit from the same degree of enterprise heterogeneity, water scarcity (demand exceeds supply) and market information as the market in the southern connected MDB. Water broking is typically conducted by real estate agents and industry groups such as Canegrowers, and the resultant pricing and data is not always transparent. There are opportunities to make better use of existing water markets across the region. RDMW is reviewing and enhancing market and trading arrangements in Queensland, including to improve the way market information is provided to make the most of existing water resources and infrastructure.
	Water pricing for existing Sunwater water supply schemes	In January 2020, the Queensland Competition Authority recommended irrigation prices for 2021-22 to 2023-24. At the time of writing (January 2021), the Queensland Government has:

Policy area	Relevant policies (agency)	Relevance to MIW Regional Water Strategy
		• Rejected the Queensland Competition Authority's recommendations to increase prices, and • Committed to reducing irrigation costs for 2021-22 to 2023–24. In the 2020-21 budget, it made $81.6 million available to reduce irrigation costs by: 50 per cent for fruit / vegetable growers and 15 per cent for other irrigators. • Committed to absorb any costs related to dam safety upgrades rather than passing these costs onto water users.
	Regional Water Supply Security Assessments (RDMW and local councils)	The Regional Water Supply Security Assessment program is a partnership between local councils and the Department of RDMW that is designed to improve urban water supply planning and security in regional areas.
	National Water Initiative (DAWE)	The National Water Initiative (NWI) is an inter-jurisdictional agreement that guides the use and management of water resources. Key elements of the NWI, including the objective to use water sustainably have been considered in developing options to address service needs and economic enablers.
	Productivity Commission Inquiry into the NWI, the scope of which includes the Productivity Commission advising on ways in which the NWI could be improved. This will include advice to assist governments' progress their commitment to renew the NWI	The Productivity Commission are currently preparing advice for the Commonwealth Government on how the NWI could be improved. A renewed NWI provides an opportunity to improve water resource development and use in the region, including to improve the process to develop bulk water infrastructure.
	National Water Infrastructure Development Fund (National Water Grid Authority)	The National Water Infrastructure Development Fund (NWIDF) is a $3.5 billion commitment from the Australian Government to co-invest in water infrastructure to: support primary industries and unlock potential; promote the growth and sustainability of regional economies; and build resilience. The NWIDF provides a potential funding

Policy area	Relevant policies (agency)	Relevance to MIW Regional Water Strategy
		source for priority regional water infrastructure projects.
Infrastructure and economic development	MIW Regional Priorities (GW3)	In addition to commissioning this Regional Water Strategy to ensure water security for the MIW region as a key economic enabler, GW3 also has committed to driving economic development for the region through focussing on the following key priority sectors for 2021 – 2022: • Agriculture and aquaculture • Aviation and aerospace • Biofutures • Mining and METS • Tourism The Strategy has considered interfaces with a range of key enablers including: • Education, skills and training • Infrastructure • Transformation through technology • Energy and power • Water • Policy and influence • Data collection and analysis.
	Queensland State Development Infrastructure Plan (DSDILGP)	The Queensland Government's infrastructure priorities are set out in the State Infrastructure Plan (SIP). It details a four-year program of infrastructure projects that is updated annually, to build industry confidence, generate jobs and economic growth, and improve liveability. The 2020 update of the plan identified the following investments near the MIW region that have relevance to the Strategy: • Bowen recycled water network upgrade • New beef abattoir beyond Moranbah • Mackay Resources Centre of Excellence • Bruce Highway - Mackay Northern Access Upgrade • Mackay Ring Road and Walkerston Bypass

Policy area	Relevant policies (agency)	Relevance to MIW Regional Water Strategy
		• Burdekin Falls Dam Improvement and Dam Raising (planning works).
	Developing Northern Australia and Northern Australia Infrastructure Facility (DISER)	The *Our North Our Future* white paper on developing Northern Australia defines priorities to unlock Northern Australia's economy over the next 20 years. The plan is focused on investment and collaborative support to grow Northern Australia through: • simpler land arrangements to support investment • developing the north's water resources • business, trade and investment • infrastructure to support growth • the northern workforce • good governance.
	Australian Infrastructure Plan and Infrastructure Priority List (Infrastructure Australia)	The Infrastructure Priority List identifies nationally significant problems, opportunities and projects. Priority initiatives relevant to the Strategy include: • Bowen Basin productive water supply as a priority initiative (opportunity to develop industry and agriculture in the Bowen Basin and surrounding regions • Bulk water supply security to support primary industries and unlock potential, promote the growth and sustainability of regional economies and build resilience.
	Business Case Development Framework (Building Queensland)	The Queensland and Australian Governments have developed frameworks to assist proponents when developing business cases and conducting economic appraisal of prospective infrastructure investments. Relevant Queensland frameworks include Queensland Treasury's Project Assessment Framework and Building Queensland's Business Case Development Framework which supports, augments and is integrated with the Project Assessment Framework. At the national level, IA's Assessment Framework is also relevant (see below).
	Infrastructure Australia Assessment Framework (Infrastructure Australia)	The Infrastructure Australia Assessment Framework (IAAF) provides guidance for identifying and assessing nationally significant problems and opportunities and infrastructure projects to address problems or realise

Policy area	Relevant policies (agency)	Relevance to MIW Regional Water Strategy
		opportunities. Infrastructure Australia are required to update the IAAF at least every two years in accordance with the *Infrastructure Australia Act 2008*. This ensures that the IAAF remains current, and consistent with similar frameworks used elsewhere in Australia and overseas. Infrastructure Australia are currently updating the IAAF, with updates focused on maintaining clear alignment of the Assessment Framework with jurisdictional requirements, providing new guidance on emerging areas of best practice and clarifying guidance on Infrastructure Australia's minimum requirements (Infrastructure Australia, 2020).
Agriculture	Growing for Queensland (DAF)	Growing for Queensland defines DAFs vision and role for contributing towards a successful future for Queensland's agriculture, fisheries and forestry sector. A range of outcomes and initiatives are defined under three key themes: • Innovative – inspire talent, investment and ideas to drive industry development • Responsive – Anticipate and respond to emerging needs of our environment, economy and people, and • Sustainable - Support sustainable and socially responsible industries.
	Queensland Agricultural Land Audit (DAF)	The Queensland Agricultural Land Audit identifies important land for current and future production and the constraints to development. The audit includes: • maps that show current and potential agricultural land use • strengths, weaknesses, opportunities and threats to agricultural development • information on land uses, infrastructure, biophysical conditions and constraints to agricultural development. This combined information has guided development of the Strategy and has ensured recommendations relating to future bulk water supply are connected to contemporary information on Queensland's agricultural land.

Policy area	Relevant policies (agency)	Relevance to MIW Regional Water Strategy
	Queensland Biofutures: 10-Year Roadmap and Action Plan (DSDILGP)	Under the Biofutures Roadmap and Action Plan, the Queensland Government has committed $20 million worth of funding across four biofutures areas. These include: • to assist companies complete due diligence and achieve financial close access to venture capital markets • for a Biofutures Acceleration Program to identify strategic catalytic investment opportunities and attract investors • for a Biofutures Commercialisation Program that will assist businesses manage risk in the development of technology. • for establishing a dedicated industry sectoral unit that will support Queensland's biofutures industry. The MIW region has a high capacity to support potential bioindustries thanks to its large feedstock driven by high volumes of sugarcane production and other bio based waste products. The Biofutures Roadmap has relevance to the MIW region and its water supply through its ability to create and support an alternative revenue base for the region's sugar industry. Under existing contracts biofutures will not increase farm-gate value for cane. Should the biofutures potential of the region be realised, the increased returns of these new products could support a restructure of grower contracts.
	Inquiry into growing Australian agriculture to $100 billion by 2030 (DAWE)	A strategic, Australian Government led push to grow Australia's agricultural sector to $100 billion by 2030 through 7 themes: • Trade and exports - strengthening agricultural ties with major and emerging export markets. This will deliver new trade and market access for producers, while also reducing red tape. • Biosecurity – safeguarding Australia from exotic pests and diseases means lower costs for our producers and is critical to our market access. • Stewardship – ensuring Australian farmers are rewarded for their stewardship of land and water.

Policy area	Relevant policies (agency)	Relevance to MIW Regional Water Strategy
		• Supply chains – ensuring that we have fair, strong and resilient supply chains where everyone is treated fairly and pays their share. • Water and infrastructure – supporting Australian farmers, rural and regional communities with infrastructure when and where it is needed. • Innovation and research – modernising Australia's agricultural innovation system to drive improvements in collaboration, commercialisation and uptake to grow productivity and competitiveness. • Human capital – enabling people and their communities right across the agriculture supply chain with the support, infrastructure and skills to do their jobs. Given the essential role of water in expanding agricultural production, the Strategy has heavily considered these themes. This includes understanding how they interface with the MIW region's broader economic development objectives and how particular actions in the Strategy can support these objectives in lockstep with the $100 billion target.
Mining, energy and resources	Powering Queensland Plan (Department of Resources)	The Queensland Government is investing $1.16 billion through a range of actions to ensure an affordable, secure and sustainable supply of electricity. This includes a commitment to the 50 per cent renewable energy target by 2030 (Department of Resources, 2020).
	50 percent renewable energy target by 2030 (Department of Resources)	To reach its 50 per cent renewable energy target by 2030, the Queensland Government is supporting several renewable energy initiatives from the household level through to commercial electricity providers. These initiatives interface with, and directly support actions under the Strategy, particularly those related to reducing water related energy costs.
	Queensland biofuels mandates (Department of Resources)	Under the Queensland biofuels mandate, the *Liquid Fuel Supply Act 1984* requires certain fuel sellers to sell a minimum amount of sustainable biobased petrol and sustainable biobased diesel in Queensland (referred to collectively as the biofuels mandates).

Policy area	Relevant policies (agency)	Relevance to MIW Regional Water Strategy
		The biofuels mandate is currently under review by the Department of Resources. The outcome of this review may impact the attractiveness of producing biobased fuels in Queensland. The MIW region has strong potential to produce biofuels owing to its large bio feedstock comprised of sugarcane and other biobased waste products.
	National Resources Statement (DISER)	The National Resources Statement sets out the government's policy and long-term reform agenda for the Australian resources sector. It includes a five point action plan to: • deliver the most attractive and competitive investment destination for resources projects • open up new industries and resources regions • better focus the sector's innovation, research and development on long-term, sectoral growth • develop and retain the world's best workforce • deliver better outcomes for stronger and more engaged communities. This strategic long-term approach aims to position Australia's resources sector as the world's most advanced, innovative and successful (DISER, 2019). The MIW region is one of Australia's most resource rich areas and is well placed to leverage initiatives that are supported under the National Resources Statement. To realise these opportunities, water has to be available at the right time, scale and location to underpin continued growth in the MIW region's resources sector.
Environmental, social and cultural	The Reef 2050 Plan (DES & DAWE)	The Reef 2050 Long-Term Sustainability Plan is the Australian and Queensland Government's overarching framework for protecting and managing the Great Barrier Reef to 2050 (DAWE, 2020). An updated draft version of the Plan was recently released for a period of public consultation and will be followed by a final updated plan in early 2021. A large focus of the Reef 2050 plan is managing runoff and other pollutants that impact the Great Barrier Reefs water quality and overall health. Given the MIW region's position as a gateway to the Great Barrier Reef, the tourism economy the reef

Policy area	Relevant policies (agency)	Relevance to MIW Regional Water Strategy
		supports, and increasing public expectation that we manage our scarce natural resources responsibly, the Strategy has considered how water use in the region impacts the surrounding environment, particularly the Great Barrier Reef.

4.5. Concurrent investigations

A number of studies and investigations related to the MIW region's water needs have been conducted in recent years or are currently under active assessment. These studies contain useful analysis that assists in better understanding the service needs, along with initiatives that have been previously explored to meet the MIW region's water needs. A summary of concurrent investigations is provided in Table 14. A more detailed examination of each investigation is provided in Appendix B – Concurrent investigations.

Table 14 Summary of Concurrent Investigations

Study/Scheme	Project status
Water for Bowen	Previous investigated by Sunwater and discarded in 2011. Project has re-emerged as the Water for Bowen Pipeline Project.
Urannah Water Scheme	The Detailed Business Case for the project has been completed and is under review by the State Government. The project has been declared a Coordinated Project by the Department of State Development, Infrastructure, Local Government and Planning. At the time of writing, the EIS approval process was under way.
Burdekin Falls Dam raising	Currently the subject of a detailed business case being run by Building Queensland.
Northern region demand study	Currently being undertaken by Sunwater and RDMW to gauge general demand across the Northern part of the State.
Burdekin Moranbah Pipeline and Eungella Southern Extension Pipeline Duplication	Currently under consideration by Sunwater. Eungella Southern Extension being actively developed.
Abbot Point SDA	Established in 2008 and remains in force to facilitate new development activity at Abbot Point.
RDMW Regional Water Supply Security Assessments	Completed for Mackay and Whitsunday regional councils. Incomplete for Isaac Regional Council.

Study/Scheme	Project status
Connors River Dam and Pipeline	Reached pre-construction phase before being suspended by the State. No current intention from Sunwater to recommence the project.

4.6. Identified service needs

The tables presented under the below sub-headings reflect the opportunities and challenges identified through background research in the previous sections, chapters and appendices found in this report and also those heard through consultation. This includes Service Needs that generally represent demand for additional water and are location specific. However, several identified opportunities and challenges did not fit the definition of a Service Need. For example, discussions with stakeholders often revolved around the importance of alignment between the objectives of strategic policy initiatives and up and downstream water dependent industries, the flow of information between these industries, investors, consumers and the community, and government's ability to enable these industries by supporting outcome-based approaches to meeting regulation and being a conduit of information.

These opportunities and challenges are defined as Economic Enablers and are generally location agnostic or region wide service needs. Clearly defined roles, responsibilities and objectives on these issues will help realise opportunities to increase use of existing water resources and increase the chance of new water infrastructure being developed at the right time, scale and location. Economic Enablers are presented as the green pillars and underpin the Service Needs in Figure 20.

Economic Enablers are therefore presented first. Options under these items will generally be policy, regulatory or advocacy focused, be relatively less resource intensive, and will often be possible to deliver concurrently. The outcomes of options under the Economic Enablers will support options and outcomes delivered by addressing Service Needs. For this reason, the Service Need statements are presented second.

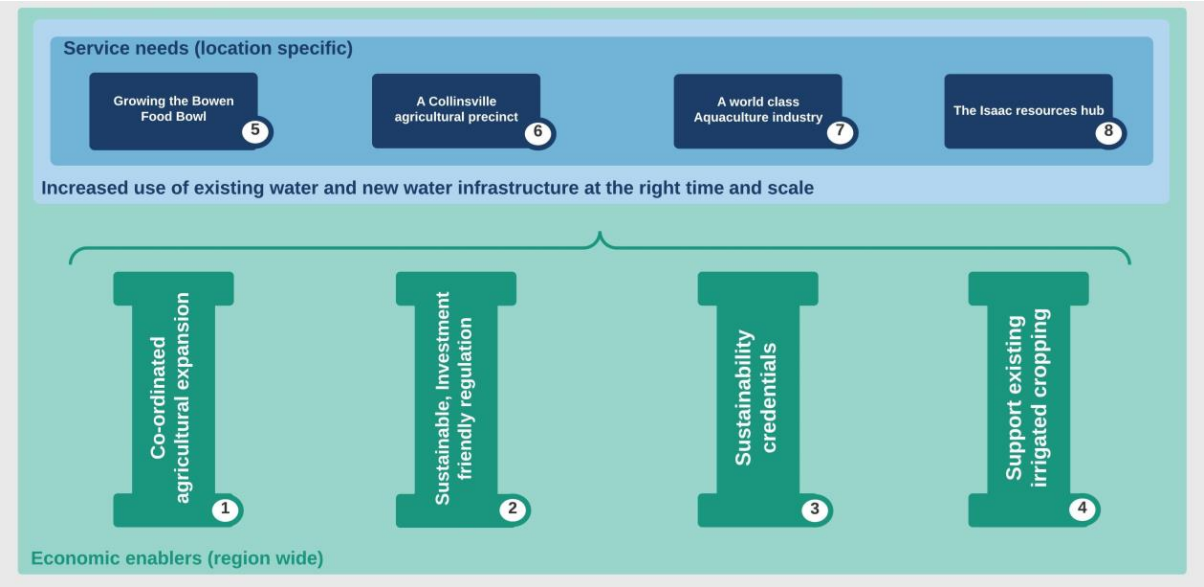


Figure 20 MIW Regional Water Strategy Service needs map

4.6.1. Region wide service needs

Economic Enabler 1 – Co-ordinated agricultural expansion

Economic Enabler 1 To support agricultural expansion and increased farm gate margins, market-driven land use change needs to be supported by market information. Water and water infrastructure needs to be available at the right time, scale, and location to support this expansion.	
Location	Region wide
Description	The MIW region's close proximity to a growing international middle class, particularly in South-east Asia, changing consumer tastes and preferences (including for more and alternative proteins and high-quality fruits, nuts, vegetables and bioproducts), climate, land and water availability and trust in the quality and consistency of Australia's agricultural products all create opportunities for market-driven land use change in the region. Specific opportunities include: • High value irrigated cropping and enclosed cropping around Bowen, Collinsville and Mackay. • Servicing an emerging biofutures market across the region, but particularly around Mackay and Proserpine, with cane serving as one potential foundation feedstock (noting the potential for alternative feedstocks). Water is available to realise each of these opportunities and there are multiple water infrastructure projects being considered concurrently, by different agencies, that could support these opportunities. The challenge that needs to be overcome for the region is establishing the market for high value cropping and biofutures products and then working back down the supply chain to provide information to the private sector to meet this market, at scale, via existing and new water resources and infrastructure. Scale is critical for new bulk water infrastructure, processing facilities and the biofutures initiative to be economically and financially viable. Achieving scale and realising the opportunities, including accessing international markets, involves multiple parties throughout the supply chain. Multiple parties mean there are coordination challenges that need to be overcome.

Economic Enabler 2 – Sustainable, investment friendly regulation

Economic Enabler 2 Outcome-focused regulation and planning approvals can incentivise sustainable investment in industries that utilise water resources.	
Location	Region wide
Description	Queensland's environmental regulatory framework supports world leading, sustainable primary production and mining. Internationally, this is a competitive advantage as consumers demand products that are produced sustainably. However,

Economic Enabler 2 Outcome-focused regulation and planning approvals can incentivise sustainable investment in industries that utilise water resources.	
	the cost of doing business in the region can be high for water dependent businesses and investors compared to other countries. Specifically, there are opportunities to improve how the region meets its regulatory requirements in relation to water quality and the process by which regulatory approvals for bulk water infrastructure projects are coordinated. **Managing water quality** In line with the Department of Environment and Science's recent release of the *Point Source Water Quality Offsets Policy 2019*, there are opportunities to investigate the appropriateness of an outcome focused approach to allow the MIW regions existing and new Environmental Authority (EA) holders to efficiently and flexibly mitigate their water quality impacts. There are also opportunities to explore the potential for mine water to be approved for reuse as a beneficial resource under the *Waste Reduction and Recycling Act 2011*. **Coordinating bulk water infrastructure approvals** In line with findings from the recent independent review of the Federal Governments *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), environmental regulatory frameworks at the State and Federal level can often be duplicative and focused on process instead of outcomes. There may be opportunities to streamline regulations and planning approvals to incentivise investment in industries that can utilise water resources. Whilst the process of streamlining regulation has commenced, further improvements can still be made. Areas of relevance to the Strategy that are cited as having scope for further improvements include: • Assessment methods for threatened species listings • The process for bilateral assessments for projects that impact state and federal environmental interests[18] • The water trigger (under section 24D of the EPBC Act).[19]

[18] The bilateral agreement between the Commonwealth of Australia and the State of Queensland relating to environmental assessment (the assessment bilateral agreement) allows the Commonwealth Minister for the Environment to rely on specified environmental impact assessment processes of the State of Queensland in assessing actions under the EPBC Act.

[19] The water trigger allows the impacts of proposed coal seam gas and large coal mining developments on water resources to be comprehensively assessed at a national level.

Economic Enabler 3 – Market the region's sustainability credentials to encourage investment

Economic Enabler 3	
Stakeholders increasingly expect key water-using industries to deliver social value in addition to commercial value. Whilst industries are adapting and innovating, coordination and information sharing amongst like industries could support an improved ability to demonstrate social value creation in aggregate, as opposed to by individual entities.	
Location	Region wide
Description	Customers and the community increasingly expect industry to deliver environmental (e.g. reef protection, soil, water and air quality), cultural and social outcomes alongside commercial outcomes. Water-using industries have adapted to this new operating context and have developed their own frameworks to measure and report on the social value they deliver. These frameworks often align with relevant global frameworks and guidance. For example, mining companies report social value with reference to the *United Nations Global Compact's CEO Water Mandate* which aims to support *Sustainable Development Goal 6: Clean Water and Sanitation for All*. Whilst industries are adapting and innovating, coordination and information sharing amongst like industries could support an improved ability to demonstrate social value creation in aggregate, as opposed to by individual entities. At an individual company level, the incentive for this level of coordination and information sharing is low, as benefits are not realised by individual companies, but by industries as a whole. There are however regional benefits of aggregation; for example, where the region is trying to attract investment from biofutures processing companies. Beyond improved coordination of information sharing and reporting on social value, there are also opportunities to standardise reporting metrics. Economists have developed a number of techniques for measuring social value in monetary terms. The benefit of reporting on metrics in terms of their dollar value is that it allows different outcomes to be viewed through a common lens based not on any one individual's values, but on society's values as a whole.

Economic Enabler 4 – Supporting existing irrigated cropping

Economic Enabler 4	
The irrigated broadacre cropping industry is in a period of transition with opportunities to increase farm gate margins by realising Biofutures opportunities and reducing irrigation input costs.	
Location	Mackay and Whitsunday (i.e. Proserpine) Local Government Areas (LGAs)
Description	If the status quo remains, it is plausible that the irrigated broadacre cropping industry in Mackay and Proserpine LGAs declines in the medium to long-term. Contributing factors include: • Increasing irrigation and energy costs, both of which impact farm gate margins. • Underutilisation of available irrigation water. • Volatile sugar prices, driven by a highly competitive global production market.

Economic Enabler 4	
The irrigated broadacre cropping industry is in a period of transition with opportunities to increase farm gate margins by realising Biofutures opportunities and reducing irrigation input costs.	
	• Market demand for raw sugar declining as the health impacts of sugar become better understood by consumers. • Ageing grower cohort. The Queensland Government's 15 per cent reduction on water prices for broadacre crops will provide some relief. However, there is still a chance that irrigated broadacre cropping declines in the Mackay and Whitsunday LGAs. In the absence of an alternative product (e.g. biofutures) or market driven land use change to higher value crops (e.g. sweet potato, macadamias, avocadoes), any decrease in irrigated broadacre production, and particularly sugar, will have economic impacts for growers, sugar mills, local businesses, and the Mackay and Whitsunday region's.

4.6.2. Location specific service needs

Service Need 1 – Growing the Bowen Food Bowl

Service Need 1	
Access to HP water could unlock high value irrigated cropping expansion in the Bowen area and industrial expansion at the Abbot Point SDA (including for the Port of Abbot Point)	
Location	Whitsunday LGA
Description	**High value irrigated cropping** The Bowen area has a climate that creates growing conditions amenable to expanding high value irrigated cropping. However, there are limitations on existing water resources that include: • The 10,500 ML of HP water in Peter Faust cannot be supplied to Bowen as the existing pipeline is a potable water pipeline and the capacity is well below that required for high value irrigated cropping expansion. • Medium priority water is not sufficiently reliable to underpin high value irrigated cropping investment. • Utilisation of MP allocations is low in the Proserpine scheme, and there would be potential to purchase MP allocation and convert them to HP, however there is a HP cap in the Water Plan of 22,000 ML that had already been reached. The Water Plan would require amendment to allow further conversion. • Groundwater resources are available but there are issues with the reliability and quality (i.e. salinity) of this resource for horticultural expansion. Seawater intrusion around Bowen needs to be managed carefully. The best available current demand forecast for new, high value irrigated cropping near Bowen is between 16,000 and 17,000 ML of new, HP water allocation. There is potential for additional demand beyond these estimates for agricultural and

Service Need 1 Access to HP water could unlock high value irrigated cropping expansion in the Bowen area and industrial expansion at the Abbot Point SDA (including for the Port of Abbot Point)	
	aquaculture. For example, the Whitsunday Aquaculture Development Area (ADA) may have future demands for water (also discussed in Service need 3). Additional supply to the Whitsunday LGA is likely to make this ADA a more attractive location for prospective investors. **Industrial** The Port of Abbot Point, which is a deep port, is likely to require more water associated with growth in exports and industrial activities at the Abbot Point SDA. For the Abbot Point SDA, whilst the volume and timing of water requirements are uncertain and dependent on industrial growth, water certainty and a coordinated approach to water development will underpin potential future growth developments. For example, the production of green hydrogen is an emerging industry for which water is a primary input. Renewable hydrogen has several industrial uses and is receiving increasing interest from the private sector and support from the Queensland Government under its *Queensland Hydrogen Industry Strategy 2019-24*. The best available current demand forecast for industrial activities in the Abbot Point SDA (including potential expansion of exports through the Port of Abbot Point) is approximately 3,000 ML of new, HP water allocation.

Service Need 2 – A Collinsville agricultural precinct that can meet regional needs

Service Need 2 There are high value irrigated cropping opportunities near Collinsville but there is currently no supplemented water supply	
Location	Whitsunday LGA
Description	Collinsville has 9,500 Ha of high-quality cropping land that could be developed to support high value irrigated cropping, however there is currently limited supplemented water supply that can service this area.

Service Need 3 – A world class aquaculture industry

Service Need 3 There are opportunities for aquaculture expansion in the MIW region including within ADAs but there is currently no supplemented water supply	
Location	Region wide (within ADAs)
Description	Aquaculture is expanding throughout the MIW region, particularly in the Proserpine area and within ADAs. With additional water, there is the potential, based on known development plans alone, for existing aquaculture production to double over the next ten years. The aquaculture industry has no end of life, is an employment-intensive industry and, with appropriate management of natural capital, could exist

	indefinitely. However, aquaculture needs a reliable and consistent source of supplemented freshwater supply for the industry to expand. Individual businesses have assessed water supply options that can meet forecast growth, applying an avoid, mitigate, offset hierarchy – ultimately though, for production growth forecasts to be realised, new HP allocation will be required. Access to approximately 5,000 ML per annum of HP water by 2024, potentially reaching 10,000 ML by 2030, would support known expansion plans for existing aquaculture near Proserpine. Supply to this area could also meet the future water needs of the Dingo Beach township. Expansion plans in the Whitsunday and Bloomsbury ADAs are less certain but possible.

Service Need 4 – The Isaac resources hub

Service Need 4 High priority water allocations and new pipeline capacity will be required for metallurgical coal expansion plans and urban water security in the Isaac region. There are also opportunities to expand irrigated agriculture in the region.	
Location	Isaac LGA
Description	High priority water allocations and new pipeline capacity will be required for metallurgical coal expansion plans and urban water security in the Isaac region. There is also increasing interest in green hydrogen, with present and future opportunities near Moranbah (Dyno Nobel Moranbah) that may have future water requirements. The best available current demand forecast is that approximately: • 20,000 ML of new, HP water allocation is required for mining in the Bowen Basin by 2040. • 3,000 ML of HP water is required for urban needs in Moranbah, Dysart, and Clermont by 2036. Adani has secured 10,800ML of strategic reserve from the Belyando Suttor sub-catchment of the Burdekin Basin Water Plan area. This water is planned to be taken via a water harvesting facility located just downstream of the junction of the Belyando and Suttor Rivers on the border of the GW3 area and is in addition to the 20,000 ML of demand that has been identified for the northern Bowen Basin. **Supplying water to meet mining demand** There are supply options that could meet this demand, including the beneficial reuse of mine affected and CSG water, a piped water supply, or a combination of these options, however there are barriers to their implementation. For example: • For mine affected water, regulatory instruments that govern the use of mine affected water could be reconsidered to determine whether environmental risks can be appropriately regulated in a way that provides more flexibility for this resource to be used. • For CSG water, there is uncertainty on the volume and timing of available water.

Service Need 4 High priority water allocations and new pipeline capacity will be required for metallurgical coal expansion plans and urban water security in the Isaac region. There are also opportunities to expand irrigated agriculture in the region.	
	• For a new pipeline, current contractual arrangements for bulk water supply seek to fully underwrite, up-front, the costs of a new pipeline plus a return on and of capital, through long-term take or pay contracts. The pipeline will be shared by multiple parties. Each mining company has different demands and timing for pipeline capacity and water allocations. For some miners, they might not need water for 10 years and the costs of signing on to take or pay contract now are a barrier. This issue is compounded as financial institutions require evidence of a secure water supply to underwrite loans for mine expansion. Combined, this creates a circularity problem that disincentivises mine development, particularly for smaller companies or those looking to establish new operations in the area. **Urban demand and supply security and price risk** Isaac Regional Council does not hold water allocations and therefore has little control of supply security and price. A large proportion of existing supplies are sourced under legacy agreements with mining companies which in some cases have expired, and miners are openly stating that they are seeking to terminate urban supply arrangements. This leaves the Council exposed to both volume and price risk. Water is expensive and reflects contract prices with Sunwater; the cheapest price for water on the short-term market is circa $2,650 per ML and, depending on the source of supply, can exceed $4,000 per ML. In addition, even if Council could secure and fund the ongoing cost of allocations, there is no existing distribution infrastructure to deliver water to many of the towns in need.

4.6.3. Urban Water Security for Mackay

As outlined in Section 2.4.1, Mackay currently enjoys a relatively high level of water security which is partially assisted by a low level of irrigation utilisation in the Pioneer scheme. The Mackay Regional Water Supply Security Assessment confirmed that should current levels of irrigation utilisation continue, access to the 12,735 ML of unsold high-class A held by Sunwater would ensure an acceptable level of urban supply security to Mackay and Sarina for the population growth scenarios considered up to and beyond 2036.

The detailed manner in which water supply security has been assessed in conjunction with a clear pathway to maintain existing reliability has resulted in Mackay's urban water supply requirements being excluded from the service need description. Providing that Council maintains communication with Sunwater regarding access to the unsold allocations urban water security should be assured in the medium term, and there is little benefit in lobbying by GW3 for an alternative outcome.

With this observation noted, there are several policy initiatives outlined in this strategy relating to increased sugar industry support and transition to higher value markets such as biofutures. If these strategies prove successful and there is a resurgence of the sugar industry in Mackay, the assumptions that underpin the current urban security assessment may alter and new supply measures to bolster supply may need to be considered. Several supply options to meet this need were identified during the development of the Strategy, and whilst they are not recommended to be carried through for

further consideration in the short term, they have been included here as a reference point should supply options for Mackay need to be revisited.

Option	State Infrastructure Plan Category	Suitability for Further Assessment	Inclusion in Short list (Y/N)
Secure unsold HP allocation from the Pioneer scheme	Better Use	As outlined in Section 2.4.1, the 12,735 ML of unsold allocation in Teemburra Dam is sufficient to meet the urban water supply requirements of Mackay and Sarina over the medium term.	Yes
Secure allocation from permanent trades in the Pioneer scheme	Better Use	As outlined in Section 2.3.1, usage of MP allocations in the Pioneer is currently averaging 25 per cent, which is extremely low. There is an opportunity to purchase MP allocation and convert it to HP to meet long-term urban requirements. The downside of this option is that is permanently impacts the ability of the sugar industry to return to a growth scenario should biofutures become established in the region. As there is adequate existing MP allocation available to support Mackay into the medium-term, it is recommended that this option be revisited in five to ten years once the long-term future of the sugar sector is better understood.	No
Raise Marian Weir to create new HP allocation	Improve Existing	There is 10,500 ML of general reserve in the Water Plan for sub catchments 1 to 8 within which Marian Weir is located. Given the comparatively lower cost and environmental impact associated with augmenting a brownfield asset versus constructing of a greenfield asset, this option offers the most attractive infrastructure related supply option for the Pioneer. However, the raising would still be subject to a long development phase, notably due to the likely requirement for a federal EIS given the asset is located within a reef catchment. As with the MP conversion option above, this option should be considered in the longer term once the future of the sugar industry in Mackay is better understood.	No

Option	State Infrastructure Plan Category	Suitability for Further Assessment	Inclusion in Short list (Y/N)
Raise Kinchant Dam to create new HP allocation	Improve Existing	Kinchant Dam is located in sub catchment 11 of the Pioneer and does not currently have an ability to access any form of reserve. In addition, given Kinchant is a water harvesting asset the power costs of this option are high by comparison to alternatives such as raising Marian Weir. This option is unlikely to meet the identified service need.	No
Construct Sandy Creek Weir to create new HP allocation	New	Sandy Creek is located in sub catchment 12 of the Pioneer and can potentially access 4,000 ML of general reserve in the Water Plan. As a greenfield asset the weir has a harder development pathway than raising Marian Weir, and it is located in the Eton scheme meaning that water will need to be pumped back to the Pioneer in order to integrate with the existing bulk water distribution network.	No
Construct Black Creek Dam to create new HP allocation	New	Black Creek Dam is located in sub catchment 1 of the Pioneer and hence could access the 10,500 ML of general reserve available. This volume is inadequate to justify construction of the dam which has potential storages with capacities up to 547,000 ML providing a yield of up to 75,000 ML.	No

4.7. Mapping the MIW region's service needs

The MIW region's service needs are informed by known water demand estimates which have been supplemented by engagement with stakeholders in workshops and through targeted discussions. This data is collated and mapped in Figure 21 to provide a geographical representation of the MIW region's service needs. Region wide service needs, or Economic Enablers, support Service Needs, are location agnostic and are therefore not presented. Service Needs are presented within the labelled bubbles.

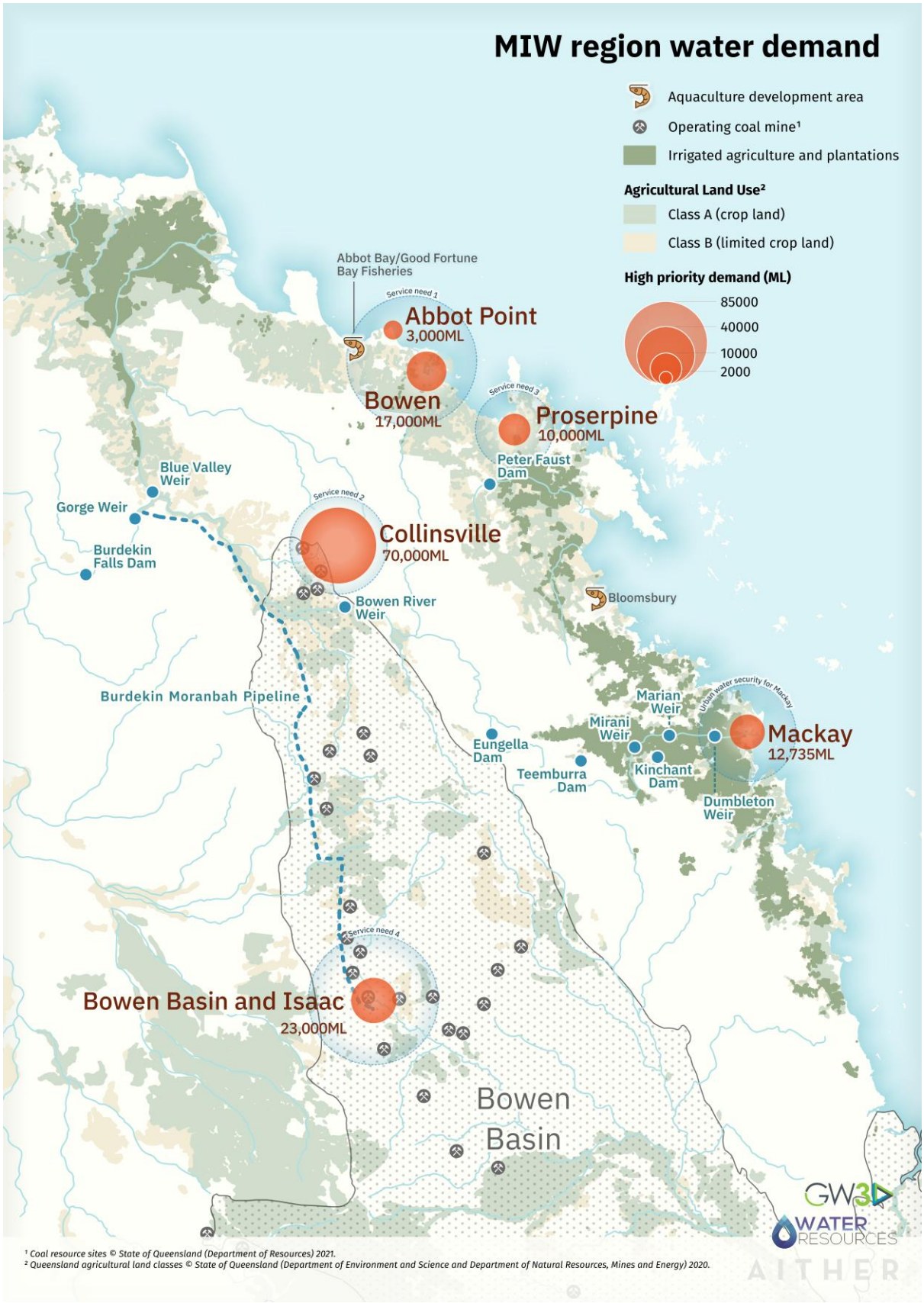


Figure 21 MIW region's service needs and known demands for water

5. Options identification and short listing

Outcomes of this chapter

Specific options are required to meet the MIW region's water related service needs identified in section 4.6 and realise associated benefits. The options identification and short listing chapter documents:

- a long list 46 non-infrastructure (i.e. policy, regulatory and advocacy) and infrastructure (i.e. water supply) options available to potentially meet the region's service needs,
- the option type in accordance with the State Infrastructure Plan categories, and
- whether the option is viable for short listing in the context of the previously defined service needs.

The outcome of this process is a short list of 41 options mapped to the MIW region's specific and water related service needs. Each short listed option is provided an ID for later reference.

5.1. Developing and short listing options for assessment

A long list of 46 options with the potential to service the MIW region were identified through a two-step process. In the first instance, historical data on water storage and distribution options that could supply the region were collated (section 3). This was followed by several options' identification workshops with regional stakeholders, GW3 and the Project Steering Committee. A particular emphasis was placed on potential non-infrastructure options (i.e. policy, regulatory and advocacy focused) in relation to service needs identified at the initial service need workshops and defined in section 4.6.

Each option has been considered with respect to its State Infrastructure Plan category, viability for development and ability to meet the relevant service need. Viable options were short listed for prioritisation by the Project Steering Committee. Table 15 and Table 16 document the long list of options and then identify the short listed options put forward for prioritisation in the options assessment process.

Non-infrastructure options are characterised differently to infrastructure options in that they can be considered 'no regrets' options that are worth pursuing regardless of their overlap with other options. This is consistent with the Queensland Government's State Infrastructure Plan that ranks non-infrastructure interventions such as 'reform' and 'better use' as preferable to capital intensive infrastructure solutions (Figure 22). For these reasons, all identified non-infrastructure options that support both Economic Enablers and Service Needs are short listed for consideration in the options assessment process.

Figure 22 State Infrastructure Plan 'Option types'

Source Queensland Government (2016)

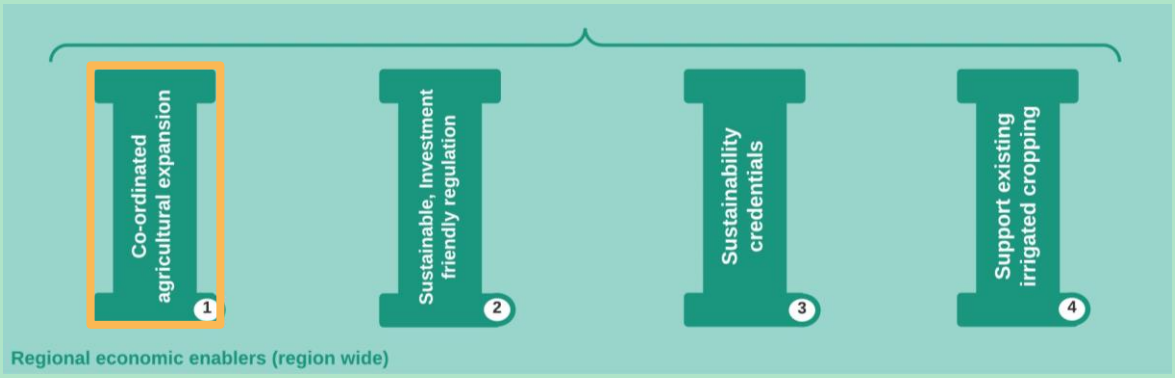
The first part of each options unique ID identifies which service need the options is intended to meet. For example, 'EE1' stands for Economic Enabler 1, and 'SN1' stands for Service Need 1. Within service need groupings, short listed options are provided with a unique ID number that serves several purposes:

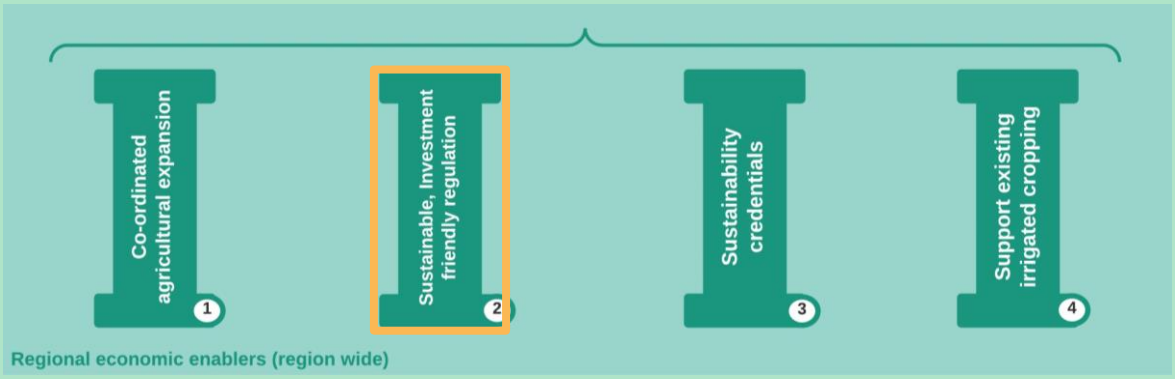
- Where any part of an ID number is shared (e.g. 1.1a and 1.1b), this means that options may be complimentary and could form part of a program of options in the final Strategy
- Where no part of an ID is shared (e.g. 1 and 2), this means that options are independent and do not necessarily have direct interfaces with other options
- Finally, for administrative purposes, the ID acts as reference number for the options assessment process.

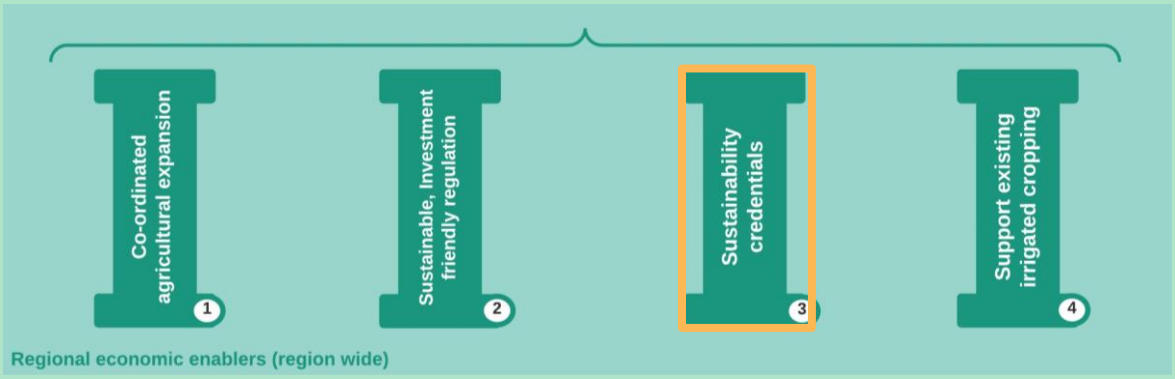
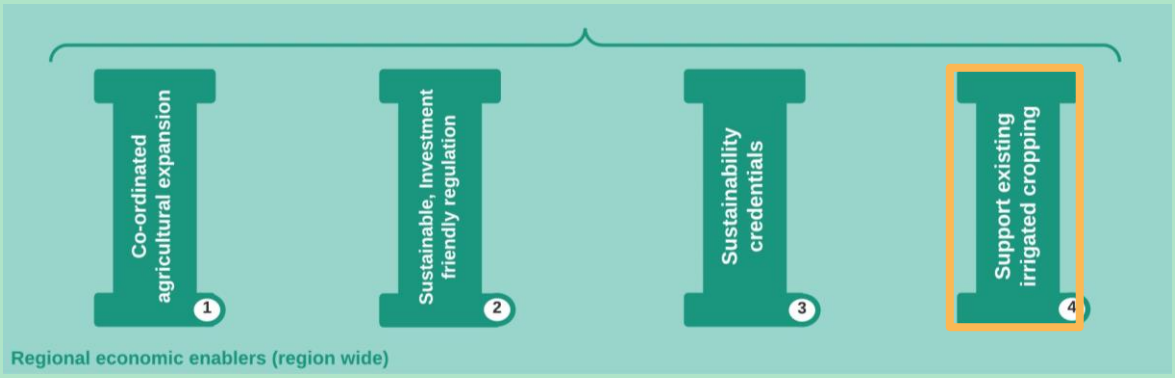
5.2. Options that support Economic Enablers

As identified in section 4.6 and discussed in section 5.1, non-infrastructure options that support the Economic Enablers will generally be policy, regulatory or advocacy focused, be less resource intensive, and can be delivered concurrently. Outcomes of options under the Economic Enablers will support options and outcomes delivered by addressing Service Needs.

Table 15 Policy, regulatory and advocacy options long list

Option (summary only)	State Infrastructure Plan Category	Inclusion in Short list (Y/N)	ID
Economic Enabler 1 To *support agricultural expansion and increased farm gate margins, market-driven land use change needs to be supported by market information. Water and water infrastructure needs to be available at the right time, scale, and location to support this expansion* 			
Expand representation of the MIW Agribusiness Futures Alliance Project steering committee to include water officials from Sunwater. Ensure Sunwater, together with RDMW and DAF, have visibility of market led demand intelligence and regional production capability. Ensure market intelligence informs how existing and new water resources and infrastructure can help realise export market opportunities.	Reform / Better use	Yes	EE1-1.1a
Ensure market intelligence information captured by the Agribusiness Futures Alliance Project is connected to future water infrastructure business cases to determine the risk adjusted returns to growers and project proponents.	Better use	Yes	EE1-1.1b
Advocating for the Queensland Government to create a 'one stop shop' information hub to market Queensland's water products. This 'one stop shop' should be coupled with information on available land and soils.	Better use	Yes	EE1-1.2a
Hold investment attraction tours that showcase, to big agribusiness and existing growers in the region, the region's strengths including water reliability, available land, climate for growing a variety of crops, good soils, access to supply chains etc.	Better use	Yes	EE1-1.2b

Option (summary only)	State Infrastructure Plan Category	Inclusion in Short list (Y/N)	ID
With information from the above two options, further investigate where disaggregated land use zoning might be preventing larger scale agricultural investment. With this intel, advocate for strategic changes to local zoning precincts, specifically where there is good quality agricultural land and also restrictions on land use and parcel sizes.	Reform	Yes	RE1-1.2c
Coordinate across agencies and communicate to stakeholders, via regular updates, the status of bulk water infrastructure developments that could service the region.	Reform / Better use	Yes	RE1-1.3
Economic Enabler 2 *Outcome-focused regulation and planning approvals can incentivise sustainable investment in industries that utilise water resources*  			
For aquaculture and agriculture, outcome-focused mechanisms that focus on efficiently achieving Environmental Authority (EA) conditions at region wide level (e.g. net reduction in salinity and nutrients). This could include market mechanisms such as bubble licenses.	Reform	Yes	RE2-1a
For mining, approvals that manage and allow for the beneficial re-use of mine affected water.	Reform	Yes	EE2-1b
For bulk water infrastructure approvals, avoiding duplicative conditions at the State and Federal levels and instead prioritising outcomes. This duplication may in part be resolved by any amended EPBC Act.	Reform	Yes	EE2-1c
Economic Enabler 3			

Option (summary only)	State Infrastructure Plan Category	Inclusion in Short list (Y/N)	ID
Stakeholders increasingly expect key water-using industries to deliver social value in addition to commercial value. Whilst industries are adapting and innovating, coordination and information sharing amongst like industries could support an improved ability to demonstrate social value creation in aggregate, as opposed to by individual entities 			
An independent and impartial third party could help to facilitate coordination amongst individual private entities and support information sharing on value. GW3, the local Natural Resource Management (NRM) group or industry bodies are all examples of organisations that would be well placed to support information sharing on water use between industry players.	Better use	Yes	EE3-1a
Advocate, including through a potential renewed NWI, for consistent, nationally accepted guidance to value economic, social and environmental costs and benefits so that water use benefits and impacts can be identified, measured and communicated across all consumptive and non-consumptive uses.	Reform	Yes	EE3-1b
Economic Enabler 4 *The irrigated broadacre cropping industry is in a period of transition with opportunities to increase farm gate margins by realising biofutures opportunities and reducing irrigation input costs* 			

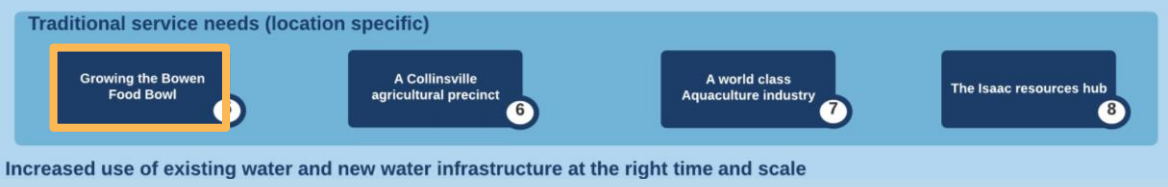
Option (summary only)	State Infrastructure Plan Category	Inclusion in Short list (Y/N)	ID
In alignment with the recommendation in the Regional Agribusiness Supply Chains Report establish a new, collaborative partnership with the sugar and broadacre cropping industry and in particular canegrowers (proposed MIW broadacre grower's partnership) to understand drivers for underutilisation of irrigation water.	Better use	Yes	EE4-1.1a
Under the proposed MIW broadacre grower's partnership, understand existing capability building and succession planning tools being used by the industry.	Better use	Yes	EE4-1.1b
Consider extension programs to ensure growers can access resources to understand the value of water in production.	Better use	Yes	EE4-1.2
Advocate for a time-constrained concession on water prices.	Reform	Yes	EE4-2.1a
Advocate for a time-constrained concession on energy prices.	Reform	Yes	EE4-2.1b
Through the proposed MIW broadacre grower's partnership, calculate the sugarcane production capacity in the Mackay and Proserpine regions under a scenario where existing water resources are fully utilised and provide this information to officials involved in developing the Biofutures industry.	Better use	Yes	EE4-2.2
Advocate for a suite of policy measures proposed under Economic Enabler 1 to allow the irrigated broadacre cropping industry to increase farm-gate margins.	Better use	Yes	EE4-3
At the farm level, encourage growers to explore energy efficiency improvements through audits under the Energy Savers Plus Program Extension designed specifically for agricultural customers.	Better use	Yes	EE4-4.1
Investigate the feasibility of installing renewable energy systems and micro grids, such as solar, funded through feed-in tariffs or other financial incentives (i.e. renewable energy certificates).	Better Use / New	Yes	EE4-4.2a
Investigate the feasibility of installing renewable energy systems and micro grids, such as solar, funded through concessional finance offered by the	Better Use / New	Yes	EE4-4.2b

Option (summary only)	State Infrastructure Plan Category	Inclusion in Short list (Y/N)	ID
Clean Energy Finance Corporation and/or the Northern Australia Infrastructure Fund.			
Consider the installation of solar energy systems to reduce pumping costs at the bulk supply level.	Better Use / New	Yes	EE4-4.3

5.3. Options to meet Service Needs

Four Service Needs have been identified that require a combination of non-infrastructure and future water supply solutions in order to address the challenges and realise the opportunities of each service need. A long list of options has been derived from the analysis provided in the water source chapter and are presented in Table 16. Each option has been considered with respect to its viability for development and ability to meet the relevant service need, with preferred options being carried through for prioritisation by the Project Steering Committee.

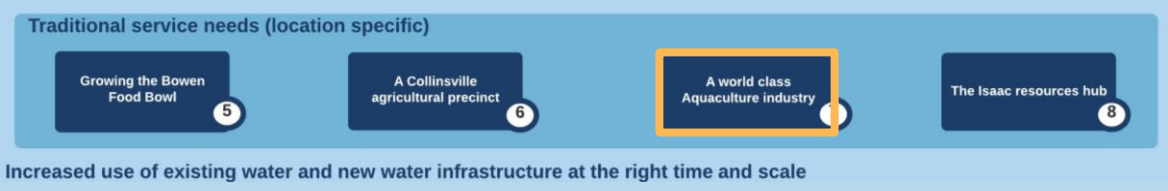
Table 16 Water supply options longlist

Option (summary only)	State Infrastructure Plan Category	Suitability for Short list	Inclusion in Short list (Y/N)	ID
Service Need 1 *Access to HP water could unlock high value irrigated cropping expansion in the Bowen area and industrial expansion at the Abbot Point SDA (including for the Port of Abbot Point)* 				
Refer to the program of non-infrastructure options proposed to meet Economic Enabler 1	Reform / Better use	Non-infrastructure options are less resource intensive and will often be possible to deliver concurrently.	Yes	SN1-1
Engage with RDMW as part of the Whitsunday Water Plan review to ensure industry needs are considered	Reform / Better use	Non-infrastructure options are less resource intensive and will often be possible to deliver concurrently.	Yes	SN1-2

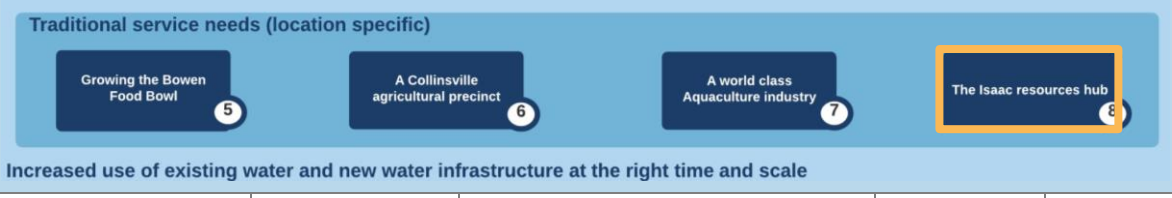
Option (summary only)	State Infrastructure Plan Category	Suitability for Short list	Inclusion in Short list (Y/N)	ID
Conversion of MP allocation to HP from Peter Faust Dam and construct a new pipeline to Bowen	Better Use / New	Water usage analysis outlined in section 3 shows an average utilisation of MP allocation in the Proserpine scheme of 39 per cent, highlighting the opportunity to make better use of this resource through conversion to HP and application in high value irrigation. Depending on the final alignment, a distribution pipeline to Bowen would be in the order of 70km, making it one of the shorter distribution options to meet this service need. This option would require amendment of the HP cap for the Proserpine Water Supply Scheme in the Whitsunday Water Plan.	Yes	SN1-3a
A new pipeline extracting water from the Elliot Main Channel or a new pipeline from Burdekin River to supply unsold HP allocation to Bowen	Better use / New	Concept designs have already been undertaken by Sunwater for a pipeline from the Elliot Main Channel to demand nodes around Gathalungra and Bowen in lieu of the original Water for Bowen channel extension concept proposed in 2006. The Water for Bowen Pipeline Company has also proposed an alternative project that would deliver water directly from the Burdekin River via an alignment that follows the Bruce Highway. HP water is currently available from the Burdekin scheme to meet the stated demands, although the raising of Burdekin Falls Dam would be required to provide the full supply volume proposed by the Water for Bowen Pipeline Company of 100,000 ML.	Yes	SN1-3b

Option (summary only)	State Infrastructure Plan Category	Suitability for Short list	Inclusion in Short list (Y/N)	ID
Construct Urannah Dam and a pipeline to Bowen via Peter Faust Dam	New	Should Urannah Dam proceed it will provide an opportunity to bolster existing supplies from the Proserpine scheme with high security water required to underpin high value irrigation. Whilst more expensive than supply of existing water from Peter Faust Dam, the option would not be inhibited by the current HP caps in the Whitsunday Water Plan and should therefore be retained as a potential option.	Yes	SN1-3c
Construct new bore field and distribute water to relevant demand nodes in Bowen	New	As stipulated in section 5.2, there are no available groundwater reserves within the Bowen region and there is concern that over allocation has already led to saltwater intrusion in the region. Any additional proposed take of groundwater in Bowen cannot be regarded as sustainable and should be excluded from further consideration.	No	NA
Service Need 2 *There are high value irrigated cropping opportunities near Collinsville but there is currently no supplemented water supply* 				
Refer to the program of non-infrastructure options proposed to meet Economic Enabler 1	Reform / Better use	Non-infrastructure options are less resource intensive and will often be possible to deliver concurrently.	Yes	SN2-1

Option (summary only)	State Infrastructure Plan Category	Suitability for Short list	Inclusion in Short list (Y/N)	ID
Construct Urannah Dam	New	The Urannah Dam project takes advantage of the 150,000 ML strategic reserve for the Bowen Broken, representing a rare opportunity for a large-scale dam development that fits within the existing water planning framework. The dam will have a yield of up to 103,000 ML of HP water that will service a 9,500 Ha irrigation scheme at Collinsville, along with a pipeline to connect water supply to industrial customers in the Bowen Basin. Up to 1200 megawatts of pumped hydro energy with solar and wind precincts up to 1,500 megawatts are contemplated, delivering additional benefits to the region beyond the contemplated service need.	Yes	SN2-2
Secure unsold HP allocation from Burdekin Falls Dam and distribute to Collinsville via new pipeline	Better use / New	Collinsville is a short distance of around 25 km from the existing Burdekin to Moranbah Pipeline alignment. The pipeline could be readily duplicated via the existing easement and a spur line taken to Collinsville to supply irrigation. However, Burdekin Falls Dam does not currently offer available volumes of allocation to meet this service need requirement (circa 80,000 ML), and it is unlikely that the volumes required could be delivered at a cost that would facilitate a reasonable commercial and economic outcome.	No	NA
Raise Burdekin Falls Dam and distribute	New	This option addresses the shortcomings of the option above with respect to available	No	NA

Option (summary only)	State Infrastructure Plan Category	Suitability for Short list	Inclusion in Short list (Y/N)	ID
to Collinsville via new pipeline		volumes but does not resolve the cost prohibitive nature of the distribution.		
Secure allocation from permanent trades in the Bowen Broken scheme and distribute water to Collinsville via the Broken River	Better use	The volumes of water required to meet this service need are double the entire volume of water currently available from the Bowen Broken scheme, and most allocations are held by mining companies who cannot operate without the supply.	No	NA
Service Need 3 *There are opportunities for aquaculture expansion in the MIW region including within ADAs but there is currently no supplemented water supply* 				
Refer to the program of non-infrastructure options proposed to meet Economic Enabler 2. In the context of aquaculture, this includes advocating for outcome-based mechanisms	Reform	Non-infrastructure options are less resource intensive and will often be possible to deliver concurrently.	Yes	SN3-1
Secure unsold HP allocation in Peter Faust Dam and construct a pipeline to Proserpine aquaculture facilities	Better Use / New	This is the lowest cost option available to meet this service need and draws upon available unsold HP allocation.	Yes	SN3-2
Construct water harvesting facility in the lower reaches	New	The Whitsunday Water Plan holds 28,500 ML in general reserve of which only 1,700 ML	No	NA

Option (summary only)	State Infrastructure Plan Category	Suitability for Short list	Inclusion in Short list (Y/N)	ID
of Six Mile Creek or the Proserpine River and pipe supply to Proserpine aquaculture facilities		has been allocated. However, the remaining reserves are targeted for the Kelsey Creek / Lethe Brook, Thompson Creek, O'Connell River and Andromache River sub-catchments (i.e. all sub-catchments other than Proserpine and Six Mile Creek). Hence this proposal is not consistent with the existing Water Planning Framework, and yields are likely to be limited given the location downstream of Peter Faust Dam and the existing irrigation scheme.		
Construct Urannah Dam and pipeline to Proserpine via Peter Faust Dam	New	Should Urannah proceed it will provide an opportunity to bolster existing supplies from the Proserpine scheme with high security water required to underpin aquaculture. Whilst existing supplies from Peter Faust could be utilised to meet immediate known demands, there is no opportunity to expand supply beyond current levels.	Yes	SN3-3
Extension of the Elliot Main Channel or a new pipeline from Burdekin River to supply unsold HP allocation to the Whitsunday ADA in conjunction with Service Need 1	Better Use / New	Distribution infrastructure from the Burdekin Haughton scheme that may be developed to support high value irrigation could also support development of the Whitsunday ADA, and hence this option should be considered in conjunction with the options and benefits identified in Service Need 1.	Yes	SN3-4

Option (summary only)	State Infrastructure Plan Category	Suitability for Short list	Inclusion in Short list (Y/N)	ID
Service Need 4 *High priority water allocations and new pipeline capacity will be required for metallurgical coal expansion plans and urban water security in the Isaac region. There are also opportunities to expand agriculture in the region.* 				
To make better use of existing water, undertake a pre-feasibility study to test the idea and secure funding partners for a more detailed feasibility study on a mine affected water reuse scheme (including for CSG water)	Better use / New	This option cannot meet the urban water requirement aspect of the service need given water quality concerns and is unlikely to be able to meet all of the mining related demands given reliability issues. However, it is a supporting option that could be used to defer other capital investment and provide a long-term supply option to facilitate a shift from mining to irrigated agriculture and associated economic growth in the Isaac Council area in the longer term. It should therefore be considered in conjunction with other options in meeting this service need.	Yes	SN4-1.1
Pending the outcome of 1.1, refer to the program of non-infrastructure options proposed to meet Economic Enabler 2. In the context of mining the aim is to allow more mine affected water to be beneficially re-used	Reform / New	Non-infrastructure options are less resource intensive and will often be possible to deliver concurrently.	Yes	SN4-1.2

Option (summary only)	State Infrastructure Plan Category	Suitability for Short list	Inclusion in Short list (Y/N)	ID
Pending the outcomes of 1.1 and 1.2, develop a secondary market to trade mine affected water	Better use / New	Non-infrastructure options are less resource intensive and will often be possible to deliver concurrently.	Yes	SN4-1.3
Advocate for a community service obligation (CSO) to reduce the cost that Isaac Regional Council pays for water	Reform	Non-infrastructure options are less resource intensive and will often be possible to deliver concurrently.	Yes	SN4-2
Explore alternative financing options for a new bulk water pipeline that addresses the up-front costs, risk sharing and circularity and timing problems that are preventing investment	Better Use / New	Non-infrastructure options are less resource intensive and will often be possible to deliver concurrently.	Yes	SN4-3.1
Secure unsold HP allocation from Burdekin and construct Burdekin to Moranbah Pipeline Duplication	Better Use / New	35,000 ML of unsold HP allocation is available in Burdekin Falls Dam. The existing Burdekin to Moranbah Pipeline has a capacity of 22,600 ML, and hence a duplication of the existing pipeline would meet this service need. Anticipating the need for a duplication at some time in the future, Sunwater secured an easement for Burdekin to Moranbah Pipeline that is large enough for a duplication, and hence the required tenure is already available.	Yes	SN4-3.2a

Option (summary only)	State Infrastructure Plan Category	Suitability for Short list	Inclusion in Short list (Y/N)	ID
Construct Urannah Dam and pipeline to the Bowen Basin	New	A pipeline alignment from Urannah Dam to Moranbah would be shorter than the Burdekin pipeline, however the required lift over the Broken River Range (and hence power costs) is significant. Nonetheless if Urannah is constructed it would likely provide the most competitive alternative to a duplication of Burdekin to Moranbah Pipeline.	Yes	SN4-3.2b
Construct Connors River Dam and Pipeline	New	Connors River Dam would provide 49,500 ML of HP allocation if constructed. Detailed designs have been completed for both the dam and the pipeline, all property required for the dam has been acquired by the State, and the project has State and Federal EIS approval. At this stage it appears that Connors is unlikely to proceed due to insufficient demand, however given that the project is largely construction ready, it should be considered as a fallback option if Burdekin or Urannah are unable to meet the service need.	Yes	SN4-3.2c

5.4. Short listed options

The outcome of this chapter is a short list of 41 options mapped to the MIW region's specific and water related service needs. Figure 23 spatially maps short listed infrastructure options to Service Needs. These short-listed options are put forward for prioritisation in the options assessment chapter to inform their sequencing and implementation as part of the Strategy.

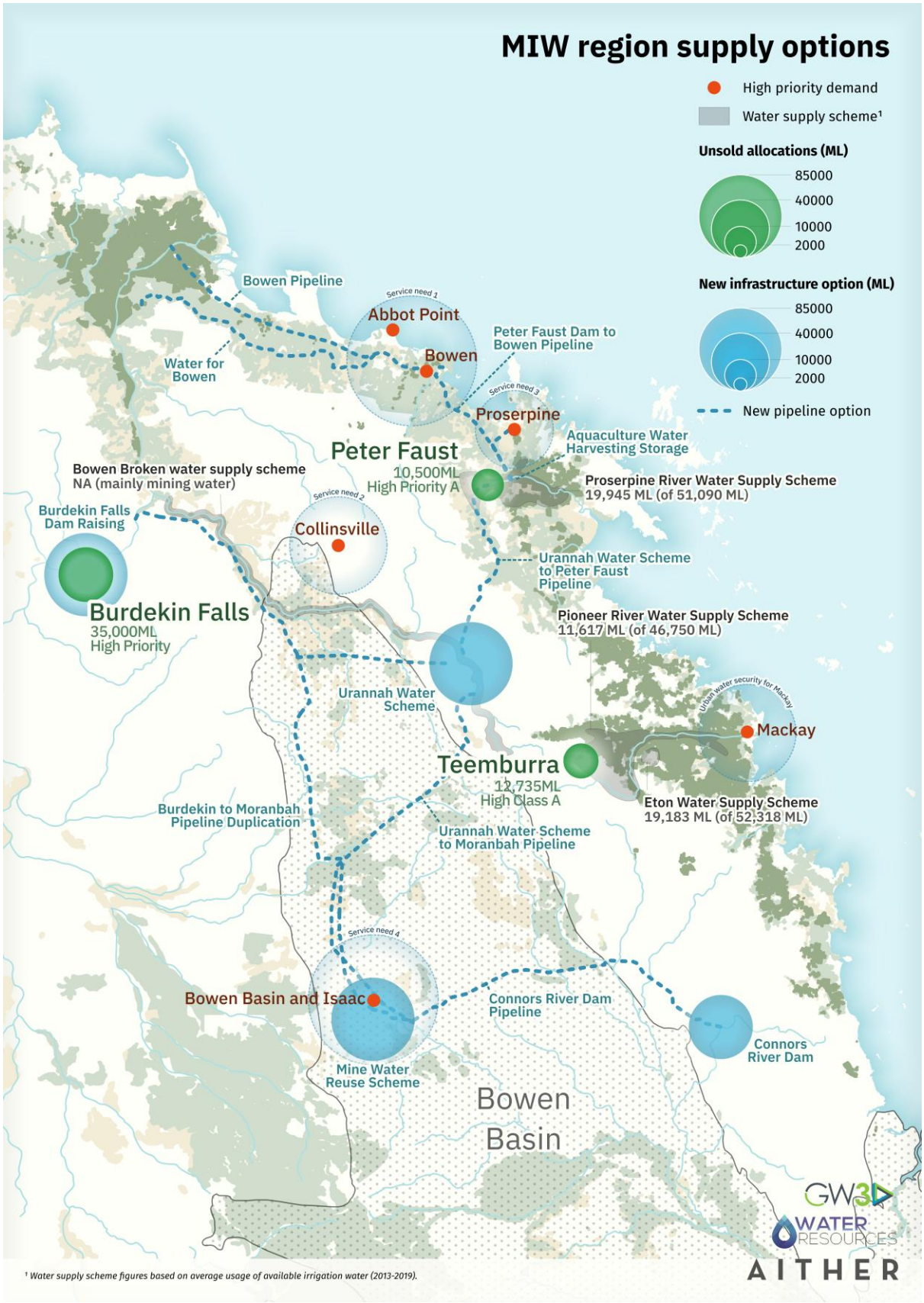


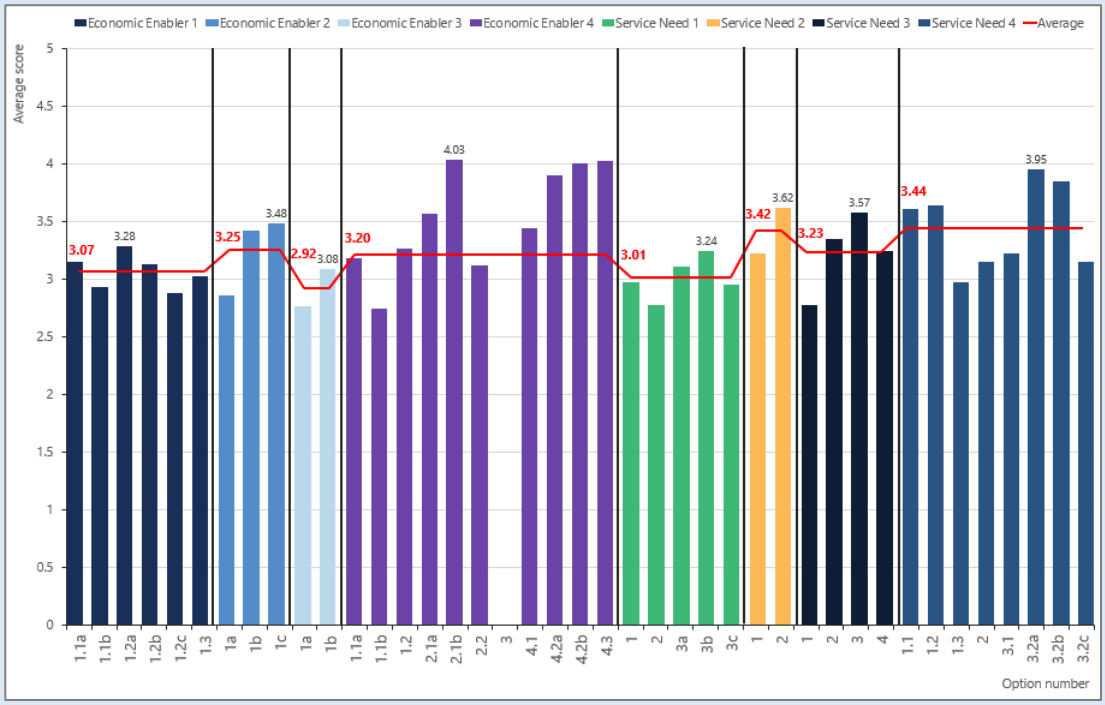
Figure 23 Mapping infrastructure options to Service Needs

6. Options assessment

Outcomes of this chapter

The options assessment process comprised a qualitative prioritisation of all options and rapid cost benefit analysis (CBA) of some infrastructure options. The purpose of the prioritisation process is to inform how options are ultimately implemented under the Strategy. The prioritisation process did not seek to exclude options.

The below figure presents the results of the qualitative prioritisation process across all options and service needs.



The highest performing options from the qualitative prioritisation for each service need were:

Economic Enabler 1 – Co-ordinated agricultural expansion

- Create an Agri-investor information hub (EE1–1.2a)

Economic Enabler 2 – Sustainable, investment friendly regulation

- Advocate to reduce duplicative state and federal bulk water infrastructure approval conditions (EE2-1c)

Economic Enabler 3 – Market the region's sustainability credentials to encourage investment

- Advocate for consistent and nationally accepted guidance for measuring the economic, social and environmental costs and benefits of water (EE3-1b)

Economic Enabler 4 – Supporting existing irrigated cropping

- Advocate for a time-constrained concession on energy prices (EE4-2.1b)

Service Need 1 – Growing the Bowen Food Bowl

- Construct Urannah Dam and supply water via a new northern pipeline to Peter Faust Dam and then on to the Bowen region (SN1-3b)

Service Need 2 – A Collinsville agricultural precinct that can meet regional needs

- Construct Urannah Dam (SN2-2)

Service Need 3 – A world class aquaculture industry

- Supply water from Urannah Dam via a new northern pipeline to Peter Faust Dam and then on to existing aquaculture near Proserpine (SN3-3)

Service Need 4 – The Isaac resources hub

- Construct Burdekin to Moranbah Pipeline Duplication to supply water to the Bowen Basin mines and Isaac Regional Council (SN4-3.2a).

The rapid CBA assessed six infrastructure options that were short listed based on their ability to meet Service Needs identified in section 4.6. The below table presents the rankings for infrastructure options in terms of their relative economic BCRs (total NPV benefits divided by total NPV costs). Rankings are organised by the respective service needs they can meet. The Urannah Water Scheme was not assessed as a more detailed economic assessment has recently been completed as part of the detailed business case.

Ranking	Option
Service Need 1 – Growing the Bowen Food Bowl	
1	Pipeline from Peter Faust Dam to Proserpine Prawn Farm and then Bowen*
2	Pipeline from Peter Faust Dam to Bowen
3	Pipeline from Elliot Main Channel to Bowen
Service Need 2 – A Collinsville agricultural precinct that can meet regional needs	
NA	No options assessed – The Urannah Water Scheme can meet this service need and already has a completed detailed business case. Given the rapid nature of the CBA, the Urannah Water Scheme has not been modelled as more detailed economic analysis has been undertaken on this option as part of the detailed business case.
Service Need 3 – A world class aquaculture industry	
1	Pipeline from Peter Faust Dam to Proserpine Prawn Farm
2	No second option assessed although the Urannah Water Scheme could meet this service need
3	No option assessed
Service Need 4 – The Isaac resources hub	
1	Burdekin to Moranbah Pipeline Duplication
2	Connors Dam and Pipeline

3	No third option assessed although the Urannah Water Scheme could meet this service need

* This option can meet Service Needs 1 and 3

Source Aither analysis (2021)

6.1. Qualitative prioritisation process

6.1.1. Approach to assessing short listed options

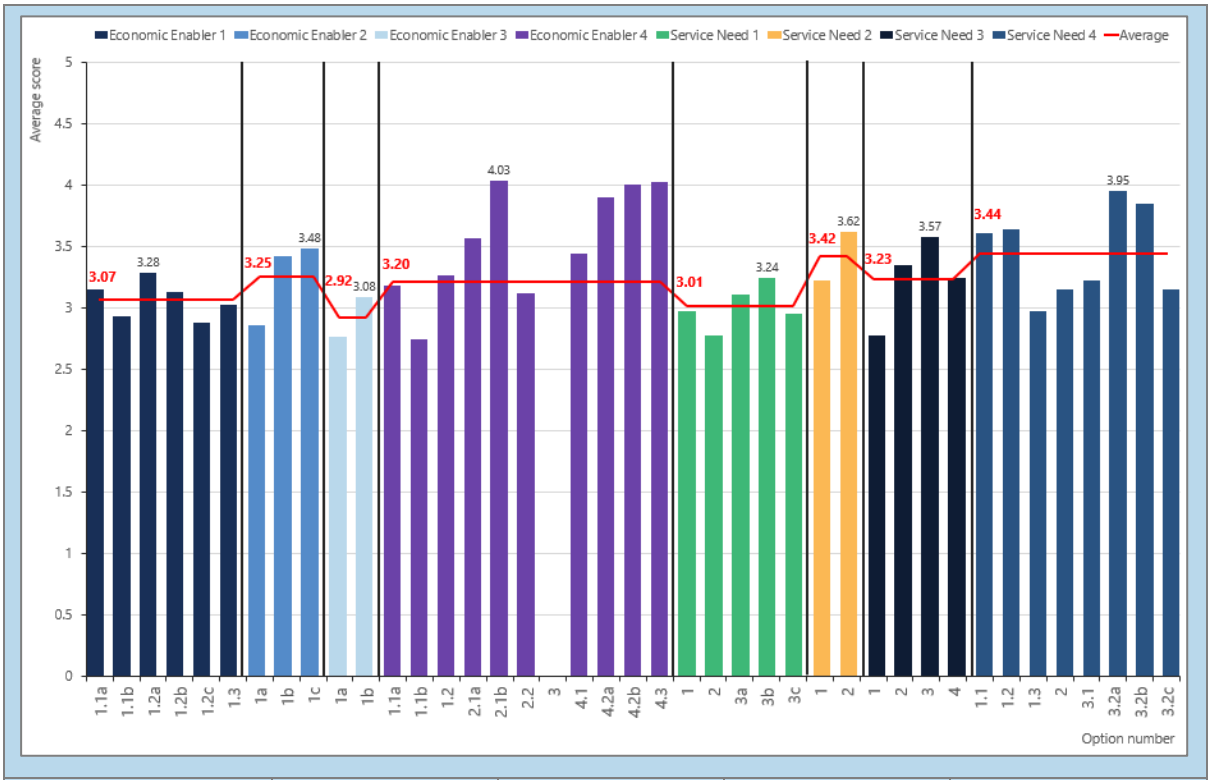
An initial qualitative prioritisation framework and long list of criteria were developed and workshopped with GW3 representatives and the Project Steering Committee. This workshop resulted in a final qualitative prioritisation framework and short list of criteria that could be used to prioritise all potential options in accordance with the overarching objectives and desired outcomes of the Strategy. The final criteria were:

- Promotes diversity and expansion of water using industries across the region
- Allows value adding opportunities to be explored and enabled
- Creates regional economic, social and environmental resilience
- Generates long-term water security and flexibility for all water users
- Delivers affordable electricity and water prices for all users.

Workshop participants were provided with a recap of each option prior to assessing that option. Options were then scored against the prioritisation criteria on a scale of one to five using online ranking software *Menti*. An average score out of five was ultimately calculated for each option. Options were ranked relevant to their performance against other options that could meet the same service need (i.e. *Economic Enabler* or *Service Need*). The purpose of the qualitative prioritisation process was to inform how options will be implemented under the Strategy. The prioritisation process did not seek to exclude options.

6.1.2. Results

Figure 24 presents the results for all options and service needs. The y-axis represents an average score out of five and the x-axis provides a bar for each option. Service needs and their respective options are distinguished by different bands of coloured bars separated by vertical lines. The highest scoring option from each service need is indicated by the black number above the respective option bar. The red line and numbers represent the average score across all options for each service need and act as a proxy for how much weight stakeholders placed on addressing a particular service need. Additional detail on high performing options is provided in the supporting data table underneath the bar chart.



Economic enabler / Service need	First score (option)	Second score (option)	Third score (option)	Average score for service need
Economic enabler 1	3.28 (EE1-1.2a)	3.15 (EE1-1.1a)	3.13 (EE1-1.2b)	3.07
Economic enabler 2	3.48 (EE2-1c)	3.42 (EE2-1b)	2.86 (EE2-1a)	3.25
Economic enabler 3	3.08 (EE3-1b)	2.76 (EE3-1a)	NA	2.92
Economic enabler 4	4.03 (EE4-2.1b)	4.02 (EE4-4.3)	4.00 (EE4-4.2b)	3.20
Service need 1	3.24 (SN1-3b)	3.11 (SN1-3a)	2.97 (SN1-1)	3.01
Service need 2	3.62 (SN2-2)	3.22 (SN2-1)	NA	3.42
Service need 3	3.57 (SN3-3)	3.35 (SN3-2)	3.24 (SN3-4)	3.23
Service need 4	3.95 (SN4-3.2a)	3.84 (SN4-3.2b)	3.64 (SN4-1.2)	3.43

Figure 24 Summary results of qualitative prioritisation workshop

Note Option EE4-3 is equivalent to the program of options under EE1 and hence was not voted on.

Source Aither analysis (2021)

In the context of the broader Strategy, the option prioritisation process serves as a guide to structure how options are implemented. To this end, the rankings and performance of options has been considered in development of the Strategy in section 7 with regards to their sequencing and implementation.

The highest performing options from the qualitative prioritisation for each service need were:

- **Economic Enabler 1 – Co-ordinated agricultural expansion:** Create an Agri-investor information hub (EE1–1.2a)

- **Economic Enabler 2 – Sustainable, investment friendly regulation:** Advocate to reduce duplicative state and federal bulk water infrastructure approval conditions (EE2-1c)
- **Economic Enabler 3 – Market the region's sustainability credentials to encourage investment:** Advocate for consistent and nationally accepted guidance for measuring the economic, social and environmental costs and benefits of water (EE3-1b)
- **Economic Enabler 4 – Supporting existing irrigated cropping:** Advocate for a time-constrained concession on energy prices (EE4-2.1b)
- **Service Need 1 – Growing the Bowen Food Bowl:** Construct Urannah Dam and supply water via a new northern pipeline to Peter Faust Dam and then on to the Bowen region (SN1-3b)
- **Service Need 2 – A Collinsville agricultural precinct that can meet regional needs:** Construct Urannah Dam (SN2-2)
- **Service Need 3 – A world class aquaculture industry:** Supply water from Urannah Dam via a new northern pipeline to Peter Faust Dam and then on to existing aquaculture near Proserpine (SN3-3)
- **Service Need 4 – The Isaac resources hub:** Construct Burdekin to Moranbah Pipeline Duplication to supply water to the Bowen Basin mines and Isaac Regional Council (SN4-3.2a).

6.2. Rapid CBA

6.2.1. Approach to assessment

The economic viability of infrastructure options is primarily driven by the value of water in production or use compared to the costs of the infrastructure. The nature of the demand, in terms of the volume of demand, and the mix of demand across enterprises (agriculture, mining, industrial and urban) is the key driver of economic benefits. On the other side of the equation, capital, and to a lesser extent, operating costs are the primary drivers of costs.

CBA is a decision support tool for evaluating these benefits and costs and can help to identify whether a prospective project has economic merit (i.e. the present value of benefits outweighs the present value of costs). The key outputs of CBA are standard decision-support criteria including net present values (NPVs) and benefit cost ratios (BCRs). Rapid CBA provides a consistent (i.e. NPV dollars) basis for comparing infrastructure options within and across regions. The rapid CBA has focused on those infrastructure options that were short listed based on their ability to meet Service Needs[20].

A detailed list of limitations, assumptions and parameters used in the rapid CBA model is documented in Appendix D – Rapid CBA assumptions and parameters.

6.2.2. Results

As discussed above, in the context of the broader Strategy, the rapid CBA process serves as a guide to understand the relative performance of different options at a high level. Ultimately, decisions on bulk water infrastructure are matters for the State Government and proponents.

[20] Given the rapid nature of the CBA, the Urannah Water Scheme has not been modelled as more detailed economic analysis has been undertaken on this option as part of the detailed business case.

Table 17 presents the ranking results for these six infrastructure options in terms of their relative economic BCRs (total NPV benefits divided by total NPV costs). Rankings are organised by the respective service needs they can meet.

Table 17 Summary rankings based on results of rapid CBA

Ranking	Option
Service Need 1 – Growing the Bowen Food Bowl	
1	Pipeline from Peter Faust Dam to Proserpine Prawn Farm and then Bowen*
2	Pipeline from Peter Faust Dam to Bowen
3	Pipeline from Elliot Main Channel to Bowen
Service Need 2 – A Collinsville agricultural precinct that can meet regional needs	
NA	No options assessed – The Urannah Water Scheme can meet this service need and already has a completed detailed business case. Given the rapid nature of the CBA, the Urannah Water Scheme has not been modelled as more detailed economic analysis has been undertaken on this option as part of the detailed business case.
Service Need 3 – A world class aquaculture industry	
1	Pipeline from Peter Faust Dam to Proserpine Prawn Farm
2	No second option assessed although the Urannah Water Scheme could meet this service need
3	No option assessed
Service Need 4 – The Isaac resources hub	
1	Burdekin to Moranbah Pipeline Duplication
2	Connors Dam and Pipeline
3	No third option assessed although the Urannah Water Scheme could meet this service need

Note * This option can meet Service Needs 1 and 3

Source Aither analysis (2021)

7. Regional Water Strategy

The Strategy presents actions that remove barriers to economic growth, or Economic Enablers and actions that directly support economic growth by meeting demand for additional water, or Service Needs across the MIW region.

The first page presents the Strategy on a page which reflects a high level summary of the complete Strategy. The Full Regional Water Strategy is presented on subsequent pages in the following format with lead organisations for each action in **bold**:

- ID
- Action (what) – a summary description of the action
- Implementation (how) – the recommended steps to implement the option
- Dependencies – presented in terms of:
  - Supported by - actions that support the action in question
  - Supports – actions that the action in question supports
  - Competes with – for infrastructure/water supply options only, the alternative water supply options that can meet the same demand (in part or in whole).
- Timing – presented in terms of:
  - Short – in the next two years
  - Medium – between two and five years
  - Long – within ten years.

Actions that support Economic Enablers

The actions for each Economic Enabler comprise policy, regulatory or advocacy actions to support the actions required to meet the Service Needs.

Economic Enabler 1 – Coordinated agricultural expansion

To support agricultural expansion and increased farm gate margins, market-driven land use change needs to be supported by market information. Water and water infrastructure needs to be available at the right time, scale, and location to support this expansion.

Outcomes achieved by meeting service need

- Export opportunities are diversified and realised
- Value adding opportunities are explored and enabled
- Market driven land use change
- Strategic, market-focussed collaboration between industry and all levels of government to ensure that new bulk water infrastructure project assessments and investments are coordinated
- Sustainable expansion of aquaculture and agriculture across the region (including diversity within agriculture)

ID	Action (what)	Implementation (how)	Dependencies	Timing
EE1-1.1a	Ensure Sunwater, together with RDMW and DAF, have visibility of market led demand intelligence and regional production capability.	**GW3** to expand representation of the MIW Agribusiness Futures Alliance Project steering committee to include water officials from Sunwater in addition to existing representatives[21]. **RDMW, Sunwater and project proponents** to ensure market intelligence informs how existing and new water resources and infrastructure can help realise export market opportunities.	Supported by: • none Supports: • EE1-1.1b • Service Needs	Short
EE1-1.1b	Ensure market intelligence information captured by the Agribusiness Futures	The **Agribusiness Futures Alliance Project steering committee** should be	Supported by: • EE1-1.1a	Short

[21] Existing representatives include GW3, Great Whitsunday Council of Mayors, Regional Development Australia (Mackay Isaac Whitsunday), Regional Councils, Regional Airports, Industry bodies, DAF, DSDILGP, RDMW, TIQ, NQBP (N.B. this list does not completely account for all machinery of government changes associated with the recent Queensland election)

ID	Action (what)	Implementation (how)	Dependencies	Timing
	Alliance Project is connected to future water infrastructure business cases to determine the risk adjusted returns to growers and project proponents.	consulted with and provide input to any bulk water infrastructure business cases being proposed in the region (e.g. Hells Gate Dam).	Supports: • Service Needs	
EE1-1.2a	Support outside investment by ensuring agricultural investors have access to information on land and water availability by advocating to create a 'one stop shop' information hub to market Queensland's water products. This information, designed to attract investment to the region (and Queensland), will complement the existing AgTrends Spatial mapping tool.	Targeted towards investors that are more familiar with water products in the Murray-Darling Basin, the objective of the 'one stop shop' information hub is for the **RDMW** to market Queensland's water products. For example, a Queensland water allocation has the same attributes (i.e. defined in statute, perpetual tradeable etc.) as an entitlement in the southern Murray Darling Basin but are generally much cheaper to purchase. This 'one stop shop' should be coupled with information on available land and soils.	Supported by: • None Supports: • EE1-1.2b • EE1-1.2c • All Service Needs	Short
EE1-1.2b	Support outside investment by ensuring agricultural investors have access to information on land and water availability by holding investment attraction tours that showcase, to big agribusiness and existing growers in the region, the region's strengths including water reliability, available land, climate for growing a variety of crops, good soils, access to supply chains and	The **Agribusiness Futures Alliance Project steering committee** should oversee and facilitate investment attraction tours that showcase the region but also provide information on what the private sector sees as the risks or barriers to investment which will inform other actions. For example, a commonly cited risk for agricultural investors is availability of water. This action should include collaboration to align with DSDILGP's	Supported by: • EE1-1.2a Supports: • EE1-1.2c • Service Needs	Short

ID	Action (what)	Implementation (how)	Dependencies	Timing
	sustainable agriculture etc.	activities in relation to biofutures.		
EE1-1.2c	Advocate for strategic changes to local zoning precincts, specifically where there is good quality agricultural land and restrictions on land use and parcel sizes.	With information from option EE1-1.2a and EE1-1.2b, the **Agribusiness Futures Alliance Project steering committee should oversee an** investigation of where disaggregated land use zoning might be preventing large scale agricultural investment. **GW3** should then use this intelligence to advocate for evidence-based changes to local zoning precincts to incentivise agricultural expansion.	Supported by • EE1-1.2a • EE1-1.2b Supports • All Service Needs	Medium
EE1-1.3	Ensure stakeholders and industry remain informed of the status of any bulk water infrastructure developments.	**RDMW** should, in partnership with Sunwater, the North Queensland Water Infrastructure Authority, and other project partners, communicate to stakeholders, via regular updates, the status of bulk water infrastructure developments that could service the region.	Supported by • EE1-1.1a • EE1-1.1b Supports • All Service Needs	Short

Economic Enabler 2 – Sustainable, investment friendly regulation

Outcome-focused regulation and planning approvals can incentivise sustainable investment in industries that utilise water resources.

Outcomes achieved by meeting service need

- Strategic, outcome-focussed collaboration between industry and all levels of government to ensure that policy and regulatory settings enable and support existing and new industries
- Reduced regulatory burden for all parties leading to increased private investment and new development
- Supply options and water use are environmentally sustainable
- Sustainable expansion of mining, aquaculture and agriculture across the region (including diversity within agriculture)
- Reform that appropriately manages environmental risk whilst incentivising investment, innovation and least cost achievement of environmental standards

ID	Action (what)	Implementation (how)	Dependencies	Timing
EE2-1a	In line with the Queensland Department of Environment and Science's (DESs) recent release of the *Point Source Water Quality Offsets Policy 2019*, investigate the appropriateness of an outcome focused approach to allow the MIW regions existing and new Environmental Authority (EA) holders to efficiently and flexibly mitigate their water quality impacts.	**GW3** to liaise with DES to investigate, understand and communicate to industry, existing regulatory pathways that could allow local businesses to flexibly manage environmentally relevant activities (ERAs) that impact on water quality (e.g. activities that contribute pollutants and salinity). This could include for example, amalgamating EAs and meeting aggregated requirements with a bubble licensing scheme.	Supported by • None Supports • All Service Needs	Medium
EE2-1b	In line with the *Waste Reduction and Recycling Act 2011*, understand the potential for mine water to be approved for reuse as a beneficial resource.	For mining, **GW3** to liaise with DES to investigate, understand and communicate to industry, approval requirements that would allow for the beneficial re-use of mine affected water.	Supported by • None Supports • Service Need 4	Medium
EE2-1c	Streamline the environmental approvals	**GW3** should advocate to the Queensland Office of	Supported by • None	Medium

ID	Action (what)	Implementation (how)	Dependencies	Timing
	pathway for bulk water infrastructure which is currently subject to State and Commonwealth legislation and can be duplicative which slows investment, economic growth and jobs[22].	the Coordinator General and DAWE, to remove duplicative conditions for bulk water infrastructure development. Specific areas of duplication that could be further streamlined include: • consistency in the assessment methods for listing threatened species. • the process for conducting bilateral assessments[23] • the water trigger (under section 24D of the EPBC Act).[24]	Supports • All Service Needs	

[22] Duplication may in part, be resolved by any amendments to the EPBC Act arising from the independent Samuel review (2020). Samuel (2020) recommends that the Commonwealth give responsibility for granting approvals to the states. This is under the proviso that state governments can demonstrate compliance and maintain accreditation with Commonwealth Government National Environmental Standards. The purpose of the National Environmental Standards is to ensure Matters of National Environmental Significance (MNES) are protected by each state government's approval processes.

[23] The bilateral agreement between the Commonwealth of Australia and the State of Queensland relating to environmental assessment (the assessment bilateral agreement) allows the Commonwealth Minister for the Environment to rely on specified environmental impact assessment processes of the State of Queensland in assessing actions under the EPBC Act.

[24] The water trigger allows the impacts of proposed coal seam gas and large coal mining developments on water resources to be comprehensively assessed at a national level.

Economic Enabler 3 – Market the region's sustainability credentials to encourage investment

The community expects key water-using industries to deliver social and environmental value in addition to commercial value. Whilst industries are adapting and innovating, coordination and information sharing can improve industries' ability to demonstrate social value creation in aggregate, and as individual entities. For businesses, social and environmental value is increasingly becoming a competitive advantage as consumers demand products that are produced sustainably. The region can therefore leverage social and environmental value generation to attract investment.

Outcomes achieved by meeting service need[25]

- Regional economic, social and environmental resilience (including in the face of change)
- Sustainable expansion of mining, aquaculture and agriculture across the region (including diversity within agriculture)
- Export opportunities are diversified and realised
- Value adding opportunities are explored and enabled

ID	Action (what)	Implementation (how)	Dependencies	Timing
EE3-1a	Explore the feasibility of an authenticated data sharing platform (e.g. block chain supported) to improve reporting on social value creation at a region-wide level. **GW3** should advocate for funding to support an independent and impartial third party to facilitate coordination amongst individual private entities and support information sharing on social value. In the absence of a legislated requirement, this will require voluntary participation. Participants are likely to benefit from improved community support, traceability, marketing and branding	Initially, **GW3** should define the desired outcomes, participants, metrics, anonymity, timesteps, return on investment and platform for any such data sharing platform and reporting. **GW3**, the **local NRM group** or **industry bodies** are all examples of organisations that would be well placed to support information sharing on water use between industry players.	Supported by • EE3-1b Supports • None	Medium

[25] The below sub-options can be delivered independently but may also benefit from being delivered in coordination. Furthermore, both options are related to economic enabler 2 in that they are focused on achieving and reporting on social and environmental outcomes. To this end, any evolutions to the environmental regulatory environment that result in a transition to outcome-based regulation should be considered by these options.

ID	Action (what)	Implementation (how)	Dependencies	Timing
	opportunities, particularly within the MIW region.			
EE3-1b	**GW3** to advocate, including through a potential renewed NWI, for consistent, nationally accepted guidance to value economic, social and environmental costs and benefits of water in different uses. Water use benefits and impacts can then be identified, measured and communicated across all consumptive and non-consumptive uses.	**GW3** can advocate to the Department of Regional Development, Manufacturing and Water, the National Water Grid Authority and the Australian Department of Agriculture, Water and the Environment. Specifically, material should focus on methodological guidance and appropriate dollar per unit values for the different costs and benefits attributable to various water uses. Similar guidance is provided for other publicly provided services, for example in the Australian Transport Assessment and Planning (ATAP) Guidelines[26].	Supported by • None Supports • EE3-1a	Medium

[26] The ATAP Guidelines provide a comprehensive framework for planning, assessing and developing transport systems and related initiatives. This includes guidance on specific parameters values for use in economic analysis.

Economic Enabler 4 – Supporting existing irrigated cropping

The irrigated broadacre cropping industry is in a period of transition with opportunities to increase farm gate margins by realising biofutures opportunities and reducing irrigation input costs

Outcomes achieved by meeting service need

- More efficient and productive use of the region's bulk water resources
- Electricity and water prices are affordable for all users
- The value and cost of water is considered in production and consumption decisions
- Having consistent regional priorities
- Attract outside investment and support the region's economic growth
- Diversify the region's agricultural production
- Value adding opportunities are explored and enabled

ID	Action (what)	Implementation (how)	Dependencies	Timing
EE4-1.1a	Consistent with the recommendation in the Regional Agribusiness Supply Chains Report commissioned by GW3, **GW3** should establish a collaborative partnership with the broadacre cropping and sugar industry, and in particular canegrowers, with an aim to build relationships and an understanding of major challenges faced by industry.	A key focus of the proposed **MIW broadacre grower's partnership** should be on understanding current drivers for underutilisation of irrigation water by canegrowers.	Supported by • None Supports • EE4-1.1b • EE4-1.2	Short
EE4-1.1b		Under the same **MIW broadacre grower's partnership**, examine whether existing capacity building, extension and succession planning mechanisms are increasing farm gate margins in the broadacre cropping and sugar industries.	Supported by • EE4-1.1a Supports • EE4-1.2	Short
EE4-1.2	Through the proposed **MIW broadacre grower's partnership**, develop new capacity building, extension and succession planning mechanisms to ensure growers can access resources to understand and maximise the value of their water in production.	Any extension program should only be developed where the findings from EE4-1.1a and EE4-1.1b deem such a program to be relevant and valuable. Specific actions under this program may include increasing awareness of publicly available tools such	Supported by • EE4-1.1a • EE4-1.1b Supports • None	

ID	Action (what)	Implementation (how)	Dependencies	Timing
		as ABARES *farmpredict*, which allows farmers to forecast farmgate profits under various irrigation profiles.		
EE4-2.1a	In recognition of the strategic economic importance of the irrigated broadacre cropping industry in Mackay and Proserpine, and its potential to support biofutures initiatives, **GW3** to advocate for a concession on water prices to temporarily increase farm gate margins. This that could support the industry as it transitions to higher value modes of production.	Specifically, a further reduction in water prices, beyond the 15 per cent reduction committed to by the Queensland Government for broadacre growers prior to the 2020 election to align with the 50 per cent reduction provided for fruit and vegetable growers. Any concession should include review mechanisms. These mechanisms are intended to proactively account for any changes to irrigated broadacre crop margins and the impact this has on grower's capacity to pay a market price for water.	Supported by • None Supports • None	Short
EE4-2.1b	For the reasons outlined in EE4-2.1a, **GW3** to advocate for a time-constrained concession on energy prices to temporarily increase farm gate margins.	The concessional energy tariff should consider and better reflect existing irrigated broadacre crop margins and grower's capacity to pay. Any concession should include both event and time-based review mechanisms. These mechanisms are intended to proactively account for any changes to irrigated broadacre crop margins and the impact this has on grower's capacity to pay a market price for energy.	Supported by • None Supports • None	Short
EE4-2.2	Through the proposed **MIW broadacre grower's partnership**, calculate the	**GW3** to engage an independent and impartial third party to conduct the	Supported by • EE4-1.1a	Short

ID	Action (what)	Implementation (how)	Dependencies	Timing
	sugarcane production capacity in the Mackay and Proserpine regions under a scenario where existing water resources are fully utilised.	analysis. Provide this information to officials involved in developing the biofutures industry.	• EE4-1.1b Supports • Service Needs	
EE4-3	**GW3** to advocate for and support policies that will facilitate opportunities for the irrigated broadacre cropping industry to increase farm-gate margins.	Refer to the program of policy and non-infrastructure options proposed to meet Economic Enabler 1. Specifically, any transition should focus on market driven land use change that can drive increased farm gate margins[27].	Supported by • Economic Enabler 1 Supports • Service Needs	Short
EE4-4.1	Through the proposed **MIW broadacre grower's partnership**, encourage growers to explore energy efficiency improvements at the farm level.	Specifically, provide information to growers on audits made available under the Energy Savers Plus Program Extension designed specifically for agricultural customers. Participants of this program can receive a co-contribution grant of up to 50 per cent towards the cost of implementing audit recommendations, up to $20,000. For example, a previously completed audit of a sugarcane farm in the Mackay area identified energy savings of between 19 and 30 per cent by upgrading the farms on-farm pumping systems.	Supported by • EE4-1.1a • EE4-1.1b Supports • None	
EE4-4.2a	To reduce pumping related energy costs at the bulk supply level (i.e. Eton, Pioneer and Proserpine Water Supply	In the first instance, understand opportunities to obtain concessional finance offered by the Clean Energy Finance	Supported by • EE4-4.1 Supports	Short

[27] Should the biofutures potential of the region be realised, the increased returns of these new products could support a restructure of grower contracts.

ID	Action (what)	Implementation (how)	Dependencies	Timing
	Schemes), **GW3** in collaboration with **Sunwater**, should investigate the feasibility of installing renewable energy systems and micro grids, such as solar through public finance.	Corporation and/or the Northern Australia Infrastructure Facility.	• EE4-4.3	
EE4-4.2b		Explore opportunities to leverage feed-in tariffs, or financial incentives (i.e. renewable energy certificates) provided under the Federal Government's Renewable Energy Target program.	Supported by • EE4-4.1 Supports • EE4-4.3	Short
EE4-4.3	Consider the installation of renewable energy systems to reduce pumping costs at the bulk supply level.	Pending the outcome of EE4-4.2a and EE4-4.2b, consider the installation of solar energy systems to reduce pumping costs at the bulk supply level.	Supported by • EE4-4.2a • EE4-4.2b Supports • None	Medium

Actions that support Service Needs

The actions described in the below tables include a mix of non-infrastructure and infrastructure options. Generally, actions are unique to the Service Need that they are supporting. However, in some instances, specific infrastructure options may be able to service more than one Service Need. Furthermore, the timing and sequencing of decisions to proceed with one infrastructure option will likely impact the need for, timing, capacity and sequencing of other infrastructure options. For example, the Urannah Water Scheme is a regional solution capable of meeting multiple service needs concurrently. Other infrastructure options (e.g. Burdekin to Moranbah pipeline duplication) are localised solutions capable of meeting specific service needs. These are matters for the Queensland Department of Regional Development, Manufacturing and Water to lead, in partnership with Sunwater, Bowen River Utilities and industry and other stakeholders.

GW3s role in these decisions should be to consistently represent and advocate for the preferences of its stakeholders. Specifically, this means understanding the volume and reliability of water demanded by individual stakeholders and connecting this information to Sunwater, RDMW and other relevant parties. Connecting contemporary demand estimates to the decision making processes will help ensure that the right infrastructure is delivered at the right time to meet market led water demands.

Service Need 1 – Growing the Bowen Food Bowl

Access to HP water could unlock new, high value irrigated cropping in the Bowen area and industrial expansion at the Abbot Point SDA (including for the Port of Abbot Point).

Outcomes achieved by meeting service need

- Export opportunities are diversified and realised
- Value adding opportunities are explored and enabled
- Strategic, outcome-focussed collaboration between industry and all levels of government to ensure that new bulk water infrastructure project assessments and investments are coordinated
- Information on water availability supports water dependent investment in the region
- Sustainable expansion of industry, aquaculture and agriculture across the region (including diversity within agriculture)

ID	Action (what)	Implementation (how)	Dependencies	Timing
SN1-1	Through the MIW Agribusiness Futures Alliance Project steering committee**, GW3** to advocate for policies that will support investment in, and expansion of, the region's agricultural production and industry.	Refer to the program of policy and non-infrastructure options proposed to meet Economic Enabler 1. Specifically, actions should focus on information provision that can support water supply at the right time, scale and location, attract investment, and	Supported by • Economic Enabler 1 Supports • SN1-3a • SN1-3b • SN1-3c	Short

ID	Action (what)	Implementation (how)	Dependencies	Timing
		enable market driven land use change.		
SN1-2	**GW3** to engage with RDMW through the MIW Agribusiness Futures Alliance Project steering committee as part of the Whitsunday Water Plan review to ensure industry needs are considered.	**GW3** to prepare a submission to the formal public consultation process conducted as part of the Whitsunday Water Plan review stating that there is demand for up to 20,000 ML of HP water to support new agriculture and industrial expansion.	Supported by • Economic Enabler 1 Supports • SN1-3a • SN1-3b • SN1-3c	Short
SN1-3a	Convert water in Peter Faust Dam from MP allocation to HP allocation and construct a new pipeline to Bowen.	**RDMW,** together with **Sunwater,** should investigate the viability of each of options SN1-3a, SN1-3b and SN1-3c which are all capable of meeting this service need. If warranted, a formal business case process for SN1-3a and SN1-3b could be commissioned to complement the existing detailed business case for the Urannah Water Scheme (SN1-3c)[28].	Supported by • SN1-1 • SN1-2 Supports • None Competes with • SN1-3b	Long
SN1-3b	Construct a new pipeline that extracts water from the Elliot Main Channel or a new pipeline from Burdekin River to supply unsold HP allocation to Bowen.		Supported by • SN1-1 Supports • None Competes with • SN1-3a	Long
SN1-3c	Construct Urannah Dam and a pipeline to Bowen via Peter Faust Dam.		Supported by • SN1-1 Supports • SN1-3a • SN1-3b Competes with • None	Long

[28] It should be noted that any significant purchase of MP allocations for conversion to HP may have impacts to the production of sugar cane in the Proserpine scheme, and hence proposed purchase and conversions should be discussed with Canegrowers Proserpine.

Service Need 2 – A Collinsville agricultural precinct that can meet regional needs

There are high value irrigated cropping opportunities near Collinsville but there is currently no supplemented water supply.

Outcomes achieved by meeting service need

- Export opportunities are diversified and realised
- Value adding opportunities are explored and enabled
- Strategic, outcome-focussed collaboration between industry and all levels of government to ensure that new bulk water infrastructure project assessments and investments are coordinated
- Information on water availability supports water dependent investment in the region
- Sustainable expansion of mining, aquaculture and agriculture across the region (including diversity within agriculture)

ID	Action (what)	Implementation (how)	Dependencies	Timing
SN2-1	Through the MIW Agribusiness Futures Alliance Project steering committee**, GW3** to advocate for policies that will support investment in, and expansion of, the region's agricultural production and industry.	Refer to the program of policy and non-infrastructure options proposed to meet Economic Enabler 1. Specifically, actions should focus on information provision that can support water supply at the right time, scale and location, attract investment, and enable market driven land use change.	Supported by • Economic Enabler 1 Supports • SN2-2	Short
SN2-2	Construct the Urannah Water Scheme	Bowen River Utilities have prepared a detailed business case for the Urannah Water Scheme. The "Bowen Basin productive water supply" initiative was included as a priority initiative on the Infrastructure Australia Infrastructure Priority List 2021. Financial closure and environmental approvals by the **Queensland Government** are required.	Supported by • SN2-1 Supports • None Competes with • None for this service need	Long

Service Need 3 – A world class aquaculture industry

There are opportunities for aquaculture expansion in the MIW region including within ADAs but there is currently no supplemented water supply.

Outcomes achieved by meeting service need

- Regional economic, social and environmental resilience (including in the face of change)
- Export opportunities are diversified and realised
- Value adding opportunities are explored and enabled
- Strategic, outcome-focussed collaboration between industry and all levels of government to ensure that new bulk water infrastructure project assessments and investments are coordinated
- Expansion of aquaculture across the region

ID	Action (what)	Implementation (how)	Dependencies	Timing
SN3-1	**GW3** to investigate mechanisms that will support investment in, and expansion of, the region's aquaculture industry.	Refer to Economic Enabler 2. In the context of aquaculture, this includes investigating outcome-based mechanisms that allows proponents to demonstrate net reductions in nutrients and salinity through offsets or other market mechanisms.	Supported by • Economic Enabler 2 Supports • SN3-2 • SN3-3 • SN3-4	
SN3-2	Secure unsold HP allocation in Peter Faust Dam and construct a pipeline to the Proserpine aquaculture facilities.	**RDMW,** together with **Sunwater,** should investigate the viability of each of options SN3-2, SN3-3 and SN3-4 which are all capable of meeting this service need. If warranted, a formal business case process for SN3-2 and SN3-4 could be commissioned to complement the existing detailed business case for the Urannah Water Scheme (SN1-3c).	Supported by • SN3-1 Supports • None Competes with • SN1-3a	Long
SN3-3	Construct Urannah Dam and pipeline to Proserpine via Peter Faust Dam.	Bowen River Utilities have prepared a detailed business case for the Urannah Water Scheme. The "Bowen Basin productive water supply"	Supported by • None Supports • SN3-2 • SN3-4	Long

ID	Action (what)	Implementation (how)	Dependencies	Timing
		initiative was included as a priority initiative on the Infrastructure Australia Infrastructure Priority List 2021. Financial closure and environmental approvals by the **Queensland Government** are required.	Competes with • None	
SN3-4	Extension of the Elliot Main Channel or a new pipeline from Burdekin River to supply unsold HP allocation to the Whitsunday ADA.	**Sunwater** should investigate the viability of this option through a formal business case process. This option should be considered in conjunction with opportunities for expansion of high value irrigated agriculture in the Bowen area. The option has the potential to meet both service needs.	Supported by • SN3-1 Supports • None Competes with • None	Long

Service Need 4 – The Isaac resources hub

High priority water allocations and new pipeline capacity will be required for metallurgical coal expansion plans and urban water security in the Isaac region. There are also opportunities to expand agriculture in the region.

Outcomes achieved by meeting service need

- Strategic, outcome-focussed collaboration between industry and all levels of government to ensure that policy and regulatory settings enable and support existing and new industries
- Supply options and water use are environmentally sustainable
- Expansion of mining across the region
- Long-term water security and flexibility for all water users

ID	Action (what)	Implementation (how)	Dependencies	Timing
SN4-1.1	To make better use of existing water, undertake a pre-feasibility study to test the idea and secure funding partners for a more detailed feasibility study on a mine affected water reuse scheme (including for CSG water). Conceptually, the reuse scheme could install gathering lines to consolidate supplies into local "sub-regional" storages for subsequent redistribution to increase water reliability through wet and dry cycles in the Bowen Basin and nearby catchments, including for agriculture.	**GW3**, in collaboration with Sunwater and **RDMW** commission a feasibility study to: • Map conceptually, the social, environmental and economic benefits of taking water off mine-sites, storing it, reusing it in other, non-potable uses and repatriating it to mines during dry times. The mapping exercise should identify potential beneficiaries and use cases (e.g. could this water be used to expand irrigated agriculture in the Isaac region or improve the reliability of irrigation allocations in the Nogoa-Mackenzie scheme, thereby creating an opportunity to access NWIDF funding). • Confirm adequate modelled reliability to facilitate substitution for surface water supplies.	Supported by • Economic Enabler 2 Supports • SN4-1.1 • SN4-1.3	Short

ID	Action (what)	Implementation (how)	Dependencies	Timing
		• Estimate capex per ML of supply for the various sub-regional storage locations. • Consider barriers to use, including water quality and mine site environmental authority conditions. • Assess commercial frameworks for water disposal and on-supply services. • Understand options to integrate the reuse scheme with existing supply sources and distribution infrastructure) to maximise scheme efficiency and address current supply and demand imbalances, including in neighbouring water supply schemes such as the Nogoa-Mackenzie. The options process should also examine the potential to, in the future, repurpose existing distribution infrastructure to mines to service other uses including irrigated agriculture. • Quantify the value of the opportunity. • Explore funding sources for a more detailed feasibility study.		

ID	Action (what)	Implementation (how)	Dependencies	Timing
SN4-1.2	Advocate for approvals that will support expansion of the region's mining industry.	Refer to Economic Enabler 2. In the context of mining, this includes investigating, and potentially obtaining, approvals that allow mine affected water to be beneficially re-used.	Supported by • Economic Enabler 2 Supports • SN4-1.3	Short
SN4-1.3	Develop a secondary market to trade mine affected water.	Pending the outcomes of SN4-1.1 and SN4-1.2, **RDMW** and **Sunwater** develop a market that allows mines to trade their mine-affected water with other mines. Such a market will need to be designed carefully and will likely benefit from a central market operator, similar to approaches used in electricity markets.	Supported by • SN4-1.1 • SN4-1.2 Supports • None	Medium
SN4-2	Advocate for a Community Service Obligation (CSO) payment to reduce the cost Isaac Regional Council pays for water.	**GW3** in consultation with Isaac Regional Council should provide the Queensland Government with evidence of the current water supply security and price risk challenges[29]. Advocacy for a CSO should present evidence separately for current arrangements and for any future costs associated with a new pipeline, and the desire for parity with other local government areas. Any advocacy measures should also include consideration of appropriate distribution infrastructure to deliver water to key demand nodes	Supported by • None Supports • None	Short

[29] Specifically, the fact that Isaac Regional Council does not hold its own water allocations and therefore has little control of supply security and price. A large proportion of existing supplies are sourced under legacy agreements with mining companies which in some cases have expired, and miners are openly stating that they are seeking to terminate urban supply arrangements. This leaves the Council exposed to both volume and price risk.

ID	Action (what)	Implementation (how)	Dependencies	Timing
		(e.g. Dysart and Middlemount).		
SN4-3.1	Investigate new ways of financing commercial bulk water pipelines that supply their mining customers	**RDMW** should lead a study to explore alternative financing options for new bulk water pipelines that addresses the up-front costs, risk sharing, circularity and timing problems that are preventing investment in these types of assets. For example, in Newcastle, the coal industry has used convertible notes to incentivise shared infrastructure investment with varying timing and capacity requirements, and multiple counterparties for coal handling assets. Convertible notes allow investors to provide a loan to a development vehicle, which converts to asset equity at a discounted price once the asset is built. A similar instrument may prove useful in the Bowen Basin.	Supported by • None Supports • SN4-3.2a • SN4-3.2b • SN4-3.2c	Medium
SN4-3.2a	Secure unsold HP allocation from Burdekin Falls Dam and construct Burdekin to Moranbah Pipeline Duplication.	**RDMW,** together with **Sunwater,** should investigate the viability of each of options SN4-3.2a. SN4-3.2b and SN4-3.2c, which could all be capable of meeting this service need. If warranted, a formal business case process for SN4-3.2a and SN4-3.2b could be commissioned to complement the existing detailed business case for the Urannah Water Scheme (SN4-3.2b). Consideration should be given to possible	Supported by • SN4-3.1 Supports • None Competes with • SN4-3.2b • SN4-3.2c	Long

ID	Action (what)	Implementation (how)	Dependencies	Timing
		extension of the pipeline to transport water south to Middlemount and Dysart to meet urban supply requirements.		
SN4-3.2b	Construct Urannah Dam and pipeline to the Bowen Basin.	Bowen River Utilities have prepared a detailed business case for the Urannah Water Scheme. The "Bowen Basin productive water supply" initiative was included as a priority initiative on the Infrastructure Australia Infrastructure Priority List 2021. Financial closure and environmental approvals by the **Queensland Government** are required.	Supported by • SN4-3.1 Supports • None Competes with • SN4-3.2a • SN4-3.2c	Long
SN4-3.2c	Construct Connors River Dam and pipeline.	A detailed business case and EIS has previously been completed for Connors River Dam. It is the **Queensland Government's** responsibility to determine next steps for the project.	Supported by • SN4-3.1 Supports • None Competes with • SN4-3.2a • SN4-3.2b	Long

Appendix A – Regional socio-economic profile

This Appendix summarises the MIW region's geographic context, population, climate and employment and water dependent economy and comparative advantages. All data was contemporary at the time of writing in late 2020.

Geographic context

The MIW region is located on the central east coast of Queensland and includes the Whitsunday Islands. The region comprises the three local government areas of Mackay, Isaac and Whitsunday, and the major regional centre of Mackay (Figure 25). It covers around 90,354 square km, or five per cent of Queensland's total land area.

Figure 25 MIW Local Government Areas

Source ABARES, 2016. Regional Development Australia Mackay-Isaac-Whitsunday, 2020

Population and employment

The region is home to 173,006 people, or 3.4 per cent of Queensland's total population. The annualised population growth rate for MIW region is 0.4 per cent compared to 1.5 per cent for Queensland. The population is projected to grow by 47 per cent from 2015 to 2031 (Australian Government and Reef Catchments, 2015).

Australian Bureau of Statistics (ABS) data from the May 2020 Labour Force Survey indicate that 92,100 people were employed in the Mackay - Isaac - Whitsunday region, accounting for 4 per cent of total employment. Prominent water dependent industries include agriculture, mining, construction, manufacturing, and to a lesser degree forestry and fishing.

Mining is the largest employer in the region (14,100 or 19.5 per cent of those employed) followed by health care and social assistance (11,400), and construction (9,200) (Figure 26). Other important employment sectors in the region include retail trade, transport, postal and warehousing and manufacturing. The agriculture, forestry and fishing sector employs 2,300 people representing two per cent of the region's workforce (ABARES, 2020).

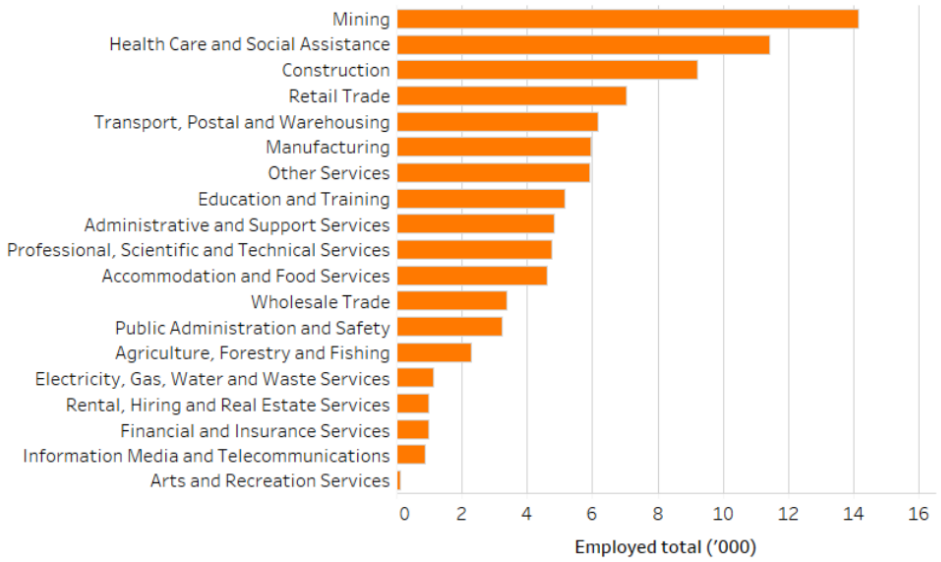


Figure 26 MIW employment profile

Source Australian Bureau of Statistics, 2020

The MIW region's comparative advantage stems from various sources, including its strategic location, its mining and agricultural resource base, access to strategic infrastructure and the skill profile of the region's workforce (Greater Whitsunday Alliance, 2018). For these reasons, the region has historically had low levels of unemployment (Department of Jobs and Small Business, 2019).

Climate

The MIW region is in tropical Queensland. The climate of this region is characterised by two seasons; the monsoonal wet season (from around December to April), which is dominated by prevailing north-westerly winds, and the dry season (May to November), when south-easterly trade winds dominate. Annual and seasonal average rainfall are variable, affected by local factors such as topography and vegetation, and broader scale weather patterns, such as the El Niño–Southern Oscillation.

The annual average rainfall is 1,585 mm in Mackay, 1,444 mm in Proserpine (Whitsunday) and 994 mm in St Lawrence (Isaac). Rainfall across the three regions follows a similar wet season extending from December through to April but vary considerably in magnitude, with Proserpine recording the most followed by Mackay and St Lawrence (Figure 27 to Figure 29). The coastal parts of the MIW region experience greater variations in rainfall between seasons. Inland regions receive significantly less rainfall, partly due to their location on the western side of the Great Dividing Range. Collinsville for instance, located approximately 80 km inland of Proserpine, receives 702 mm annually, less than half its coastal neighbour. Many parts of the Whitsunday and Isaac regions reside inland and record similar annual rainfall.

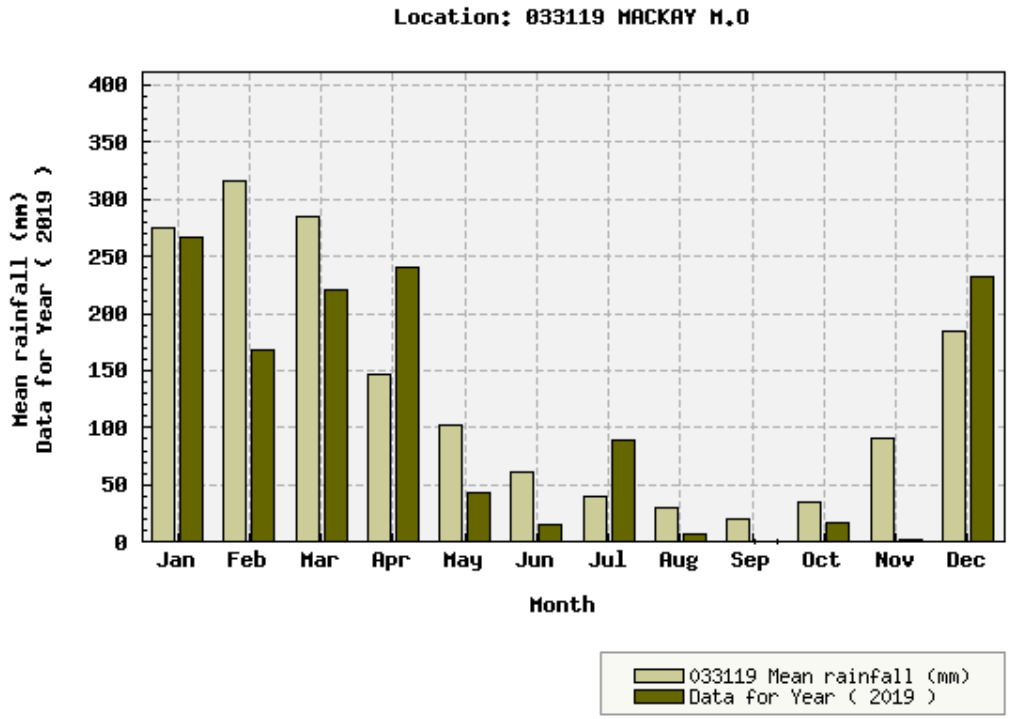


Figure 27 Mackay monthly rainfall data

Source BOM, 2020

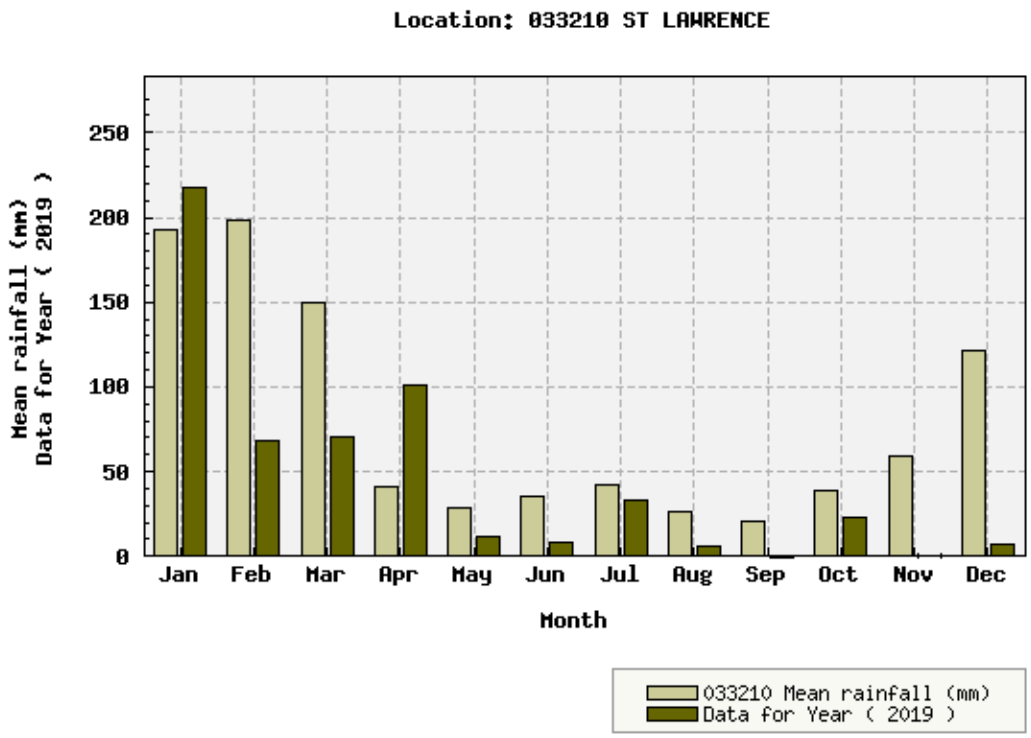


Figure 28 Isaac (St Lawrence) monthly rainfall data

Source BOM, 2020

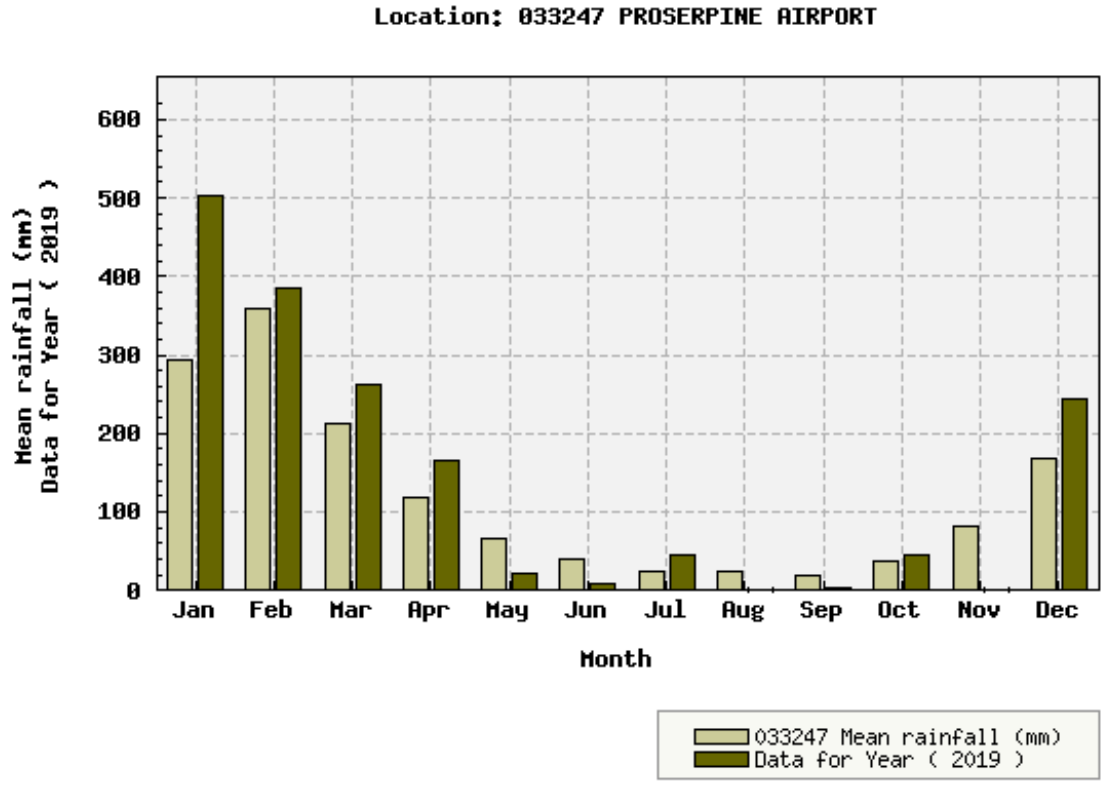


Figure 29 Proserpine (Whitsunday) monthly rainfall data

Source BOM, 2020

The average annual temperature is 22 degrees, ranging between averages of 27 degrees in summer and 17 degrees in winter. The region experiences very high humidity, particularly in coastal areas. There were 227 days over the last year with a relative humidity above 70 per cent and 100 days above 80 per cent (The Australia Institute, 2019).

Climate variability is expected to impact the region's future climate and weather. Despite relatively stable temperatures from 1910 to 1950, both minimum and maximum temperatures throughout Australia have shown an increasing trend, with an overall increase from 1910 to 2010 of approximately 0.8 degrees centigrade (ABS, 2015). The region can expect higher temperatures, more frequent hot days, more intense downpours, less frequent but more intense tropical cyclones, rising sea level and more frequent sea-level extremes (Queensland Government, 2019).

Agriculture

Agricultural land in the MIW region occupies 79,800 square km, or 89 per cent of the region. Areas classified as conservation and natural environments (nature conservation, protected areas and minimal use) occupy 6,600 square km, or seven per cent of the region (Figure 30). The region boasts a diverse agricultural industry which contributes over $1.3 billion to the Queensland economy and 10 per cent of the total gross value of agricultural production in Queensland (ABARES, 2019).

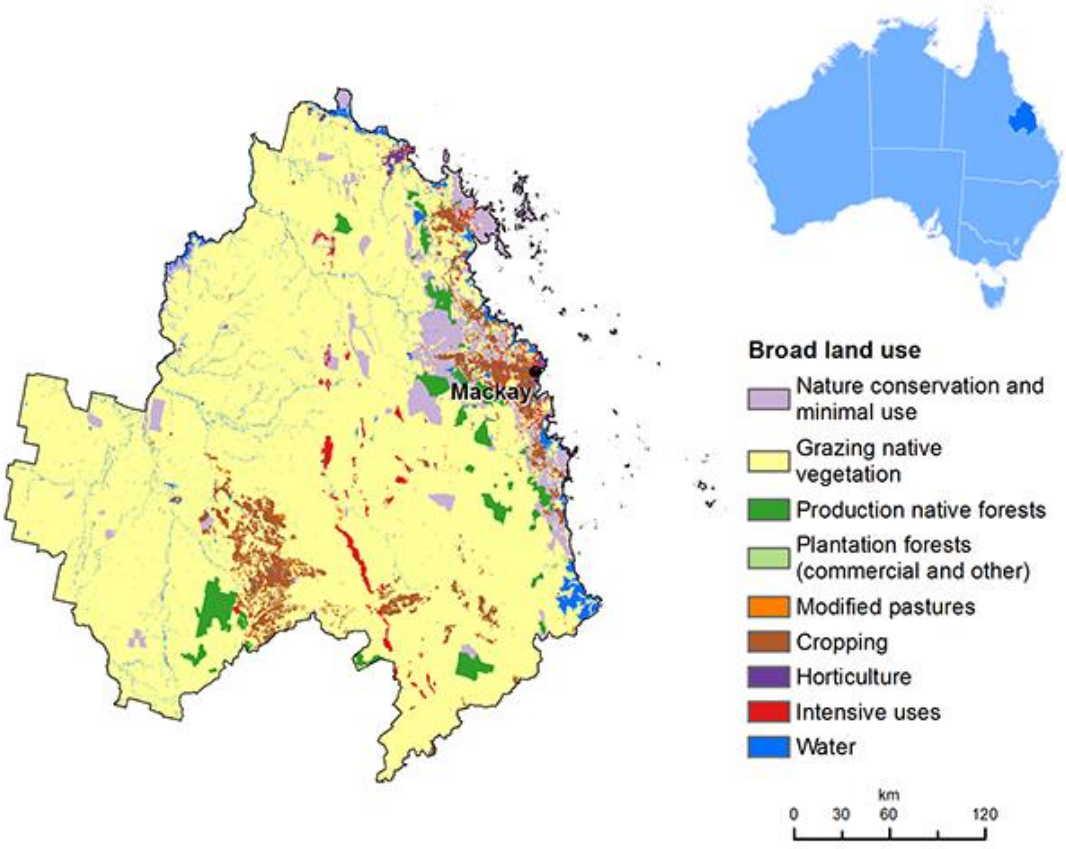


Figure 30 Broad land use in the region

Source ABARES, 2018

Livestock grazing and cropping of wheat and sorghum dominate the western areas of the region, while the region's coast is dominated by sugar and horticulture. Dryland farming of grain and sunflower occurs in the Central Highlands. The region has a large sugarcane growing area, mainly located in high rainfall areas, or in irrigated areas such as the Sarina, Mackay and Proserpine districts (Queensland Government, 2019).

The most important commodities in the region based on the gross value of agricultural production are cattle and calves ($622 million), followed by sugarcane ($362 million) and tomatoes ($69 million). These commodities together contributed 82 per cent of the total value of agricultural production in the MIW region in 2019 (ABARES, 2020).

The MIW region is one of the largest winter growing vegetable regions in Australia, producing over $185 million worth of annual produce across the major commodities of tomatoes, capsicums, beans, mangoes and melons (Figure 31). Importantly, the region also accounts for 46 per cent ($32 million) of the state's capsicum production (TIQ, 2020).

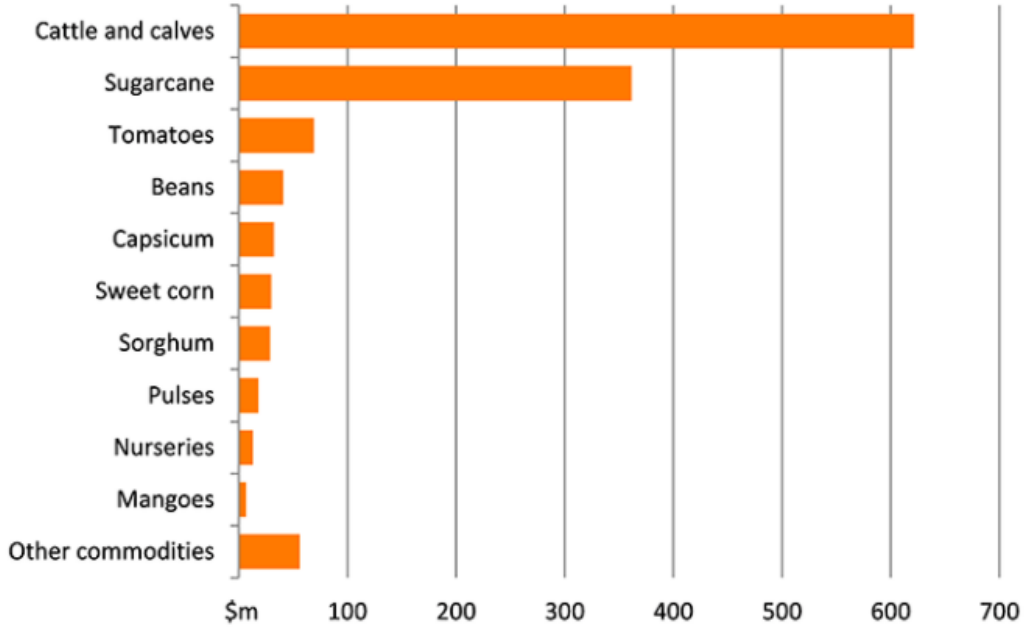


Figure 31 Value of agricultural production in the MIW region, 2018-19

Source ABARES, 2020

Rice is being increasingly considered as an alternative to sugarcane near Mackay. It can assist growers to improve their cash flow by supplementing income with slightly increased returns per Ha, potentially improve soil condition and breaking disease cycles through crop rotation (Reef Catchments, 2015).

The effects of climate change on agriculture are likely to be significant. Climate change is expected to increase evaporation resulting in more frequent depletion of soil moisture, reduced ground cover and lower livestock stock carrying capacity. Rising tree densities and declining pasture condition will raise the sensitivity of pastures to climate-induced water stress. More frequent and intense extreme weather events will damage crops, particularly those grown close to the coast. Erosion risks are also likely to increase due to greater year-to-year variability in rainfall (DES, 2019).

Mining and resources

The economy of the MIW region is driven by mining, which contributes 77.5 per cent of export value and generates an estimated $18.25 billion each year (Remplan, 2020). The region is home to both the Bowen and Galilee basins, representing the largest coal mining deposits in Australia and supporting towns such as Blackwater, Moranbah, Dysart and Emerald. It also includes the Abbot Point and Galilee Basin state development areas, providing further capacity for expansion in the region. These development areas provide strategic locations for industrial and port-related development that require a large footprint, proximity to a port and separation from sensitive receptors (Queensland Government, 2020).

The Bowen and Galilee basins use Mackay and Moranbah as major service centres for the region. Mackay has a strategic role as a key logistical hub and export/support service centre for the significant resource deposits and projects operating across the Bowen and Galilee basins. It has a competitive edge due to excellent rail, road and port connectivity (Resource Industry Network, 2020).

New activity in the Galilee Basin and opportunities in alternative energy, fuels and bio-based industrial products will see this area expand its coal interests to also become a leading producer of bio-based products. Expansion will require development of pipeline, transport, and electricity generation and distribution infrastructure with skills such as engineering and construction trades continuing to be in demand (Trade & Investment Queensland, 2019).

The region is highly dependent on mining operations, the outlook for which is uncertain. In recent years, there has been significant investment in mining projects in the region, but the future viability of mining depends on a range of factors. These include export market relationships and recent trade hostilities with China, government policy responses to the growing threat of climate change, as well as the exchange rate and international competition.

Other industry

The MIW Region is represented by a broad range of industries, with the mining sector underpinning economic activity throughout the region. Other dominant industries include manufacturing, transport, construction, tourism, education and business services (Figure 32).

The manufacturing industry includes heavy fabrication and mining-related maintenance, supporting the industry through all stages of the mining process from exploration to mine site rehabilitation. The region boasts several firms that deliver high growth services like mining safety and risk management for manufacturing companies. Another feature of the region is Paget Industrial Estate, which is home to a range of engineering companies, many of which export services and equipment to countries including China, New Caledonia, Papua New Guinea and Ghana (Trade & Investment Queensland, 2019).

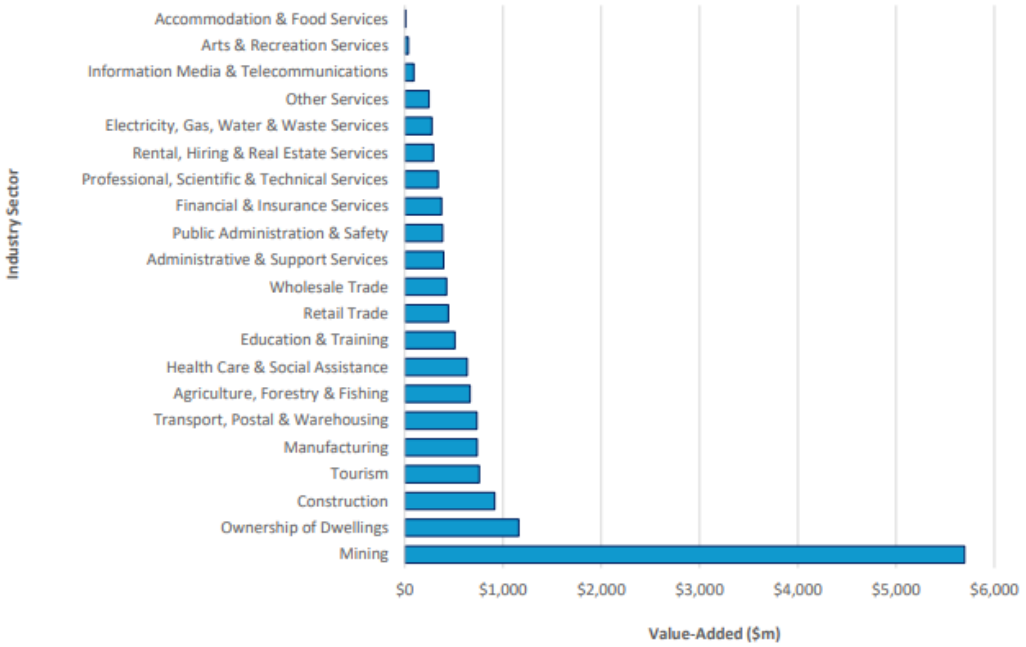


Figure 32 Value-added by industry in MIW region, 2018

Source REMPLAN, 2018

The region's tourism sector is a key provider of jobs and one of the largest contributors to the value of the region's industry output. The Whitsunday Coast is a gateway to the '74 island wonders' and to a large section of the Great Barrier Reef. Australia's tourism industry continues to grow as new markets emerge, particularly in Asia where the emerging Indian, Malaysian and Chinese middle-class is driving much of the industry's income growth. This has been hampered significantly by the recent international travel restrictions but can be anticipated to resume in the coming years.

The construction industry is driven by the strength of heavy and civil engineering construction and the construction services sector, both of which provide inputs to the mining and agricultural industries. The MIW region's transport industry consists of road, rail, water and other transport as well as a large transport services and storage sector (Greater Whitsunday Alliance, 2018).

Supporting infrastructure

The MIW region is home to a network of supporting infrastructure to facilitate development of one of the most resource-rich locations in Australia. Mackay is the major urban centre of the region, with other major centres including Bowen, Moranbah, Proserpine, Sarina, Airlie Beach and Cannonvale. The region has ideal positioning at the gateway to the Asia-Pacific and close economic ties with expanding Asia-Pacific markets. The region also has three regional airports.

Mackay's general cargo port supports fuel distribution into resource areas, with coal ports at both Hay Point and Abbott Point. There are opportunities to use both developed and undeveloped industrial land at the Port of Mackay for activities relating to sugar, grain and fuel, the shipping function of the port, other port-related industrial development, and marine services activity (TIQ, 2020).

The southern hemisphere's biggest mining service support centre is the Paget Industrial Estate, located in South Mackay. Comprising over 480 Ha of industrial land and more than 500 registered

businesses, the estate services the mining and resources sector in Central Queensland and provides specialist industrial, transport and supply chain services.

Appendix B – Concurrent investigations

This appendix provides further detail on the studies and investigations on water supply and demand in the MIW region that are summarised in section 4.5. These studies contain analysis which supports identified service needs, along with initiatives that have been previously explored to meet the MIW region's water needs.

Water for Bowen

The Water for Bowen project was designed to transport up to 60,000 ML per annum of water from the Burdekin Haughton Water Supply Scheme to Bowen for industrial, urban and agricultural use. The project involved the construction of a new transport system planned to extend south from the Burdekin River, along the coastal plain to Bowen and surrounds.

The Project was identified as a key project necessary to support a number of development initiatives in the region. The most relevant State Government strategic planning initiatives at that time were:

- Northern Economic Triangle Infrastructure Plan 2007–2012
- Statewide Water Policy
- Program of Works, Statewide Water Grid, Regional Water Infrastructure Projects.

In 2006 a Foundation Customer process was instigated to provide funding for the next stage and to provide greater certainty regarding demand. At that time, Foundation Customer demand was found to be 59,025 ML per annum. A substantial proportion of the identified Foundation Customer demand (34,050 ML per annum) was the State Government acting as a proxy for future industrial demand associated with the Abbot Point SDA.

During the development and design phase of the project, projected urban and industrial demand for water in the area significantly reduced, with the cancelling of several proposed developments particularly at the Port of Abbot Point. During the same period, the estimated cost of construction of the project increased significantly.

During 2010, Sunwater conducted additional demand surveys, and used this data to scope and design several smaller capacity variations to the project. With decreased demand and increased cost, Sunwater determined that the Project was not commercially viable, and the project was discontinued from further development.

Water for Bowen Pipeline

In 2017 a new project aimed at providing large volumes of water for irrigated agriculture emerged in the form of the Water for Bowen Pipeline Project, an initiative of the privately owned Bowen Pipeline Company. The project included the progressive development of a pipeline corridor from the Burdekin River at Ayr through to Gumlu, Guthalungra, and on to Bowen. The Pipeline was planned to follow State owned corridors in the form of the Bruce Highway and the North Coast Line.

The project was targeting the delivery of 80,000 to 100,000 ML per annum of new water supply to the Bowen area. Work on the project appears to have been suspended in recent times, and the future for the development is unclear. There is limited documentation available describing the design, costs, or economic assessment of the proposed infrastructure.

Urannah Water Scheme

The Urannah Water Scheme is centred around a new dam to be located at 36 km AMTD on the Broken River downstream of the junction with Urannah Creek, approximately 64km South East of Collinsville. The dam will have a yield of up to 103,000 ML HP and a storage capacity of 1,000,000 ML. Up to 1200 megawatts of pumped hydro energy with solar and wind precincts up to 1,500 megawatts are contemplated. A 9,500 Ha irrigation scheme is planned at Collinsville, along with a pipeline to connect water supply to industrial customers in the Bowen Basin, (Bowen River Utilities, 2020). A schematic showing the key components of the project is shown in Figure 33.

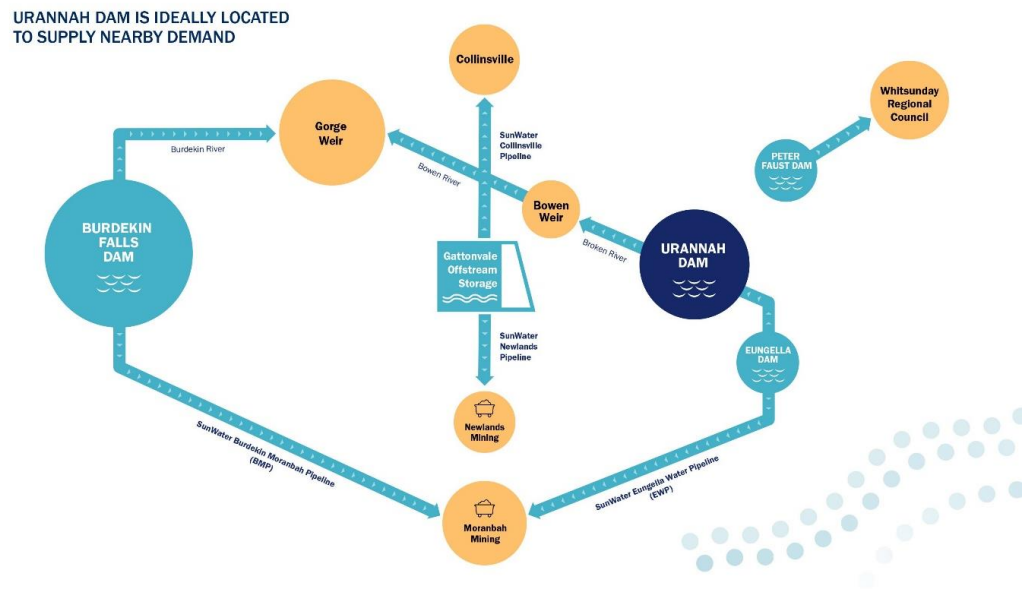


Figure 33 Urannah Water Scheme Schematic

Source Bowen River Utilities (2020)

The Detailed Business Case for the project has recently been completed and is under review by the State government. The project has been declared a Coordinated Project by the Department of State Development, Infrastructure, Local Government and Planning. At the time of writing, the EIS approval process was under way.

The project is currently forecast to cost circa $2.8 billion and generate 1,200 jobs through construction and 650 long term operational jobs (Bowen River Utilities, 2020).

Burdekin Falls Dam Raising

Burdekin Falls Dam is located approximately 210 km by road south-east of Townsville at AMTD 159.3 km on the Burdekin River. The dam is owned and operated by Sunwater and comprises a mass concrete main dam and four earth and rock-fill saddle dams. The dam was completed in 1987 and the reservoir stores 1,860,000 ML of water at the design FSL of AHD with a yield of 1,140,000 ML per annum. Burdekin is the largest water storage dam in Queensland.

In 2017 as the Burdekin Falls Dam approached full commitment of its allocation, the State determined that the timing was appropriate to investigate dam raising options. A feasibility study for the raising was completed in May 2017 by AEC Group on behalf of the Department of State Development,

Manufacturing, Infrastructure and Planning. The study identified a potential opportunity to raise Burdekin Falls Dam, but recommended that economic, financial, and environmental considerations be investigated in more detail.

In October 2018, Sunwater undertook a preliminary business case for the raising indicating that current supply capacity is "inadequate to support development and growth in North Queensland for the next generation". A demand assessment was undertaken in the preliminary business case indicating that a raising of between 2 m (150,000 ML) and 6 m (575,000 ML) could be required. preliminary business case recommended that a detailed business case be undertaken through which a more rigorous demand assessment would be conducted and an optimised level for the raising identified.

Building Queensland commenced the detailed business case for the raising in February 2020 and is scheduled to complete the study for approval by the State in August 2021.

Northern Region Demand Study

RDMW has commissioned the Northern Region Demand Study. The study is being undertaken to provide a consistent picture in relation to long-term agricultural and industrial water demand in the northern region[30]. In this context, the primary objective of this study is to develop a robust picture of future agricultural and industrial water demand in the northern region, to:

- Provide a consistent basis against which water demand profiles contained within business cases for major bulk water projects in the region, including Hells Gates Dam, the Burdekin Falls Dam Raising, and Urannah Dam, can be assessed and inform advice provided to project proponents; and
- Inform the development of future business cases, particularly for the three major bulk water projects currently under consideration, including ensuring that there is alignment in terms of expectations in relation to future water demand in the region and to prevent double counting of water demand across projects.

At the time of writing the demand study was under way and preliminary results have been considered as an input into this strategy.

Burdekin Moranbah Pipeline and Eungella Southern Extension Pipeline Duplication

Burdekin to Moranbah Pipeline is 218 km long extending from Gorge Weir on the Burdekin River to the Moranbah Terminal Storage. The pipeline was originally designed with a capacity of 17,000 ML per annum with the ability to augment the pipeline to 22,600 ML per annum through augmentation of the main pump station. The augmentation was triggered during the construction process and hence the pipeline was commissioned in 2007 at full capacity.

The Eungella Southern Extension transports water south from the Moranbah Terminal Storage following (and located within) the Powerlink easement before terminating at Lake Vermont. The pipeline is approximately 70 km long and has a design capacity of 2,550 ML per annum.

Recent demand from a number of coal mining projects under development south of Moranbah has given rise to early stage discussions with mining companies regarding the potential duplication of the Eungella Southern Extension in order to move available allocations from the Moranbah Terminal Storage to the respective mine sites. The total volume of demand in the area is known to exceed the available volumes of unsold water available from Sunwater, and there is an opportunity to increase

[30] Defined as the North region in the QBWOS.

supply into the Bowen Basin through the duplication of the Burdekin Moranbah Pipeline given the availability of unsold HP allocation in Burdekin Falls Dam. At the time of writing, no formal development activities have commenced on either of these projects.

Abbot Point SDA

SDA's are created to facilitate development in specific areas identified as providing unique industrial development opportunities. Once declared, responsibility for planning approvals transfer to the Coordinator General who will assess proposals under the development scheme specific to the SDA and may bring other powers to bear in order to facilitate development such as compulsory land acquisition.

The Abbot Point SDA was established to facilitate large-scale industrial and port-related development of regional, state and national significance. Adjacent to the Abbot Point SDA is the Port of Abbot Point; one of Queensland's priority ports. The Port of Abbot Point currently has a coal export capacity of 50 million tonnes per annum. It comprises rail in-loading facilities, coal handling and stockpiling areas and a single trestle jetty and conveyor connecting to two offshore berths and two ship-loaders which are located 2.8 km offshore. Industries considered suitable for the Abbot Point SDA include:

- large-scale, value-adding industrial development
- bulk mineral resource unloading and stockpiling facilities
- mineral processing
- integrated steel mill
- LNG facility
- fuel storage and associated infrastructure
- aerospace
- extractive industries.

MIW Council Regional Water Supply Security Assessments

RDMW administers the Regional Water Supply Security Assessment (RWSSA) program which provides an overview of the capability of the existing water sources during different rainfall events for projected population growth and water demands. Hydrologic modelling is used to assess the performance of the bulk water supply in meeting forecast demands. 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 (DNRME, 2020).

Of the three Council areas in the MIW region, Mackay and Whitsunday have had assessments undertaken under the program with an assessment of the Isaac Regional Council area yet to be performed.

Mackay Regional Water Supply Security Assessment

Published in 2017, the Mackay assessment results suggest that the current low average water use for agriculture and the non-use of Sunwater's uncommitted water are providing a temporary benefit to the council's water supply performance from the Pioneer River scheme, which underpins Mackay's urban water supply security. The assessment concludes that this benefit cannot be relied upon indefinitely, as circumstances and water-use trends may change in the future. The assessment outlines

potential changes to the council's water supply performance from the Pioneer River scheme in order to inform decisions by the council regarding the timing and extent to which additional water allocation may be required.

The assessment recommended that the following actions be taken by Mackay Council:

- monitor Teemburra Dam levels as a lead indicator to increased risk of shortages
- continually review demand within the network to understand when and how much it will be necessary to increase the allocation to meet community's needs
- maintain relationships with key stakeholders to understand the commitment of the currently unallocated high-class A water in the Pioneer River scheme
- maintain current water demand management and provide education and real-time data to end users, while continually reviewing water losses within the network
- implement water restrictions during water shortages to limit exposure.

Whitsunday Regional Water Supply Security Assessment

Published in 2016 the Whitsunday assessment highlights that the current underutilisation of agricultural allocations is significantly enhancing the observed water supply security of the Whitsunday communities, which presents a risk should the agricultural industry change course and begin to utilise its allocations in greater volumes. However, modelling undertaken by DNRME also recognised that Council currently has access to 1,693 ML of unsupplemented groundwater which could be utilised when supply in Peter Faust Dam diminishes, thereby greatly mitigating this supply risk. The unsupplemented groundwater licence volume for the Coastal and Proserpine water supply schemes meets about half of the current demand and a quarter of the projected 2036 demand and provides a significant hedge against the risk of supplemented surface water supply interruptions.

Whitsunday Council has identified several actions to be undertaken in the short term, with the following actions relevant to this RWSSA:

- Initiate discussions with Sunwater regarding the purchase of additional HP water allocations to support system reliability, prior to the Whitsunday communities' total demand exceeding HP allocation nominal values.
- Roll out a revised water restrictions policy inclusive of permanent demand management measures, which include education, more timely water consumption data provision to customers and a greater focus on reducing non-revenue water.
- Undertake a groundwater reliability assessment of council's unsupplemented groundwater entitlements.
- Initiate discussions with Department of Natural Resources and Mines regarding water resource planning outcomes when the Water Resource (Whitsunday) Plan 2010 is scheduled for review in 2020, to ensure they address the long-term security of the HP water allocation from Peter Faust Dam or alternative supplies from the region are properly assessed at appropriate times.

Isaac Regional Council water security

Isaac Regional Council does not have a completed Regional Water Supply Security Assessment. The supply of water to the Isaac Regional Council is a relatively unique situation in that Council are heavily dependent on HP allocations from the Burdekin Moranbah, Eungella Water, and Bingegang Pipelines

which are provided by mining companies. Council owns water infrastructure that meets either part or all of the water supply requirements for some townships, but in many cases are wholly reliant on water from miners. Demand can be highly variable from year to year depending on both climatic conditions and the level of mining activity and associated increase / decrease in the urban population.

Based on discussions with Council it appears that contractual arrangements with mining companies vary in terms of their duration and conditions. Most of the larger mining companies continue to honour their supply obligations, but a number have flagged a desire to end these arrangements in favour of Council establishing their own agreements with Sunwater. Council recognise the risk associated with the dependency on these contracts for long term water security and are seeking to secure their own long term supply agreements with Sunwater. However, water is expensive and reflects contract prices with Sunwater; the cheapest price for water on the short-term market is circa $2,650 per ML and, depending on the source of supply, can exceed $4,000 per ML.

Supply issues within the Council area vary from town to town, and can be briefly summarised as follows:

- *Moranbah* - Moranbah's water supply is currently received through various third-party supply arrangements (some take or pay) from Eungella or the Burdekin system. Council receives water via Sunwater infrastructure as well as BMA from Eungella. Council has access to around 3,000 ML of supply at present which meets average requirements, but there is also an issue associated with flow rate in the pipelines which is capped under the supply agreements with Sunwater. Historical daily flow rates from Sunwater through Third Party Agreements are limited to under five ML per day, and Council requires up to nine ML per day on a regular basis.
- *Dysart* - All water for Dysart is supplied by BMA under a supply agreement due to expire in 2031.
- *Middlemount* - All raw water for Middlemount is currently supplied by Anglo American to Council via Bingegang Weir and the Nogoa Mackenzie system.
- *Glenden* - All raw water for Glenden is currently supplied by NC Coal at no cost to Council. There is no current agreement in place for this supply.
- *Clermont* – Water is supplied from Theresa Creek Dam which is owned by Council. The dam has lost around 20 per cent of its capacity through siltation, and the Council is in the process of reviewing the water balance model for the town supply. The existing supply arrangement has been identified by Council as a significant risk, and options are being considered for accessing a licence to take water from Sandy Creek and recommissioning an old borefield at an estimated cost of $6.5 million.
- *Nebo* – water is supplied from a borefield that has capacity to meet three or four times the current demand from the township, however the water is hard which leads to treatment costs.
- *Camila* – town water is sourced from a borefield that is subject to periodic restrictions. The borefield is recharged from a weir that is also being accessed by cane farmers which can reduce supply quickly during peak irrigation periods.
- *St Lawrence* – supply is from a local weir that is subject to unauthorised access by cattle that increase the rate of draw down.

Given the current supply situation, Isaac Regional Council's objectives for water supply are:

- Long Term Water Security – ensure that legal arrangements for secure allocation are in place, Council to hold their own water licences, and supply is secured through reliable yield and delivery systems.
- Water purchase price to be commensurate with other regional local governments.
- If supply continues via resource sector, Council will seek government intervention to compulsorily acquire the water allocations.
- Council obtains government support to hold the resource sector accountable for their historical obligations.

Appendix C – Stakeholder engagement

This appendix outlines the stakeholder engagement activities that have informed development of the MIW Regional Water Strategy.

Purpose and objectives of stakeholder engagement

The overarching objective of the Strategy is to maximise the value of water in the region. Achieving this objective requires an inclusive and comprehensive stakeholder engagement process that is undertaken with an appreciation of related engagement activities in the region. Stakeholder engagement activities have ensured relevant stakeholders have had direct input to the formulation of the Strategy which is important for implementation.

The ongoing role of stakeholders

Stakeholders, including the Project Steering Committee, supported the Strategy by:

- helping to define what a successful Strategy entails
- assisting to identify regionally specific service needs (challenges and opportunities)
- being a source of primary data and lived experience for market insight, refinement of the service need and determination of demand
- identifying market trends, including growth opportunities and threats to existing markets
- advising on policy or regulatory barriers that impact users' ability to access and utilise existing or new water supplies
- informing the longlist of options to address identified problems or realise opportunities
- supporting development of the assessment framework and assessment of options
- implementing the actions that form part of the final Strategy through a mix of advocacy, cross agency collaboration and direct implementation.

Consideration of existing stakeholder engagement

During development of the Strategy, several existing stakeholder engagement activities were being undertaken by other parties. This included the Northern Queensland Regional Demand Assessment being undertaken by Sunwater in conjunction with DNRME (now RDMW), demand survey work being undertaken by Building Queensland in support of the Burdekin Falls Dam Raising project, and ongoing discussions by Bowen River Utilities with prospective mining and agricultural customers. The project team sought to secure the data generated from these surveys, including incorporating them into the development of the Strategy, with targeted consultation activities being undertaken to fill gaps in the existing knowledge base rather than conducting blanket surveys. This approach was intended to minimise repeated discussions with prospective water users, avoid stakeholder engagement fatigue and concentrate engagement efforts on those areas that could provide maximum benefit to the Strategy.

Approach to stakeholder engagement

The Strategy included the following consultation activities, in order of occurrence:

- Internal service need workshop to confirm desktop findings (with Steering Committee)
- External service need and options identification workshops
- Internal options identification workshop (with Steering Committee)
- Internal options assessment workshop (with Steering Committee)
- Presentation of draft findings (with Steering Committee)
- Targeted conversations (to occur throughout engagement).

The purpose, format, agenda outline, participants, materials and timing for each engagement activity is documented in Table 18.

Table 18 Details of engagement activities

Activity	Purpose	Format, length and location	Agenda	Participants	Timing (week commencing)
Internal service need workshop	Define regionally specific challenges and opportunities (service need)	One 3-hour workshop on video conferencing platform	• Welcome and introductions • Housekeeping and rules • Strategy objectives • Objective for this workshop • Regional context and background (including concurrent investigations) • Defining the service need and elements that make up the service need • Identified service needs by region (challenges/opportunities) • Likely beneficiaries • Next steps	• Project team • Steering Committee	05-Oct-20
External service need and options identification workshops	Identify regionally specific challenges and opportunities (service need) and potential options that may address the service need	Two one day workshops (either online or in person) in Mackay and Bowen/Proserpine	• Welcome and introductions • Housekeeping and rules • The Strategy (including objectives and timeline) • Objective for this workshop • Regional context and background (including concurrent investigations) • Defining the service need and elements that make up the service need • What are your region's service needs? (challenges/opportunities) • What benefits would be achieved by meeting these service needs? Who are the likely beneficiaries? • What options exist to meet these service needs? • Next steps	• Project team • External stakeholders (by location)	19-Oct-20
Internal options identification and assessment framework workshop	Confirm demand & service need & augment long list of options from external	One half day (4 hours) workshop on video conferencing platform	• Welcome and introductions • Housekeeping and rules • Update on status of the Strategy • Objective for this workshop	• Project team • Steering Committee	07-Dec-20

Activity	Purpose	Format, length and location	Agenda	Participants	Timing (week commencing)
	workshops & define assessment framework		• Summary of demand and identified options by service need • Workshop additional options • Defining the assessment framework and criteria • Next steps (including out of session finalisation of assessment framework)		
Internal options assessment workshop	Confirm options short list for inclusion in the Regional Water Strategy	One half day (4 hours) workshop on video conferencing platform	• Welcome and introductions • Housekeeping and rules • Update on status of the Strategy • Objective for this workshop • Present rapid CBA results • Conduct assessment with agreed framework • Next steps	• Project team • Steering Committee	11-Jan-21
Presentation of draft findings	Present the draft findings and outcomes of the Regional Water Strategy	30 minute presentation and 1 hour discussion on video conferencing platform (1.5 hours in total)	• Welcome and introduction • Housekeeping and rules • Objective for this workshop • Present the Draft Regional Water Strategy • Open forum/discussion • Next steps (Finalise the Strategy)	• Project team • Steering Committee	15-Feb-21
Targeted conversations	To supplement information obtained through desktop analysis and workshops	Half to one hour phone calls or teleconferences	• Not applicable	• Project team • Targeted stakeholders	Throughout engagement

Appendix D – Rapid CBA assumptions and parameters

Model limitations

The rapid CBA model has limitations due to its rapid nature and limited availability of data. The limitations of the analysis of options include:

- The rapid CBA model does not account for the timing of demand. All sources of identified demand are assumed to exist for the operational life of each respective option.
- Agricultural benefits are calculated using a gross margins approach. This may overstate the benefits as setup costs are not included in the calculation of the gross margins. This is likely to be particularly important for capital intensive crops such as tree crops.
- The economic analysis excludes the costs and benefits associated with:
  - environmental change
  - flooding
  - avoided costs of alternative infrastructure options
  - water restrictions
  - downstream producer surplus (e.g. value-added benefits).

These limitations should be considered when using the results of the rapid CBA model. These limitations can be overcome when the concepts are developed in more detail for assessment as part of a preliminary or detailed business case.

Model framework and general assumptions

The rapid CBA model applies the following principles when assessing potential infrastructure options:

- Demand profile assumptions (industry mix) are established based on the latest studies for the region
- Where necessary to realise benefits, infrastructure costs include dams and pipelines.

The rapid CBA includes a number of assumptions around project timeframes, appraisal periods, inflation and the discount rate used for calculating costs and benefits. These are outlined below.

Parameter	Unit	Value
Discount rate	%	7
Appraisal period	Years	30
Price year	Year	2021

Water storage and distribution options information

Option	Service need(s)	Capex	OPEX (ANNUAL)	Yield / Capacity (ML)	Source
Pipeline from Elliot Main Channel to Bowen	SN1	$426,388,712	$8,527,774	20,000	Water Resources escalation of Water for Gumlu Pipeline Project cost estimate
Pipeline from Peter Faust Dam to Bowen	SN1	$193,918,514	$3,878,370	20,000	Water Resources estimate based upon CSIRO cost relationship
Pipeline from Peter Faust Dam to Proserpine Prawn Farm and then Bowen	SN1 / SN3	$211,578,626	$4,231,573	30,000	Water Resources estimate based upon CSIRO cost relationship
Pipeline from Peter Faust Dam to Proserpine Prawn Farm	SN3	$51,828,358	$1,036,567	10,000	Water Resources estimate based upon CSIRO cost relationship
Connors Dam and pipeline	SN4	$937,436,964	$5,624,622	23,000 (to align with demand)	Water Resource escalation of Detailed Business Case
Burdekin to Moranbah Pipeline Duplication	SN4	$731,894,005	$14,637,880	23,000	Water Resources estimate based upon CSIRO cost relationship

MIW region demand and enterprise value assumptions

The rapid CBA model includes assumptions around the sectors that use water, the specific enterprises this water is applied to, and the value of water in production for these enterprises (measured in dollars per ML). The uses and values for the MIW region are summarised below.

Service need	Annual demand volumes (ML)					
	Broadacre agricultural demand	High value agricultural demand	Aquaculture demand	Mining demand	Urban demand	Industrial demand
SN1	0	17,000	0	0	0	3,000
SN2	NA	NA	NA	NA	NA	NA
SN3	0	0	10,000	0	0	0
SN4	0	0	0	20,000	3,000	0

Enterprise	Value ($/ML)	Type	Source
Broadacre agricultural demand	314	Annual per ML	Sunwater BFDR preliminary business case (unpublished)
High value agricultural demand	687	Annual per ML	Sunwater BFDR preliminary business case (unpublished)
Mining demand	3,789	Annual per ML	Urannah Water Scheme detailed business case (unpublished)
Urban demand	2,500	Upfront WTP	Based on observed WTP values
Industrial demand	3,000	Upfront WTP	Based on observed WTP values

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