# WATER SCHEME

**Urannah Water Scheme (UWS)** 

**Project Summary** 

May 2019



#### **URANNAH DAM** Viable, Reliable & Deliverable







#### **DEMAND FOR WATER** Supply and Price Certainty now





# Urannah Water scheme

### Urannah Water Scheme (UWS)

#### **Public Executive Summary**

This study is supported by funding from the Australian Government National Water Infrastructure Development Fund, an initiative of the Northern Australia and Agricultural Competitiveness White Papers.

> For further information please contact: Bowen Collinsville Enterprise Association

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#### Delivering long term economic benefits to the Bowen & Collinsville Communities



#### 1.1 About Us

This Project Summary, along with the associated Preliminary Business Case (PBC) has been prepared by Bowen Collinsville Enterprise Group Inc. (BCE) to provide a summary of the key elements of the proposed Urannah Water Scheme project, a large-scale water infrastructure solution capable of servicing Bowen, Collinsville, Proserpine, and Moranbah for mining, tourism and community needs.

The purpose of the PBC was to establish the two best options for the scheme, which will proceed to form the basis of the Detailed Business Case.

BCE has led the project to now be proponent ready for Urannah Water Scheme Pty Ltd to achieve financial close and early works components of the project.

#### 1.2 Bowen Collinsville Enterprise Group Inc

BCE was established in 1997 to formulate and implement an economic development strategy for Bowen Shire following the loss of 2,700 jobs between 1987 and 1997 in the mining, electricity, rail, meat processing, fishing and service industry sectors of the Bowen and Collinsville economies.

The group was funded by the Queensland Government for the first three years and subsequently by Bowen Shire Council.

Major expansions in rail and port infrastructure as well as the establishment of the State Development Area at Abbot Point and the Aquaculture Development Zone based in Bowen Shire are some of the success stories driven by BCE.

However, water infrastructure for industry and agriculture on the coastal zone and water for the mining industry inland continue to be key issues that remain unresolved.





#### **1.3** Investment Highlights

The Urannah Water Scheme (UWS) is a large-scale water infrastructure solution capable of servicing Bowen, Collinsville, Proserpine, and Moranbah for mining, tourism and community needs.

The UWS consists of a large-scale dam yielding 150,000 ML per year and holding over 1.5 GL of water, two pipelines to Proserpine and Moranbah and a large-scale irrigation scheme gravity-fed through the Broken and Bowen Rivers.

Option 1 is to build Urannah Dam to yield 150,000 ML per annum (at 290 RL Full Supply Level) and this is preferred to Option 2, which is to build Urannah Dam to yield 70,000 ML per annum. The options were assessed against the State Government's solution of duplicating the existing pipeline from Burdekin Falls Dam to provide incremental supply to Moranbah.

### The PBC demonstrated that Option 1 returns \$1.70 for every \$1 spent in benefits to costs.

The primary benefits of UWS in the Cost Benefit Analysis include:

- benefits to community users: increased certainty of long-term water supply to at-risk urban areas, with less requirement for demand management measures (only under Option 1 and 2)
- benefits to agricultural users: increased agricultural production in the region (only under Option 1)
- benefits to industrial and mining users: increased mining expansion and project certainty

UWS would ensure the continued growth of natural resources in the region, with at least 21 new resource projects requiring water before going ahead.

#### **1.4** Investment Characteristics

The UWS presents a major strategic infrastructure project with returns backed by long term operators that require supply commitments.

#### The UWS Business Case has proven:

- BCR of 1.7 for the full dam option
- a location superior in its geography, catchment, hydrological and geo-technical advantages
- a baseline financial NPV of \$558m
- over 11,000 hectares of new irrigated agricultural areas using existing mining buffer areas
- an increase in mining expansion and project certainty
- an increase in regional employment from enhanced agricultural productivity and enhanced mining activity
- new opportunities for Indigenous business development and employment
- increased certainty of long-term water supply to at-risk urban areas
- enhanced confidence to invest in long-term business operations and succession opportunities
- an increase in the value and flexibility of existing water allocations
- an increase in regional tourism
- over 1,000 MW/h in pumped storage energy generation





#### **1.5 Executive Summary**

The UWS has the potential to become the cornerstone of regional water security and economic development for Northern Queensland. The dam would become the lynchpin in an expanded regional water grid that links together and enhances the reliability of three of the region's five water schemes -Bowen Broken, Proserpine and Emerald.

As well as delivering new water for western mining and agriculture, the UWS would guarantee water security for local coastal communities, agriculture and industry for decades to come by boosting existing water supplies and making them more reliable. It would also enable more efficient water transfer for irrigated agriculture, to reinvigorate Collinsville, create new jobs and broaden the regional economic base.

The Mackay, Isaac and Whitsunday Region along Queensland's central coast, halfway between Brisbane and Cairns, is one of state's most productive regions. While coastal communities support a strong tourism sector, the regional economy is primarily founded on agriculture, and mining in western areas where the region takes in the coal-rich Northern Bowen Basin, making the region one of the largest contributors to the Queensland economy.

Water security is critical in this part of Queensland, which experiences a highly variable climate and regular drought and cyclones. Safe, accessible and reliable water supplies are an essential regional resource and underpin both community health and economic growth.

While the coastal areas surrounding Mackay are well serviced by water schemes supporting the Mackay Region, the Peter Faust Dam at Proserpine servicing the Whitsundays and Bowen is fully allocated. The Whitsunday Regional Water Security Assessment Report (DEWS 2016) has recommended Whitsunday Regional Council implement contingency plans to guarantee water security for the Whitsunday and Bowen region beyond 2025.

Climate change modelling indicates the region will experience reducing annual rainfall with larger major rainfall events eg cyclonic activity. These future challenges will need to be met by building strategically located, larger water storages over a wider area to ensure water from these events is captured and stored for longer periods. Regional water security will be further enhanced with the establishment of a water grid linking major storages and distribution nodes as proposed by UWS.







In the western areas of the region where annual rainfall patterns are highly variable there are three main sources of water supply to urban and industrial users in the Northern Bowen Basin:

- The main source of supply is the Eungella Dam on the Broken River supplying urban and industrial water to Collinsville, Glenden and Moranbah
- The Fairbairn Dam at Emerald supplies water north to Dysart and Moranbah via the Bingegang Weir on the Mackenzie River
- A pipeline from the Gorge Weir on the Burdekin River to Moranbah supplies additional water to the mining hub around Moranbah

The above supply sources are currently fully allocated and this Project Summary outlines the proposal for a Water Grid linking a new large storage at Urannah with established supply hubs at the Proserpine and Eungella dams to underpin regional water security over the next 30 years. Additionally, Urannah water supplied to the Moranbah / Dysart hub could replace water currently supplied from the Fairbairn Dam, increasing its reliability.







Investigations show existing unmet and latent demand for water in the region (excluding Mackay). The Burdekin to Moranbah pipeline is operating at capacity and mines are trading in water at prices of up to \$6,000 per megalitre (ML), large industrial users such as Abbot Point coal terminal are trucking in water and many existing agricultural and mining customers are limiting their activities to avoid using their full water allocation due to concerns about ongoing water security. When dam levels are low, water supply to industrial and agricultural users with low priority water allocations can cease completely.

Following lobbying by local business leaders, community members and elected representatives, in 2016 the Australian Government committed \$3 million to investigate the feasibility of a dam at Urannah, on the Broken River, to supplement and improve the reliability of existing regional water supplies.



In keeping with Queensland Government frameworks and policies, the PBC also examined non-infrastructure options to improve existing services through reform or by influencing demand, and capital works to supplement existing systems. Options ranged from policy changes on groundwater and pricing to duplicating the pipeline from the Burdekin to Moranbah or constructing an alternate, shorter pipeline.

Shortlisted options all centre around a new dam with instream supply to Collinsville and piped connections to existing regional networks. The capacity of the dam and the nature of new network connections differ between options. One option also includes irrigation distribution infrastructure for an agricultural precinct around Collinsville while another includes duplication of the pipeline from the Burdekin.

A key strength of the Urannah Water Supply Scheme is its capacity to supply water to Proserpine and Bowen on the coastal plain, Collinsville downstream of the Dam, and via Eungella Dam, supply water to Moranbah and areas to the South. This diverse supply network affords flexibility and water use options for the dam.

Urannah Dam will enable the further growth of existing industries within the region. The Urannah Dam project is unique in that it is centrally located within an existing vibrant region consisting of large scale established industries (Bowen Basin coal industry and rail infrastructure, high value irrigated horticulture industry in nearby Bowen, Whitsunday and Burdekin sugar industries, the coal port at Abbot Point, and the future industrial opportunity that is the Abbot Point State Development Area). Water from Urannah Dam will enable these existing established industries to further grow and develop, allowing a much faster uptake of water allocations from the Urannah scheme than would be the case for any alternate projects in areas without existing industrial demand. This will significantly improve the financial viability of the Urannah scheme.





Urannah Water Scheme, constructed to its full potential, would almost triple the dam capacity of the Mackay, Isaac and Whitsunday Region, and avoid the need to pump more water in from outside the region by duplicating the Burdekin to Moranbah pipeline. With an ultimate capacity of more than 1,500,000 ML, Urannah Dam would deliver almost 80 per cent of the capacity of Burdekin Falls Dam whilst inundating less than 20 per cent of the land area.

Unlike the Burdekin to Moranbah pipeline duplication, which would primarily supply water to western mines, the Urannah Dam Water Scheme could be used to 'top up' existing dams (Eungella and Peter Faust) for agricultural, industrial and urban users and supply water to new agricultural users.

Aligning with the objectives of key federal, state and local government policy and planning documents, Urannah Water Scheme would sustain the continued economic growth and liveability of the region. In the future, it could also support one of Australia's largest hydro-electricity projects.



Preliminary economic modelling indicates the two preferred Urannah Water Scheme options (Option 1 and Option 2) have benefit cost ratios (BCRs) of 1.7 and 0.9 respectively (7% Discount rate).







#### Recommendations

The PBC recommends the Urannah Water Scheme proceed to the detailed business case (**DBC**) phase.

It is recommended the two highest scoring options (as determined by a two-phase selection and assessment process) be carried through to the DBC. These preferred options are as follows:

- Option 1: new Urannah Dam yielding 150,000 ML per annum (at 290 RL Full Supply Level) with instream distribution to Collinsville; new pipelines from Urannah Dam to Peter Faust and Eungella dams; duplication of the existing pipeline from Eungella Dam to Moranbah to provide incremental supply to Moranbah, and irrigation distribution infrastructure near Collinsville
- Option 2: new Urannah Dam yielding 70,000 ML per annum with instream distribution to Collinsville; new pipelines from Urannah Dam to Peter Faust and Eungella dams, duplicating the existing pipeline to provide incremental supply to Moranbah

Option 1 has an anticipated capital cost of \$1,465 million and total annual operational costs of \$15 million. Option 2 has an anticipated capital cost of \$1,221 million and annual operational costs of \$13 million.





#### 1.6 Introduction

Urannah, on the Broken River, has long been considered a potential site for a largescale water storage to augment regional water supplies for urban, agricultural, mining and industrial customers and support economic development. The surrounding subcatchment has a strategic water allocation of 150,000 ML annually (already allocated in the Burdekin Water Resource Plan). BCE has been driving investigations into a potential dam since the 1990s.

In 2016, the Australian Government committed \$3 million of NWIDF funding for a 'detailed examination of the economic feasibility of Urannah Dam', as part of a broader suite of 39 feasibility studies for new water infrastructure across the nation. BCE was selected to undertake the studies.

A strategic business case (SBC) was subsequently submitted by BCE to Queensland's NWIDF administrators, the Department of Natural Resources, Mines and Energy (DNRME) in 2018.

Development of a DBC is the next step required to inform a formal investment decision.

The Urannah Water Scheme is comprised of three components, the dam, connecting pipelines and an irrigation plain.

#### 1.7 Proposal Background

Harnessing the Broken River, a tributary of the Burdekin River, offers the potential to:

- support regional mining expansion and new resource projects
- provide water security for existing agricultural, industrial (including future power generation) and urban users
- stimulate irrigated agriculture

Multiple studies have examined Urannah Dam since the 1950s. The Snowy Mountains Engineering Company (SMEC) conducted geotechnical investigations and site mapping in 1963 and 1969. Previous assessments indicated the dam is economically viable, with an acceptable social impact.

Designs produced in the 1950s include gravity-fed irrigation channels along the Bowen River to irrigate 30,000 hectares of prime agricultural land near Collinsville.

Urannah, where the dam would be constructed, is located high in the Mackay hinterland in the Mackay local government area, part of Queensland's Mackay, Isaac and Whitsunday Region. Surrounded by steep hills in a high-rainfall area, it would support a deep reservoir that could deliver almost 80 per cent of the capacity of Burdekin Falls Dam on less than 20 per cent of the land area. The site receives significantly more water, more frequently, than Eungella Dam, which is located upstream nearby.

Plans developed by SMEC in 1977–78 provide for a two-stage dam with an ultimate capacity of 1.5 million ML. The dam's elevation also offers potential to generate over 1,000 megawatts (MW) of hydroelectric power, making it one of Australia's largest potential renewable energy projects.

The site is strategically located close to a comprehensive, existing water network connecting to agricultural and urban users, large numbers of adjacent industrial





customers and land suitable for irrigation along the Bowen River, south of Collinsville. The key opportunity is for Urannah Dam to enable the expansion of the significant existing industries within the region, leveraging existing facilities, without the need for significant new enabling infrastructure (pipelines, power distribution, rail, road and port infrastructure).

SBC investigations found existing unmet and latent demand for water in the region (excluding Mackay). Water supply from Eungella Dam and Peter Faust Dam is unreliable, the Burdekin to Moranbah pipeline is operating at capacity and coastal and western customers are limiting their activities to avoid using their full water allocation due to concerns about ongoing water security. When dam levels fall, water supply to industrial and agricultural users with low priority water allocations from Peter Faust Dam can cease completely. Concern with water reliability is also undermining confidence to proceed with mining expansion plans.

Construction of Urannah Dam would be accompanied by development of a supporting distribution system, potentially via the Broken River to Collinsville (instream) and via pipelines south to Eungella and Moranbah and north-east to Proserpine.

#### The SBC identified opportunities to deliver water to:

- Proserpine water security for urban, agricultural and potentially industrial customers
- Collinsville for industrial and mining customers, and a new irrigated agricultural area (instream)
- Eungella Dam water security for mining customers in Moranbah and Newlands







#### URANNAH WATER SCHEME Options assessment Schematic - New Asset Urannah Dam and Infrastructure







#### **1.8 Regional Context**

Agriculture, mining and tourism are the foundation of the regional economy. Coal mining is the region's largest employer and will continue to be an important economic driver in the future. The region hosts the Bowen and Galilee basins which contain some of the nation's largest coal mining deposits and two major economic development hubs – the Abbot Point and Galilee Basin State Development Areas (**SDAs**).

Regional economic diversification is an ongoing challenge. The experience of Emerald, a western Queensland town, demonstrates how broadening the economic base of a mining town can stabilise the local economy and employment. Completion of Fairbairn Dam in 1972 enabled Emerald to develop an irrigated agricultural precinct that became the springboard for a thriving agricultural sector (Urannah Dam was originally proposed at a similar time to Fairbairn Dam).



The population of the Mackay, Isaac and Whitsunday Region is expected to reach 280,000 by 2031. Mackay will absorb much of this growth but communities in the Bowen Basin such as Moranbah will continue to experience pressures from residential and non-residential population growth (e.g. fly in/fly out workers).

#### Five water supply schemes operated by SunWater supply the region, specifically

- PIONEER RIVER: supplied by the Teemburra Dam (147,500 ML capacity), which provides water to Mackay's urban areas
- PROSERPINE RIVER: supplied by the Peter Faust Dam (491,400 ML capacity), which provides water to Whitsunday communities and agricultural and industrial users
- BURDEKIN HAUGHTON: supplied by the Burdekin Falls Dam (1,860,000 ML capacity), which provides water to western mines and rural communities such as Moranbah
- BOWEN BROKEN: supplied by Eungella Dam (112,400 ML capacity), which provides water to western mines and rural communities such as Collinsville and Moranbah
- **ETON:** supplied by Kinchant Dam (62,800 ML capacity), which provides water for agriculture





#### 1.9 Service Need

Urannah Water Scheme would become part of the BBWSS. It also has potential to connect into the Proserpine WSS and supplement the Burdekin Haughton WSS. These schemes incorporate the key potential demand nodes.

The BBWSS supplies water via Eungella Dam to customers downstream at Collinsville and Newlands and via pipeline to Moranbah. Due to Eungella Dam's small size and unreliable supply, Moranbah users prefer to source water from the larger Burdekin Falls Dam, supplied via the Burdekin Moranbah Pipeline (BMP). However, the BMP is very costly to operate (pumping water upstream across 209km) and is fully allocated and operating at capacity.

Users in Collinsville and Moranbah secure water through trading exchanges at significant price premiums. Many do not use their full allocation due to water security concerns. Unallocated entitlements by Whitsunday industrial and agricultural users are also high.

In the absence of any viable alternative proposals, some mining operators and proponents of new resource projects have expressed support for a second pipeline from the Burdekin that connects the Gorge Weir to Moranbah and is able to supply around 25,000 ML per annum. This is considered the Base Case in the PBC. Any alternative option must be comparable to this pipeline in service delivery.

SunWater has not considered a new storage solution for the region given the Burdekin Dam is underutilised and would prefer a new pipeline that services industrial demand only.

Total demand anticipated from demand nodes in the regional water system (excluding Mackay) is modelled at a conservative 136,650 ML per annum, split into four major areas:

- Collinsville/Newlands/Byerwen 9,650 ML per annum
- Collinsville irrigation precinct 80,000 ML per annum
- Proserpine and Abbot Point 16,000 ML per annum
- Moranbah 31,000 ML per annum

The large and complex resource customer base would be expected to take up demand beyond the modelling assumptions as the level of new projects without adequate water supply is high.

Meeting the service need would benefit the region by delivering new water for mining and agriculture, providing water security for urban coastal communities, opening up new opportunities for irrigated agriculture, generating employment by supporting business growth and giving business greater confidence to invest in the region.







#### **1.10** Options Generation, Filter and Shortlist

In keeping with Queensland Government frameworks and policies, multiple options to address the service need were identified, from reform and demand management measures to capital works that supplement existing systems and large-scale new infrastructure.

#### Options examined include:

- 1. Duplication of the Burdekin to Moranbah Pipeline at 25,000 ML per annum (Base Case).
- 2. Implementing pricing signals to restrict future water use in the Whitsundays and meet water demand beyond 2025.
- 3. Increasing pressure on ground water supplies in Bowen and the Whitsundays to meet water demand beyond 2025.
- 4. A new pipeline from Claire Weir on the Burdekin River to Bowen and Proserpine at 15,000 ML per annum as an alternative to supply water direct from Urannah utilising Dam Options 1 or 2.
- 5. A series of new weirs on the Bowen River and an upgraded pump station.
- 6. A series of new weirs on the Bowen River and an upgraded pump station, combined with Option 1 or 2.
- 7. A new pipeline from Burdekin to Byerwen with new pipeline at 8,000 ML per annum as an alternative to supply water direct from Urannah utilising, combined with Option 1 or 2.
- 8. A new pipeline from, from Burdekin to Collinsville Coal Mines at 20,000 ML per annum as an alternative to supply water direct from Urannah utilising, combined with Option 1 or 2.

- 9. A new Urannah Dam and pipeline from Urannah to Peter Faust Dam at 35,000 ML per annum (high priority).
- 10. A new Urannah Dam yielding 50,000 ML per annum with instream distribution to Collinsville and new pipelines from Urannah to Peter Faust and Eungella dams, augmenting the existing pipeline to Moranbah to improve reliability at Moranbah and duplicating the Burdekin to Moranbah pipeline.
- 11. A new Urannah Dam yielding 70,000 ML per annum with instream distribution to Collinsville and new pipelines from Urannah to Peter Faust and to Eungella dams duplicating the existing pipeline to provide incremental supply to Moranbah.
- 12. A new Urannah Dam yielding 150,000 ML per annum with instream distribution to Collinsville and new pipelines from Urannah to Peter Faust and Eungella dams duplicating the existing pipeline to provide incremental supply to Moranbah.

A two-phase process was used to assess options. First, all twelve options were assessed through a multi-criteria analysis (MCA) in order to select three options for shortlisting. Options were examined for their operational viability, ability to meet the service need and possible financial, environmental and regulatory, land use, economic and social impacts. Criteria were weighted according to their importance, with operational viability and ability to meet the service need given the highest weightings. Following the MCA, stakeholder consultation was undertaken to verify scores and rankings.





The top ranking options from the MCA were shortlisted and further economic and financial analysis was conducted to select the final two options. Shortlisted options all centre around a new dam with instream supply to Collinsville and piped connections to existing dams. One of the shortlisted options (Option 3 below) also includes duplicating the pipeline from Burdekin to Moranbah.

#### Shortlisted options include:

- Option 1: large-sized Urannah Dam yielding 150,000 ML per annum, Collinsville connection, pipes to Eungella and Peter Faust dams, new pipeline from Eungella Dam to Moranbah and irrigation distribution infrastructure near Collinsville
- Option 2: medium-sized Urannah Dam yielding 70,000 ML per annum, Collinsville connection, pipes to Eungella and Peter Faust dams and duplicating the existing pipeline to provide incremental supply to Moranbah
- Option 3: small-sized Urannah Dam yielding 50,000 ML per annum, Collinsville connection, pipes to Eungella and Peter Faust dams, and Burdekin to Moranbah pipeline duplication







#### Key points from the options assessment include:

 The duplication of the 209km Burdekin to Moranbah pipeline, was considered the 'do minimum' (Base Case). Using weighted and unweighted criteria, this option achieved the lowest (poorest) overall score. Although this option maximises the use of existing water storage (ie Burdekin Falls Dam), it has significant annual operational costs as water must be pumped uphill to Moranbah. Combining this option with Urannah Dam however significantly lifts its viability.



- Reform measures alone, such as policy changes on groundwater and pricing would be insufficient to meet the service need and could not be used to promote regional economic development.
- The four highest-scoring options all propose a dam at Urannah and supporting distribution network. All create new water supply allocations and could be used to 'top-up' water supply in other parts of the regional network to meet growth needs and boost reliability of supply. Scores for the dam increase as the number of connections to other parts of the regional water network increase.
- In the MCA, the option to combine a small dam at Urannah with a duplication of the Burdekin to Moranbah pipeline (Base Case) ranked third. This was confirmed through the shortlisting process.
- The highest scoring option overall, has the largest dam and also includes an irrigation distribution system for an agricultural precinct around Collinsville. This is the only option that could stimulate new, large-scale agricultural production and provide significant, long term, regional, economic development from expanded agriculture.
- Reform measures combined with a short pipeline from the Burdekin into the region (for example, to Bowen, Byerwen Coal Mine or Collinsville Coal Mine) was preferred after the Urannah Water Scheme. Combining reform measures with a series of weirs on the Bowen River and an upgraded pumping station is similarly viable. Both infrastructure solutions have a lower capital cost than the Urannah Water Scheme or Burdekin to Moranbah pipeline. However, these options would be unable to meet the full spectrum of identified needs, reaching only a limited selection of users.





#### **1.11 Strategic Considerations**

The Australian Government has a strong preference to invest in water resources with the potential to diversify regional economies and increase exports. Development of the right water infrastructure in the right area is considered key to realising the vision set out in Our North, Our Future: White Paper on Developing Northern Australia.

The Australian Infrastructure Plan states that infrastructure investment in Northern Australia should enhance the nation's regional productive capacity to take advantage of growing demand for Australian produce in places such as Southeast Asia and China. It also notes that successful irrigated agriculture depends on reliable and secure water resources. The Northern Australia Audit: Infrastructure for a Developing North highlighted the potential for new dams to support prospective agriculture.



In the State Infrastructure Plan (SIP), the Queensland Government indicates that water supply infrastructure should be in place (or in train) where there is a sound business case and water resources are available. Solutions should be evaluated and determined after water needs are assessed.

The framework by which new proposals for water storage are considered is outlined in the Queensland Bulk Water Opportunities Statement (QBWOS). For new water storage projects to proceed, the proponent currently needs to have commitment from foundation customers to take the water that will be made available. This allows long-term contracts to be put in place ensuring that construction costs will be recouped, and revenue will be ongoing.

The Mackay, Isaac and Whitsunday Regional Plan examines anticipated growth in the region – both population and economic – and underscores the importance of water security for economic and community health.

Queensland's Agricultural Strategy (2013) highlights the importance of agricultural industries to the state economy and the social fabric of rural and regional communities. Most jobs in agriculture and half of all jobs in food processing are regionally based. One of the four key pathways to grow Queensland's agricultural production – securing and increasing resource availability – focuses on enabling agricultural growth through optimal use of critical resources including land and water. The strategy outlines the government's intention to improve access to, and reliability of, water supplies for agricultural producers. Delivering secure and defined water entitlements for agriculture was identified as a key initiative to achieve this aim.





#### 1.12 Dam Design and Geology

Varying dam options with a range of reservoir levels were considered, from 255 metres to 295 metres Australian Height Datum (AHD) full supply level (FSL). Three construction types were also examined – a roller compacted concrete (RCC) dam, concrete faced rockfill dam (CFRD) and an earth and rockfill dam (ERD). All present feasible options for the site given the availability of suitable construction materials. A zoned earth dam was eliminated early in the investigative process as it would be less economical than other methods.

It is recommended that Urannah Dam be designed as an CFRD, with a sloping core. This would enable a large dam of 290 FSL using a staged construction. A RCC dam with earth and rockfill dam flanks was preferred at the lower levels below 280 FSL, however does not allow for a staged project unless gates are used.

#### Urannah Dam is capable of providing a mean annual diversion (yield) of up to 195,000 ML per annum depending on the height of the dam.

A dam of this size could support an irrigation area ranging from 8,000 hectares to 15,000 hectares, depending on the FSL and mix of water priorities. For example, a dam with an FSL of 295 metres would support a 40 per cent larger irrigation area than a dam with an FSL of 280 metres.

#### 1.13 Hydro Power

The Urannah Dam to Peter Faust Dam water supply pipeline has potential to generate hydropower. Hydropower plants are typically located in areas with high rainfall and elevation, similar to the Urannah region. If hydropower was incorporated, the generated energy would be 1.8 times larger than the energy required for pumps in the scheme, resulting in positive net energy recovery.

#### Key features of a potential hydropower system include:

- two pump stations to raise the water approximately 122 metres to a head pond (or surge chamber or similar) at 380 metres AHD
- low-pressure pipeline with pump rising mains for most of the alignment
- pump stations are fed from or empty into empty pond to reduce pressures in pipes
- penstock and power station are located at 125 metres AHD, for a gross head of 255 metres
- Pelton turbine

Hydropower plants can also include a pumped storage plant, which is generally a smaller dam or turkey's-nest arrangement. Two options for pumped storage were examined.

While hydropower is recommended, it is not currently included in the scope of the Urannah Water Scheme and could be pursued as a standalone project. The facility would not only offset pumping costs and remove excess pressure head but could also generate revenue from surplus energy.





#### **1.14 Market Considerations**

Market sounding was conducted during SBC investigations and to prepare the PBC with resource, agricultural and industrial sectors (including operators, potential investors and industry groups).

Participants in the market sounding strongly support the provision of new water sources for the region to diversify the economy and enable the development of resource projects.



#### Market feedback from the resource sector indicated the following:

- Increased certainty of water availability would increase financial investment certainty
- Companies will pay premiums for high priority water to have it available when needed
- Customer experiences with SunWater have been varied with some Eungella High
  Priority allocations not being available at times of high demand and low storage levels
- Long-term supply agreements would aid in securing project finance for water
- Moranbah and Newlands clusters of customers are paying significant premiums and are trading water due to scarcity
- Companies are optimising their water supplies through re-use and recycling
- Companies are paying upwards of three times the volume-weighted trading price with all current sources of mining water fully allocated
- Operational costs associated with the SunWater connection pipelines are high and while associated prices for this water are also high, it is unlikely that costs are being covered
- A number of resource projects would have proceeded when favourable commodity markets returned had secure access to water been available

#### Market feedback from the agricultural sector indicated the following:

- Demand for water is solely reliant on the creation of a new irrigation precinct with large-scale, on-farm infrastructure
- Within the proposed irrigation area at Collinsville, properties are held by a small number of owners. The majority are owned by resource companies who acquired properties for further resource development or to provide buffer areas to existing operations
- The agricultural precinct operations would benefit from a single operator approach to take advantage of high-quality soils and manage an integrated systems for potential impacts on the Great Barrier Reef





#### 1.15 Public Interest Considerations

Preliminary investigations show all shortlisted options would meet public interest effectiveness criteria and align with strategic state and federal government objectives.

Stakeholder consultation identified strong support for an additional bulk water source for the region, particularly to grow the agricultural sector. Many additional benefits were identified, which would mostly be experienced by existing urban, industrial and mining customers through increased reliability of supply.

Localised impacts would occur in the form of land acquisitions and environmental impacts. However, primary landholders of the dam site strongly support the Urannah Water Scheme concept.

It is not possible to determine a social licence for the shortlisted options from the consultation undertaken for the PBC as stakeholder consultation was targeted and conducted at a regional level only.

Urannah Dam could be a potential source of increased amenity and tourism and further public discussion is warranted.

#### **1.16 Social Impact Evaluation**

A social impact evaluation **(SIE)** considered the positive and negative impacts of the shortlisted options on the health, wellbeing and economic prosperity of affected communities, both during construction and operation. It found all options would deliver significant social benefits to communities, businesses and industrial sectors across the region.

Minimal property resumption will be required for the dam itself. Both the registered lessee of the dam site, an Indigenous land corporation called Urannah Properties Association (UPA), and the Traditional Owners support the development. However, the dam will inundate up to 10,500 hectares of land.

Demand for water in the region is increasing and economic investment is currently hindered by lack of access to reliable, affordable water. Urannah Water Scheme will deliver new water to support mining growth in western areas and provide greater water security for urban communities, agriculture and industry along the Whitsunday coast by boosting water supplies in existing dams.

It would also support greater agricultural production near Collinsville. This could be expected to reinvigorate Collinsville by creating new jobs and broadening the local economic base, with flow-on benefits to the regional economy.





#### **1.17** Environmental Assessment

The proposed dam site is located on the Broken River and the area around the river is currently used for grazing cattle. From this main location, the Broken River joins with the Bowen River before flowing 100 kilometres north-west to the Burdekin River. Urannah Creek, Broken River, Dicks Creek, Massey Creek and Ernest Creek would be affected by the proposed inundation, along with a number of lower order streams and creeks. All waterways are mapped ecological corridors of significance and have riverine conservation significance that will be addressed through the next stage of environmental investigations.

The area also includes wetlands of ecological significance and mapped wetland protection areas. Development of management and mitigation measures for these wetlands and the broader waterway network would be required for the dam to proceed. Further assessment of potential impacts to groundwater and regional hydrology are required and would be completed during the DBC phase.

Environmental offsets are likely to be required to compensate for vegetation removal to address the removal of any habitats of terrestrial species in the area.

State-protected flora and fauna occur in the surrounding area and could be affected by the dam. Potential matters of state environmental significance (MSES) that could occur downstream of the site include:

- Category B, C, and R regulated vegetation
- regulated vegetation (defined watercourse)
- wildlife habitat (threatened and special least concern animal)
- regulated vegetation (essential habitat).

Threatened fauna species listed under the Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act) may be present in the dam area or downstream. In addition, listed migratory species, including saltwater crocodile (Crocodylus porosus) and the freshwater sawfish, and threatened fauna species may use or occur in or near the inundation area. Irwin's turtle (Elseya irwini) has been recorded as being located in the area and further field studies would be required to confirm its location.

No endangered regional ecosystems or federally listed threatened ecological communities (**TECs**) would be affected by the proposed dam or its inundation area. However, three TECs may occur in the proposed irrigation area along with three nationally important wetlands, which would require assessment before agricultural development could proceed. Potential water quality impacts from this irrigation area would be given particular consideration.

Class A (high-value) agricultural land under the Regional Planning Interests Act 2014 is also located downstream. While most of the proposed agricultural irrigation precinct near Collinsville is in a strategic cropping area (with Class A and Class B agricultural land), changes to the local planning scheme may be required to support irrigation as the area currently supports dryland cattle grazing.

As a result of the above, the development of a new dam and the consequential agricultural expansion within a Great Barrier Reef catchment will require consideration under the EPBC Act.





#### 1.18 Impact Statement & Planning

Full impact assessment and planning would be completed during the DBC phase. This may include the following:

- An environmental impact statement (EIS)
- development approvals for matters identified in the relevant planning schemes as well as MSES including material change of use, operational works and building works
- an environmental authority for a prescribed environmentally relevant activities
- an amendment to the Water Plan (Burdekin Basin) 2007

Option 1 may seek declaration as a coordinated project under the State Development and Public Works Organisation Act 1971, allowing for a more streamlined approvals process. The required approvals are still completed under this process however due to the addition of an agricultural irrigation precinct, a combined approach from the government departments ensures the environmental impacts of this option are fully considered.

Native title over the western portion of the Urannah dam site has been determined in favour of the Birriah People. The Wiri People have lodged a native claim over the eastern portion of the site. The Birriah People also hold native title over the proposed agricultural irrigation precinct and this area contains 3,000 Aboriginal cultural heritage sites or registered places. Potential disruption to Aboriginal cultural heritage places, objects and values in both locations would need to be considered due to the presence of undisturbed vegetation and ephemeral water sources (on the dam site), which are strongly correlated with Aboriginal camping and occupation areas, and the large number of existing heritage sites (within the irrigation precinct).

Initial discussions have been undertaken in relation to the construction of the dam and related agricultural irrigation area with relevant stakeholders as it would require acquisition or lease of the affected land. Urannah Station (on the dam site) is held by the Urannah Properties Association as registered lessees, with the lease being granted by the Indigenous Land Corporation and the proposed irrigation precinct incorporates 23 land parcels. The proponent would continue stakeholder engagement with all interested parties during the DBC phase.







#### **1.19 Economic Assessment**

An economic analysis was used to assess the incremental economic benefits and costs of each shortlisted option and the Base Case to the local and broader economy. The table below summarises the key features of these options.

#### Features of infrastructure options assessed

	Base case	Option		
Asset		Option 1 (FSL RL290)	Option 2 (FSL RL280)	Option 3 (FSL RL255)
Urannah Dam yield	×	150,000 ML	70,000 ML	50,000 ML
Instream distribution to Collinsville	×	✓	V	✓
Pipeline to Peter Faust Dam	×	✓	√	✓
Pipeline to Eungella Dam	×	✓	✓	✓
Moranbah supply	Burdekin to Moranbah duplication	Urannah to Moranbah pipeline	Urannah to Moranbah pipeline	Burdekin to Moranbah duplication
Agricultural irrigation network	×	✓	×	×

The table below presents the results of the cost-benefit analysis (**CBA**) undertaken for these options. The analysis assumes a 30-year operating period. Option 1 achieves the highest BCR of 1.7.

#### Summary of CBA Results (\$ million, discounted)

	Shortlist Option			
CBA Results	Option 1 (FSL RL290)	Option 2 (FSL RL280)	Option 3 (FSL RL255)	
NPV	311.6	-34.5	-264.6	
BCR	1.7	0.9	0.4	

The primary benefits of the Urannah Water Scheme monetised in the CBA include:

- benefits to urban users: increased certainty of long-term water supply to at-risk urban areas, with less requirement for demand management measures (only under Option 1 and 2)
- benefits to agricultural users: increased agricultural production in the region (only under Option 1)
- benefits to industrial and mining users: increased mining expansion and project certainty

Analysis of potential agricultural production assumed crops of cotton, sorghum, small crops, avocados and mangoes could be grown within the proposed agricultural precinct based on identified soil types.

Sensitivity analysis was undertaken to determine the impact of changes in construction costs, demand, price and the assumed discount rate.





#### **1.20** Financial Analysis

Financial assessment demonstrate that all three shortlisted options have the capacity to generate positive FNPVs. The table below presents the FNPV of each option (not adjusted for risk).

#### Features of infrastructure options assessed

		Shortlist Option		
Financial	Base	OPTION 1	OPTION 2	OPTION 3
NPV	case	Large dam, network connections, irrigation infrastructure	Medium dam, network connections	Small dam plus Base Case
Total NPV	70	558	598	457

The table opposite presents the total capital and annual operational costs of the Base Case and all shortlisted options.

#### Summary of project costs for Base Case and shortlisted options

	Construction cost (\$M)	Annual operational cost (\$M/annum)			
BA	BASE CASE				
Burdekin Moranbah Pipeline Duplication (25,000 ML/annum)	\$757	\$27.1			
TOTAL	\$757	\$27.1			
OF	TION 1				
290 FSL CFRD Dam	\$673				
Pipeline Urannah Dam to Peter Faust & Abbot Point (15,000 ML/annum)	\$210	\$3.1			
Pipeline Urannah Dam to Eungella Dam and Moranbah (25,000 ML/annum)	\$382	\$9.7			
Irrigation distribution infrastructure	\$200	\$2.5			
TOTAL	\$1,465	\$15.3			
OPTION 2					
280 FSL RCC Dam	\$492				
Pipeline Urannah Dam to Peter Faust & Abbot Point (15,000 ML/annum)	\$629	\$3.1			
Pipeline Urannah Dam to Eungella Dam and Moranbah (25,000 ML/annum)	\$200	\$9.7			
TOTAL	\$1,221	\$12.8			
OF	PTION 3				
255 FSL CFRD Dam	\$258	\$3.1			
Pipeline Urannah Dam to Peter Faust & Abbot Point (15,000 ML/annum)	\$210	\$2.0			
Pipeline Urannah Dam to Eungella Dam and Moranbah (25,000 ML/annum)	\$22	\$18.4			
Burdekin Moranbah Pipeline Duplication (25,000 ML/annum)	\$757	\$27.1			
TOTAL	\$1,247	\$32.2			





#### **1.21** Recommendations

#### The Urannah Water Scheme PBC recommends the following:

- **1.** Endorsement that Option **1** progress for environment approvals and financial close being:
  - the construction of a large-scale dam to a height of 290 FSL with a yield of 150,000 ML per annum
  - augmentation of supply to the Peter Faust and Eungella Dams to address the urban demand in the Bowen, Proserpine, Collinsville and Whitsundays regions
  - instream distribution through the Bowen/Broken river system to supply industrial use for existing mining operation in the Collinsville area
  - augmentation of supply, through duplication of the existing pipeline, to Moranbah industrial customers
  - provision of an irrigated, agricultural precinct of up to 11,000ha around Collinsville

#### 2. Endorsement that Option 2 progress for further evaluation being:

- construction of a medium-scale Dam to a height of 280 FSL with a yield of 70,000 ML per annum
- augmentation of supply to the Peter Faust and Eungella Dams to increase reliability of water supply to the Bowen, Proserpine, Collinsville and Whitsundays regions
- instream distribution through the Bowen/Broken river system to supply industrial use for existing mining operation in the Collinsville area
- augmentation of supply, through the existing pipeline, to Moranbah industrial customers

- 3. Endorsement that Option 3 not progress to further evaluation via a Detailed Business Case at this time.
- 4. Note that the Urannah Water Scheme aligns with, and contributes to, the strategic objectives, programs and policies of both State and Federal government, namely:
  - deliver greater water security for Northern Australia
  - support the growth of agriculture in the Mackay, Isaac and Whitsunday Region
  - promote regional economic investment and development
  - will promote market engagement under public private partnership arrangements





#### 1.22 Conclusions

Water is a critical resource for the communities of the Mackay, Isaac and Whitsunday Region and their productive mining and agricultural sectors. These sectors contribute greatly to Queensland's economy, regional jobs and the social fabric of many rural and regional towns. Yet investigations show existing unmet and latent demand for water across the region (excluding Mackay) that is restricting economic growth and undermining business confidence to invest.

Western mines, coastal farmers and Whitsunday industrial operators are currently limiting their activities to avoid using their full water allocations as they are concerned water supply might fail at critical moments. Water supply from Eungella and Peter Faust dams used by these mines, farms and operators is unreliable. When dams get low, water supply to users with low priority water allocations ceases in order to preserve supply for high priority users, particularly urban communities.

The Burdekin to Moranbah pipeline, which brings water into western parts of the region from Burdekin Falls Dam, is also operating at capacity. Mines in Collinsville and Moranbah are trading in water at prices of up to \$6,000 per megalitre and optimising water use through re-use and recycling. Current prices place water beyond the reach of agricultural users in many western areas, which is inhibiting the growth of this sector.

Demand modelling suggests additional annual demand for water of up to 136,650 ML consisting of 40,650 ML from industry and mining, 16,000 ML from coastal communities and up to 80,000 ML from agriculture.

Market sounding reveals mining operators and proponents of new resource projects want SunWater to duplicate the pipeline from Gorge Weir to Moranbah with a 209-kilometre pipeline that would supply around 25,000 ML per annum (Base Case). Operators indicated that numerous resource projects would have proceeded when favourable commodity markets returned in recent years had secure access to water been available.

However, the PBC demonstrates that constructing a dam at Urannah, on an elevated site that receives more rainfall than the existing Eungella Dam, could deliver more water to more locations than duplicating the pipeline and much greater social benefits to the region.

As well as delivering water to western mining, Urannah Dam could be used to top up water in Eungella and Peter Faust dams, taking advantage of existing infrastructure to create a comprehensive water grid and provide greater water security for western and coastal communities. Urannah Dam would almost triple the dam capacity of the Mackay, Isaac and Whitsunday Region, delivering almost 80 per cent of the capacity of Burdekin Falls Dam on less than 20 per cent of the land area.

Constructed to its full potential, Urannah Water Scheme could also supply water for a new irrigated agricultural precinct near Collinsville for high-value crops with significant export appeal. Drawing on the experiences of Emerald, a mining town that branched into irrigated agriculture, this could be expected to reinvigorate Collinsville by creating new jobs and broadening the local economic base, with flow-on benefits to the regional economy.

Urannah Water Scheme would become part of the BBWSS and connect via pipeline to the Proserpine WSS. It would also supplement water from the BHWSS, to which it would be connected via the river system.

Around 10,500 hectares of land would be inundated by the dam in a sub-catchment with high conservation value. While property impacts would be minimal, some remnant regional ecosystem vegetation would be submerged, which could affect state and federally protected fauna. Environmental impacts will require greater investigation and careful management, particularly for sensitive areas downstream. It is likely that an EIS and EPBC approval will be required, along with environmental offsets.

While the dam site and irrigation area are either under native title or subject to a native title claim, the Urannah Water Scheme concept is supported by the Traditional Owners. However, potential impacts to Aboriginal cultural heritage needs further assessment.





Preliminary economic analysis shows the full Urannah Water Scheme, which combines the construction of a full-sized dam yielding 150,000 ML/a and supplying an irrigated agricultural precinct of up to 11,000 hectares, is economically viable with an attractive BCR of 1.7 and a capital cost of \$1,465 million. This is the preferred option identified by the PBC.

Construction of a smaller scale dam at Urannah yielding 70,000 ML/a (at a capital cost of \$1,221 million) is the second most viable option examined by the PBC and has a BCR of 0.9. Both options should be examined further through a DBC to inform an investment decision.

Analysis shows that reform measures, strategies to influence demand and capital works to supplement existing water supply systems alone would be insufficient to meet the identified service need.

The PBC represents the completion of the NWIDF-funded feasibility study into the Urannah Dam.



# UTCINNCH WATER SCHEME