bowen collinsville enterprise inc.

DELIVERING LONG TERM ECONOMIC BENEFITS TO THE BOWEN & COLLINSVILLE COMMUNITIES

bowen collinsville enterprise inc.

DELIVERING LONG TERM ECONOMIC BENEFITS TO THE BOWEN & COLLINSVILLE COMMUNITIES

This Strategic Business Case (SBC) has been prepared by Bowen Collinsville Enterprise Group Inc. to provide a summary of the key elements of the proposed Urannah Dam project.

The report brings together a range of data from previous studies and investigations into the Urannah Dam project, reflecting this pre-existing data in the context of current industry needs and development opportunities.

The purpose of this SBC is to establish high level need for a Preliminary Business Case (PBC) with the financial support of Australian Government National Water Infrastructure Development Fund. The further works will be to undertake a detailed feasibility analysis and engineering design scoping study into the Urannah Dam project.

Bowen Collinsville Enterprise Group Inc.

Bowen Collinsville Enterprise (BCE) was established in 1997 to formulate and implement an Economic Development Strategy for Bowen Shire following the loss of 2700 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 3 years and subsequently by Bowen Shire Council. Between 1998 and 2008 BCE employed a full time Economic Development Manager who worked closely with the Community and Local, State and Federal Governments to implement the Economic Development Strategy that was driven by the BCE Board.

In addition to major expansions in Rail and Port Infrastructure other highlights during this period included the establishment of the State Development Area at Abbot Point and the Aquaculture Development Zone based on Bowen Shire. 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.

The amalgamation of Bowen and Whitsunday Shires into Whitsunday Regional Council saw the restructure of regional economic development activities and creation of the Enterprise Whitsundays (EW) in February 2009 to function as the peak regional economic organisation. EW was disbanded in 2013 and Whitsunday Marketing and Development (WMDL) took over this role

BCE continues to operate in an advisory capacity to Whitsunday Regional Council (WRC) and Whitsunday Marketing and Development (WMDL) on strategic and community issues relating to the Bowen and Collinsville communities.

Strengths of BCE as a group:

- BCE is an apolitical Organisation – preparedness to talk government and private sector agencies; groups and individuals; regardless of their political orientation
- Strong community and industry links – board members bring to the table a wide range of industry knowledge, experience and networks within the Bowen and Collinsville communities.
- The BCE Board membership group has a wealth of specialised local knowledge in a wide range of economic development issues.
- Stable membership – many BCE board members have served since the board was originally established in 1997.
- BCE remains an independent Economic Development organisation in that it is not dependent on outside funding sources.
- The BCE Board is determined to remain focused on Economic Development and social infrastructure issues that are important to the Bowen and Collinsville communities.
- The BCE Board members come from a wide range of commercial and professional backgrounds and bring extensive networks and industry knowledge to the table.

BCE continues to operate as a grass roots level 'think-tank' and Economic Development Advisory Group within for the Bowen and Collinsville communities.

Contact Details

For further information in relation to the Urannah Dam project, please contact Bowen Collinsville Enterprise Group Inc.

bowen collinsville enterprise inc.

DELIVERING LONG TERM ECONOMIC BENEFITS TO THE BOWEN & COLLINSVILLE COMMUNITIES

Urannah Dam Strategic Business Case

Document number: BCE_SBC_RevF

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

Preferred citation: **Urannah Dam Strategic Business Case**.

Document History:

Revision number	Description	Date	Reviewer	Approved for issue	
			Name	Position	Name
A	First Draft	17 May 18	Study Author	Project Director	K. Huston
B	Second Draft	5 June 18	Study Author	Project Director	K. Huston
C	Issue for Consultation	13 June 18	Project Director	BCE PCG	P. McLaughlin
D	Issue for Release	25 July 18	Project Director	BCE Board	P. McLaughlin
E	Draft to State Government	26 July 18	BCE PCG	BCE Board	P. McLaughlin
F	Final Issue to State Government	6 August 18	BCE PCG	BCE Board	P. McLaughlin

CONTENTS

1 EXECUTIVE SUMMARY

This Strategic Business Case (SBC) articulates the service need and identifies the opportunities and intended benefits of an additional multi user bulk water conservation project on the Broken River approximately 64km south east of Collinsville and 63km South West of Proserpine.

The opportunities centre on the potential to leverage on significant existing economic infrastructure to grow the economy in the Bowen Collinsville and Whitsunday Regions by providing additional water for agriculture new mine, port and energy developments and also support increasing demand for water from urban and tourism growth particularly around the Whitsunday Region.

The Bowen Broken River Water Supply Scheme comprises three current assets comprising the Eungella Dam, Bowen River Weir and the Gattonvale Off-Stream Storage all operated by the state-owned monopoly, SunWater.

The system currently has some 38,930 mega litres (ML) of entitlements for use of which 16,778 ML (43.1%) is used (QCA Assumption for 2018 Service Plan). Although less than half of the water available is currently used, the available water is held by customers for water security in times of drought.. Previous studies have indicated the Eungella Dam is at its hydrological limit and raising the dam wall would not produce additional yield.

I2015 the Federal Government released the Agricultural Competitiveness White Paper which identified in Priority 2a, the need to build new infrastructure, particularly new water supply sources. The White paper identified the creation of the National Water Infrastructure Development Fund (NWIDF) which allowed $50m to support detailed planning for future water infrastructure decisions. In conjunction to the NWIDF, a White Paper on Development Northern Australia was released in 2015. Our North, Our Future: White Paper on Development Northern Australia sets out the priorities for growth with a specific focus on water infrastructure investment.

In1998, the Bowen Collinsville Enterprise Association (BCE) formed and produced a long-term position of creating new water assets in the region to support long term agricultural and commercial industry growth. Many studies in the region have been conducted by successive governments, but with inadequate vision to realise a joint land improvement and water asset approach.

A specific focus by Government to promote agriculture changes the historical approach to demand assessment in the Bowen Broken River system.

In 2016, the Urannah Dam proposal received funding under the feasibility studies component of the NWIDF with a specific focus on the generation of large scale agriculture for irrigation and security of water to the northern Bowen Basin mining region.

To date, exercises in understanding service need by the State Government rely heavily on traditional market sounding initiatives and historical use forecast modelling.

This study demonstrates that there are large-scale lands that are suitable for new irrigation areas, , within the policy context of promoting agriculture. and demand from new resource (mining) projects

This SBC has identified a service need of:

- Up to 100,000 ML per annum Agricultural Demand / annum based on the development of land suitable for irrigated cropping
- Growth in Mining & Resources Demand through security of supply initiatives not available by the current provider
-

- Potential new demand >30,000 ML per annum of Urban and Tourism Demand

The anticipated benefits are expected at a local, regional and national level. The increase in value of agricultural production in the region because of water security provides a much-needed solution to drought and market risks for the region. Greater product development and diversity with readily available port access makes better use of the surrounding transport infrastructure. Security of water supply for major resource companies to take long term decisions are a crucial benefit to a region that is highly exposed to international commodity price challenges.

In addition the SBC recognises the need to rationalise the regions water supply network to make best use of existing pipelines and make more water available to other regions such as the Galilee Basin.

1.1 Project Description

The proposed Urannah Dam is located in the Mackay Hinterland (36km AMTD) on the Broken River downstream of the junction with Urannah Creek approximately 64km South East of Collinsville and 63km South West of Proserpine. The Urannah Dam site was first investigated in 1963 and again in 1969 by the Snowy Mountains Engineering Company (SMEC) when the site was mapped and investigated by seismic surveys, dozer trenches, percussion and diamond drilling.

The storage capacities previously investigated were 863,000 ML in Stage 1 and the full allocation of 1,500,000 ML in Stage 2. As art of the PBC the optimal size of the dam taking into account financial, environmental and social factors will be assessed.

1.2 Project History

In 1957 initial designs included a gravity fed system of irrigation channels along the left and right banks of the Bowen River from a weir at Mt Sugarloaf (6 km AMTD) on the Broken River to irrigate 30,000 HA in the Birralee, Strathmore, Gattonvale, Myuna and Havilah areas adjacent to Collinsville. Further investigations were undertaken by SMEC in 1977/78 which recommended a two-stage construction of 863,000 ML (Stage 1) and up to a total of 1.5 million ML (Stage 2) which form the basis of the current studies.

A strategic reserve of 150,000 ML/annum was provided for in the 2007 Burdekin Water Resource Plan for the purposes of water related development in the Bowen/Broken system.

1.3 Project Need and Benefits

The location (elevated) and size of the Urannah Dam allows for a deep-water dam with a lower evaporation rate. Typically, the profile of large dams allow a cheaper cost of water (production & reliability) because of availability. The price availability assessment will allow for a revisit of the excess allocations identified by the 2017 State Government Bulk Water Opportunities Statement and the existing assets in the Bowen Broken Scheme area.

The dam location offers the opportunity to supply water to customers that are upstream of the lower Burdekin scheme due to its topography. This includes the provision of hydroelectric power along with water supply to promote land use changes and speed to market. The creation of new bulk water storage will reduce pipeline and pumping costs for coal field customers due to its elevated location and with increased supply, there are four (4) identified resource projects that could be assisted in commencing.

Current resource projects, Byerwen, Jax and Drake mines near Collinsville, have commenced operation and Glencore's Sarum Mine at Collinsville and BMA's Red Hill mine near Moranbah are completing advanced development plans with a total of 11 coal projects waiting to be developed.

There are a further 24 undeveloped mining leases in the northern Bowen Basin within reach of Urannah Dam between Dysart (south of Moranbah) and Collinsville.

Previous costing estimated a production cost of $230 / ML capex for the Urannah Dam which is principle input cost advantage (based on current service level cost of supply for SunWater) to allow project proponents to enter into long term arrangements without the risk profile that the current provider (SunWater) has. It is noted that the SBC does not detail operational costs at this time.

The decrease in foundation customer risk allows this SBC to estimate higher rates of demand, at a desktop level, which are to be confirmed in the market sounding phase of the PBC.

This SBC identifies the demand area, land sizing, owners and strategies for formation of the agricultural demand. Where the SBC cannot satisfy a base case economic model under the Building Queensland Framework, assumptions have been made and noted throughout this report.

1.4 Options to be developed

The purpose of the SBC is to establish the project need and benefits so that a long list of options can be identified and assessed. For works in further stages, large scale capital-intensive projects will need to be included to assess the assumptions of price competitiveness and consumer demand assessments.

There are a range of options for further assessment to address service need which include utilising existing allocations via connection schemes. These options include large construction costs for pipelines and incur large operating expenditure for pumping costs. These options include:

- Burdekin Gorge to Byerwen Mine (110km)
- Price signals to reduce demand from Peter Faust Dam supply to Whitsunday and Bowen urban & horticultural areas
- Moranbah to Lake Vermont Pipeline
- Moranbah to Alpha Pipeline
- Proserpine Dam connections to Abbot Point
- Burdekin Gorge Weir to Upper Broken River irrigation area connections.

Other demand (service need) options that will require further development in the Preliminary Business Case will include works undertaken in the Water for Bowen Study from 2006. This project investigated transfer of water to Bowen from the Burdekin River and included Bowen Growers at 13,950 ML/a, Ports Corp 3,000 ML/a and Bowen Shire Council 3,750 ML/a totalling 20,700 ML/a. This SBC does not include this demand in its summary need.

1.4.1 Other Major Considerations

The Bowen River sub-catchment is considered the highest priority within the Burdekin catchment (and one of the highest priorities along the GBR coast) with regards to remediation and reduction of sediment losses to the Great Barrier Reef.

The construction of the Urannah Dam will alter the hydrological regime of the Bowen River catchment area and ultimately through to the end of Burdekin River, affecting (potentially beneficially) transport of sediment through the system.

In addition to the GBR, the traditional owners of the region and the indigenous land corporation (Urannah Properties Association) have been engaged throughout the SBC development process and will continue to be actively engaged.

2 INTRODUCTION

2.1 Background

In 2015, a working group was formed by Bowen Collinsville Enterprise Association (BCE) to pursue growth opportunities for the region by the creation of a new water storage on the Broken River. Subsequently, the Australian Government made a commitment in the Developing Northern Australia White Paper to provide up to $3 million from the National Water Infrastructure Development Fund (NWIDF) for a 'detailed examination of the economic feasibility of Urannah Dam'. As such, this study is supported by funding from the Australian Government's NWIDF.

BCE entered into a Funding Grant Deed (the Deed) with the State of Queensland to deliver a Strategic Business Case (this document) and a Preliminary Business Case following Building Queensland's Business Case Development Framework[1] (BCDF).

The proposed Urannah Dam has not been through any formal stages of the Queensland Government Project Assurance Framework (PAF) to date but many investigation studies have been completed since the 1950s.

This Strategic Business Case is the first stage of the process as defined by the BCDF and agreed in the Deed. This report will define the project objectives, challenges and undertake early consultation processes to establish project or service need, identification of the intended benefits and conceptualisation of the project to justify further detailed assessment.

2.2 Historical Studies.

Historical studies from 1969, 1976 and 1977 identified the Urannah Dam in a series of investigations at the 22.4M (36km) AMTD site on the Broken River. These studies included detailed geotechnical studies at the site which concludes in a narrow range section and included eight (8) diamond drill holes (313 metres of total drilling) and two trench excavations of 580 metres (in total length). Following each study detailed hydrological estimates were conducted to validate catchment estimates.

A high-level review of historical costs for the construction of Urannah Dam was carried out by GHD[2] based on escalating 2001 cost estimates to 2013 dollars. However, this did not consider potential efficiencies associated with modern engineering construction techniques.

Storage capacities considered by GHD were Stage 1 – 863,000 ML and 1,500,000 ML for Stage 2 in consideration for the Burdekin WRP providing a total allocation of strategic reserve up to the full Stage 2 levels for the development of early feasibility studies. The study recommends optimising the size of Stage 1 using Roller Compacted Concrete (RCC) in place of the earth and rockfill dam previously considered in order to reduce the cost of the required spillway for ease of expansion for Stage 2.

In 2000 the CSIRO published a technical report into Northern rivers and dams[3] which identified opportunities for irrigation development in the upper Burdekin catchment of more than 40,000ha but would be reliant upon new large water infrastructure and / or expansion of the existing infrastructure.

Dam wall designs will be assessed further in the technical studies using modern dam construction technology.

A full list of the previous studies is in Appendix 1 - Previous Studies.

[1] http://buildingqueensland.qld.gov.au/frameworks/
[2] *North & Northwest Queensland sustainable resources feasibility studies – the Dalrymple scheme*, GHD, 2014
[3] Northern rivers and dams: A preliminary assessment of surface water storage potential for northern Australia, CSIRO, 2000

2.3 Project Description

The proposed Urannah Dam site is in the Mackay Bowen region on the Broken River within the Mackay Regional Council. Urannah Dam was first proposed in the 1950s.

Previous studies have identified opportunities to link water use to large scale economic uses. The major fluctuations of resources and agricultural investments with favourable market conditions has made it difficult to justify further water resources development in the region.

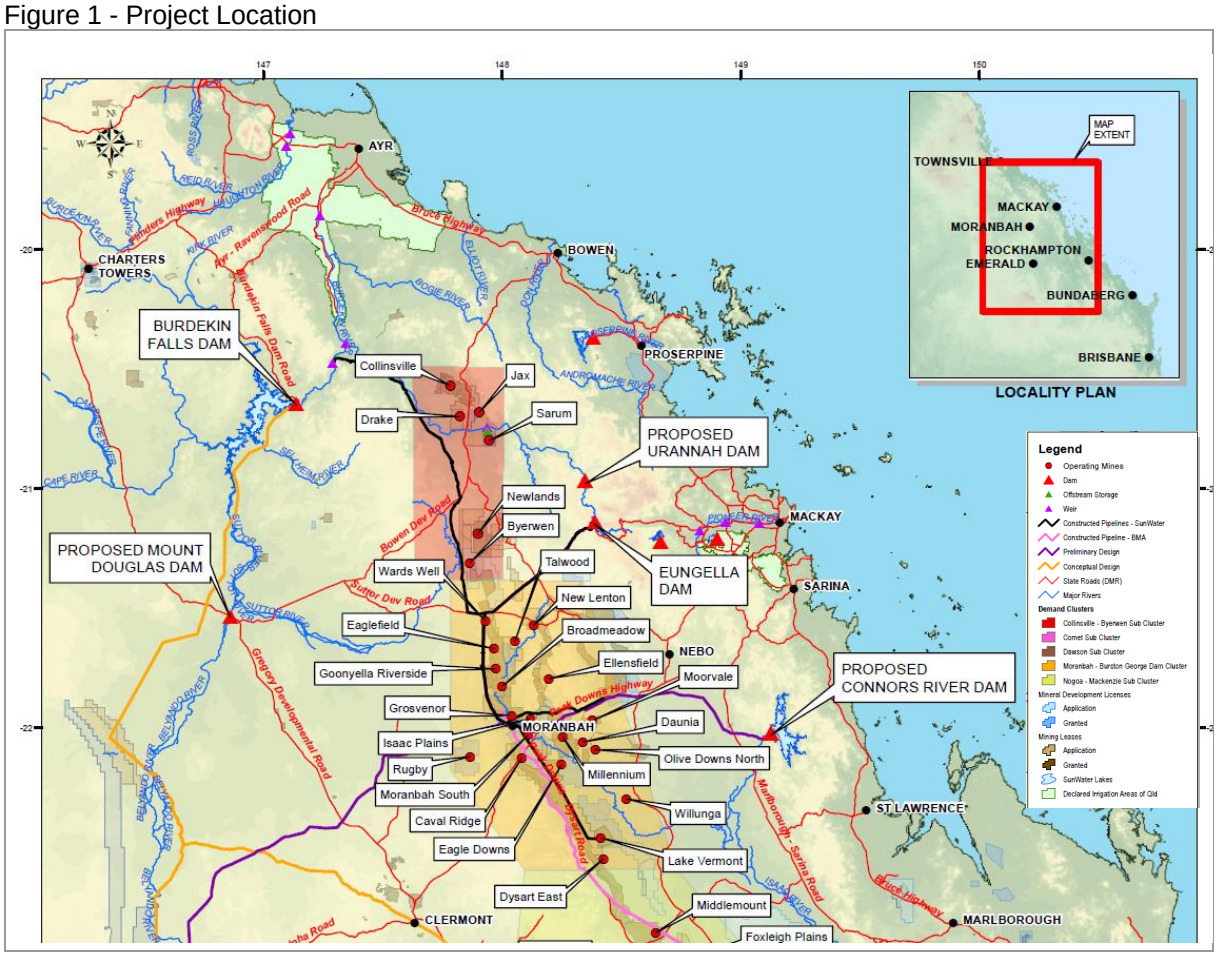
This study looks to capture all previous data and develop a more innovative approach to market opportunities of regional investment to justify a regional scale water source. The project is shown contextually and geographically in Figure 1 - Project Location**Error! Reference source not found.**.

BCE will combine large scale agricultural arbitrage, mining project demand certainty and renewable energy initiatives in studying the dam site to re-examine the merits of this large-scale water source. Other drivers such as the development of the Galilee Basin and the need for water sources that promote agriculture with lessor soil runoff impacts in catchments will support the study scope.

The Urannah Dam location is within the North Bulk Water Supply Region and forms part of the Bowen Broken Water Supply Scheme (BBWSS). The site is in the southern section of the Whitsunday Local Government Area bordering Mackay Regional Council. The demand assessments will take into account the service need of both the Fitzroy (Mackay) and Whitsunday (Upper Burdekin) regions in this SBC.

Urannah Dam is proposed for construction at AMTD 36 km on the Broken River. If constructed to FSL of 278 m (AHD), this would produce 863,000 ML of storage called Stage 1. Historical yield assessments indicate that this storage would generate about 150,000 ML/a of Medium Priority yield while Stage 2 which would raise the wall to create a storage of 1,500,000 ML would yield some 200,000 ML/a which would be close to the hydrologic limit of the catchment..

Figure 1 - Project Location



Previous assessments indicated the economic viability of the dam and confirmed that the dam would have acceptable social impact[4]. These assessments also found that environmental impacts should be manageable but that more work was required to determine the environmental impact of the project.

The dam is ideally located to be the hub for the next phase of development of Bowen and Galilee Basin coalfields and is strategically placed to be utilised to rationalise current water supply arrangements.

The Burdekin Water Resource Plan (2007) reserved 150,000 ML/a for development of water infrastructure in the Bowen/Broken Catchment, which approximates the yield of the proposed Urannah Dam. Provisions for the future development of bulk water assets are in consideration of the Water Resource Plan (WRP)[5].

In September 2014, the Federal Parliamentary Committee inquiring into the development of Northern Australia recommended the Australian Government give priority to the development and funding of proposals for sustainable dam projects.

[4]Connell Wagner, *The Urannah Scheme*, 1996
[5] DNRM, *Report on Additional Water Supply Proposals for the Don River / Euri Creek Basin*, 1997

3 PROJECT CONTEXT

This chapter considers how service need and options will be developed to the strategic objectives of the Queensland Government, Australian Government and relevant local government plans, programs and policies.

3.1 Federal Government

The National Water Initiative Agreement, which commits Queensland to work with the Commonwealth and other states and territories to progress national water reforms, was signed in June 2004. The National Water Infrastructure Development Fund (NWIDF) delivers on the Australian Government commitment to begin the planning necessary to build new dams – to secure the nation's water supplies and deliver strong economic benefits while protecting the environment.

3.2 Australian Infrastructure Plan

The Australian Infrastructure Plan sets out the infrastructure challenges and opportunities Australia faces over the next 15 years and the solutions required to drive productivity growth, maintain and enhance the nation's standard of living and ensure that Australian cities remain world-class. It highlights that infrastructure investment in Northern Australia should enhance our regional productive capacity to take advantage of growing demand for our produce in South-East Asia and China. At the same time, regulatory frameworks and operational arrangements should be aligned with any new infrastructure investments to maximise potential productive capacity.

The Australian Infrastructure Plan notes that successful irrigated agriculture is dependent on producers having access to reliable and secure water resources and that regional water infrastructure that supports irrigated agriculture faces particular challenges because of the increasingly variable climate, growing demand and difference in the ability or willingness to pay. It also notes that the flexibility and autonomy offered by water trading has facilitated the movement of water to higher value uses and increased agricultural production.

The Urannah Project is supported by the policy direction to promote agricultural production and options on meeting the Australia Infrastructure Plan will be provided in the Preliminary Business Case.

3.3 Northern Australia Audit – Infrastructure for a Developing North

The Northern Australia Audit: Infrastructure for a Developing North was published in 2015 and assessed critical economic infrastructure gaps and requirements to meet projected Northern Australia population and economic growth through to 2031.

The Northern Australia Audit found that water availability varies dramatically in Northern Australia and highlighted significant challenges, including limited existing infrastructure, which are likely to affect the development of Northern Australia. It concluded that for prospective agricultural developments there may be a range of potential water supply options, by which case-by-case evaluation is important, including water trading, expansion of existing irrigation areas and planning new dams.

The project will seek to comply with the Northern Australian Audit in considering a range of solutions to access new water supplies that provide economic and social benefits to the Bowen Collinsville and Mackay regions.

3.4 White Paper on Developing Northern Australia

The Our North, Our Future: White Paper on developing Northern Australia was released in June 2015. The White Paper outlines the Australian Government's vision for the future of Northern Australia and identifies actions over the next 20 years to unlock the North's full potential.

The development of the right water infrastructure in the right areas is considered key to realising the vision set out in the White Paper. The White Paper announced the establishment of the NWIDF and committed up to $3 million from the NWIDF to assess the economic feasibility of Urannah Dam, along with other projects. The White Paper also announced the $5 billion Northern Australia Infrastructure Facility, providing concessional finance to encourage private sector investment in northern Australia.

The shortlisted options consider Urannah Dam and other options to address the service need of the opportunity for expansion of irrigated agriculture in the Bowen Collinsville region in Northern Australia. This SBC represents progress towards realising the vision set out in the White Paper by considering the economic feasibility of Urannah Dam and whether it is the right water infrastructure to help unlock the potential of northern Australia.

3.5 Policy Context (Water)

3.5.1 National Water Initiative

The Australian Government and each of the States and Territories are parties to the Intergovernmental Agreement on a National Water Initiative (NWI). The NWI is the national blueprint for water reform and represents a shared commitment by governments to increase the efficiency of Australia's water use, leading to greater certainty for investment and productivity, for rural and urban communities, and for the environment. The NWI has driven reforms for better water management and use through changes to planning frameworks, water access entitlements, water markets, water pricing, water use efficiency and the integrated management of water.

Pricing Principles have been agreed pursuant to the NWI Agreement and include 'Principle 1: Cost recovery for new capital expenditure', – which applies to rural surface and groundwater based systems. For new or replacement assets, Principle 1 generally provides that charges will be set to achieve full cost recovery of capital expenditure (net of transparent deductions/offsets for contributed assets and developer charges and transparent community service obligations) through either:

- a return of capital (depreciation of the Regulated Asset Base (RAB)) and return on capital (generally calculated as rate of return on the depreciated RAB)
- a renewals annuity and a return on capital (calculated as a rate of return on an undepreciated asset base (Optimised Replacement Cost (ORC))
- The options will have considered the NWI Pricing Principles, including the proposed approach to capital investment and lower bound and upper bound pricing.

3.5.2 National Water Infrastructure Development Fund

The objective of the NWIDF is to undertake detailed economic planning to inform water infrastructure investment decisions and expedite the construction of water infrastructure. It aims to help secure the nation's water supplies and deliver regional economic development benefits for Australia by providing access to secure and affordable water to underpin growth in irrigated agriculture, while also protecting our environment. The NWIDF is separated into a feasibility component and a capital component.

3.5.3 Feasibility Component

The NWIDF feasibility component is comprised of $59.5 million to fund feasibility studies into new water infrastructure across Australia, with funding available over four years from 1 July 2015 to 30 June 2019.

The feasibility component aims to help governments and industry make decisions based on evidence about the best sites for new water infrastructure and accelerate the completion of thorough business cases. The feasibility assessments also aim to confirm sufficient demand from users to meet the ongoing costs of water supply, so farmers are not burdened with ongoing operational and maintenance costs they cannot afford over the longer term.

3.5.4 Capital Component

The NWIDF capital component is comprised of $440 million to facilitate the construction of new water infrastructure, with funding available over 8 years from 1 July 2017 to 30 June 2025.

The Australian Government announced $247.5 million in funding commitments during the 2016 Federal Election. An Expression of Interest (EOI) process was conducted and allocated the remaining $192.5 million, with $40 million available for infrastructure located in Northern Australia.

The EOI Guidelines exclude some activities from receiving funding, including dam safety upgrades and water infrastructure primarily for urban and potable use.

It is considered the shortlisted options align with the objectives of the NWIDF to undertake detailed economic planning to inform water infrastructure investment decisions and stimulate regional economic development benefits.

At this time, it is expected that further allocations to the Capital Component will be made. If the Urannah Dam project proceeds and the fund is extended, the option may be to seek funding consideration from the Australian Government for a portion of the capital component of the NWIDF, subject to meeting the relevant conditions.

3.5.5 National Water Infrastructure Loan Facility (NWILF)

The $2 billion NWILF provides State and Territory governments with concessional loans to co-fund the construction of water infrastructure.

The NWILF is designed to assist State and Territory governments to co-invest in vital water infrastructure. Funding aims to accelerate the construction of major water infrastructure projects such as dams, weirs, pipelines and managed aquifer recharge projects to provide affordable and secure water supplies to support the growth of regional economies and communities across Australia.

The NWILF Investment Guidelines set out the investment priorities for the loan facility which closely align with the eligibility criteria for the NWIDF: at least a 51 per cent funding commitment approved by the State; and preference is given to water storage infrastructure, including the construction of dams and weirs that deliver broad public benefits, including through increasing regional water availability and security for water users.

3.5.6 Reef 2050 Plan

The Reef 2050 Plan was released by the Australian and Queensland Governments in March 2015. The plan is the overarching framework for protecting and managing the Great Barrier Reef until 2050 and outlines management measures for the next 35 years to ensure the outstanding universal value of the Reef is preserved now and for generations to come.

The potential impact of the options for the project will be assessed against the objectives of the Reef 2050 Plan.

3.6 Queensland Government

3.6.1 State Infrastructure Plan

The SIP outlines the strategic direction for the planning, investment and delivery of infrastructure in Queensland. The SIP identifies what the government ultimately wants from its infrastructure and how this can best be achieved and is designed to provide confidence and certainty to business, industry and the community.

The SIP outlines the following outcomes the Queensland Government is seeking to achieve in relation to investment in the 'water' asset class:

- water supply infrastructure is in place or in train where there is a sound business case and water resources are available
- appropriate solutions, including demand management, are evaluated and implemented after the water needs of local government have been assessed in partnership with the state
- greater use of recycled water has been encouraged by state policies, where it is fit-for-purpose and economically viable
- water demand and the effects of stormwater and sewerage discharge on the environment has been minimised, the effects of flooding mitigated and reuse of water maximised through urban design
- State dams are safe during extreme climate events
- water is regarded as a valuable finite resource and the impact on availability and cost of water use behaviours is recognised by Queenslanders
- the water management and trading framework maximises the efficient use of water and water infrastructure.

The SIP also sets out an approach to options assessment and prioritising further infrastructure projects.

3.6.2 Queensland Bulk Water Opportunities Statement

In July 2017, the former Department of Energy and Water Supply (now DNRME) published the Queensland Bulk Water Opportunities Statement (QBWOS). The QBWOS established a framework of new proposals for water storage to be considered and conducted a high level audit of water supply and availability (allocated water, uncommitted, committed and used / unused water).

The objectives of the QBWOS for bulk water supply are:

1. Safety & Reliability of dams and urban water supplies
2. Use existing water resources more efficiently
3. Support infrastructure development that provides a commercial return to bulk water providers
4. Consider projects that will provide regional economic benefits.

3.6.3 Central Queensland Regional Water Supply Strategy 2006

The resource operations plan (ROP) for the Fitzroy Basin, released in January 2004, acknowledged that the final determination of the quantities of unallocated water available for release in different catchments would be subject to the completion of a WRP amendment to include overland flow water and a Central

Queensland Regional Water Supply Study. Development of the Central Queensland Regional Water Supply Strategy was initiated through the Central Queensland Regional Water Supply Study.

Primary drivers for the study included:

- urban and industrial growth around the Capricorn and Curtis coasts
- mining and associated urban growth in the Bowen Basin and northern Surat coalfields
- performance of existing supply schemes in combination with dry conditions in recent years
- a call by local government to chart a cooperative approach towards the development of a long-term strategy for meeting the water needs of the region.

Key water infrastructure covered by the Central Queensland Regional Water Supply Strategy included potential projects and options including:

- raising Eden Bann Weir in the Fitzroy and Livingstone Shires
- constructing Rookwood Weir in the Fitzroy Shire
- developing the Connors River Dam in the Broadsound Shire
- undertaking design work on, and construction of, the Nathan Dam in the Taroom Shire (subject to obtaining Commonwealth approval under the Environmental Protection and Biodiversity Conservation Act 1999)
- pipelines to connect the new Connors River Dam with Broadsound and possibly Nebo and Belyando Shires
- pipelines to connect Rockhampton to Gladstone
- a pipeline for the Capricorn Coast connecting Rockhampton to Yeppoon
- a pipeline from the Burdekin River to Moranbah with potential other extensions.

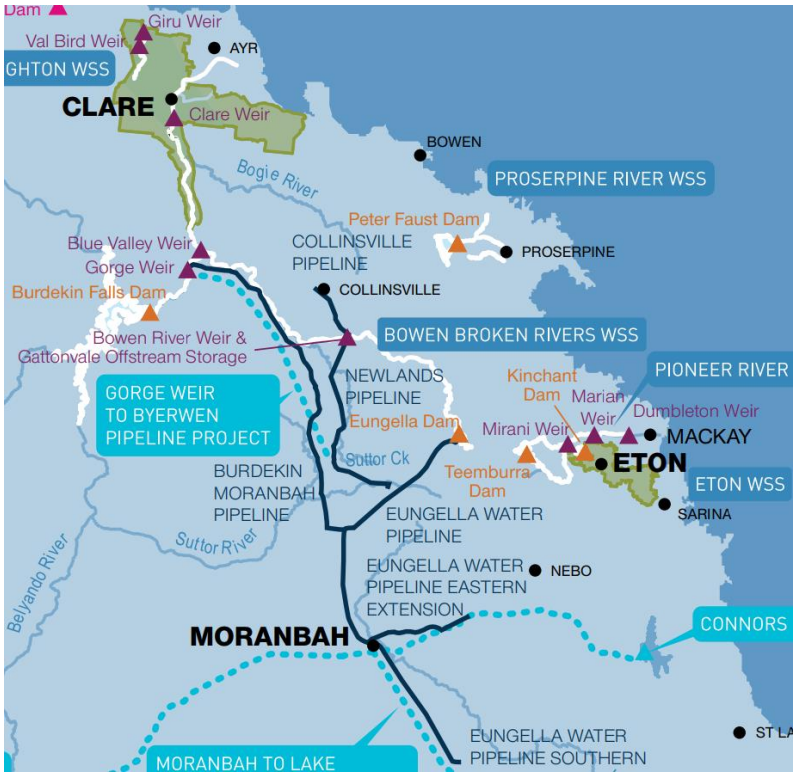
At this time, some projects have been progressed since the Strategy was released.

3.6.4 SunWater

SunWater is responsible for Queensland's regional network of bulk water supply infrastructure outside the South East Queensland area. SunWater' infrastructure supports around 5,000 customers across the mining, power generation, industrial, local government and irrigated agriculture sectors.

Within the SunWater network, there are currently a number of areas throughout Queensland which have unallocated supplemented water (i.e. available for purchase). In particular, Paradise Dam (constructed in 2005) in the Bundaberg Water Supply Scheme has underutilised capacity and uptake of water usage has not reached anticipated levels.

Figure 2 – SunWater Operations & Schemes



3.7 Agriculture

3.7.1 Queensland Agricultural Land Audit

The Queensland Agricultural Land Audit was released in May 2013. The Queensland Agriculture Land Audit identifies land important to current and future agricultural production and the constraints to development; and helps to guide investment in the agricultural sector and inform decision making to ensure the best use of our agricultural land in the future.

The subsequent PBC will detail the impact of the audit and will conduct a detailed study on the Collinsville Agricultural precinct as defined in the 1996 Hyder Soils Report.

3.8 Urannah Dam Policy Context

The QBWOS, released in July 2017, outlined key principles for the State of Queensland to consider in new bulk water assets and a guide towards proponents seeking to establish new storage.

The objectives are serviced from the common issues relating to the development of new dams, new water harvesting storages and augmentation (raising) of existing storages. Foremost is the funding of such projects for development. To enable these types of 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.

For the development of bulk storage assets by the Queensland Government (SunWater is the default proponent in this catchment), the current levels of State debt hinder the ability for new assets to be assessed as a long-term community benefit.

It should be noted that the SunWater quoted headworks costs for new opportunities are only relevant if all allocation can be sold. Under this approach if the projects are not 100% committed, either the cost per ML would need to increase, or options should be investigated as to the viability of a smaller storage. Under a changing operating model of third party utilities in Queensland (where there is no current third-party utility model regulation) the Urannah project could be operated outside of Sunwater.

Alternatively, staged construction is used for options assessment but components would need to be oversized to accommodate the ultimate system demands. While foundation customers of the initial stage of development may not need this additional capacity, and should not be obligated to pay the additional capital costs, the source of any funds over and above the minimum must be considered.

The Government had previously been able to invest in these types of projects, but now requires all developments to be independently funded (due to the change in government and its policy on privatisation). Experience to date has indicated that private investment in provisioning for potential future demands is limited without links to the land uplift (commonly called value capture). This is a key consideration to the viability of a Urannah proposal.

A change of policy would be required, allowing the Government to essentially become involved as a foundation customer to fund the portion of works required for future demands and allow such developments to proceed with the view to supplying the ultimate needs of the Bowen and Galilee Basin coal mining developments.

This policy framework allows for assessment of third parties, such as the Urannah Dam, to be assessed with broader considerations to the level of foundation customers required for a feasible project. Further, the agricultural focus of the Federal government allows for deeper consideration and weighting of the agricultural impact for the regional economy.

For most of these options, approvals required for development are yet to be achieved. These approvals would include all those clearances, licences, permits and exemptions required for the environmental, Cultural Heritage and Native Title, infrastructure development and land tenure aspects of the project.

The development of any of the options to be explored in the Preliminary Business Case would require review and confirmation of the yield modelling and investigation of impacts on downstream yields to ensure the requirements of the catchment WRPs are upheld.

The WRPs and ROPs have been developed over the past decade. In general, ROP requirements have been refined since their implementation. The rules regarding allocations are accepted by stakeholders as underpinning the reliability of the current water allocations and, generally speaking, do not impede scheme operation. As such, there are no areas that have been identified in these plans as having the potential to significantly better utilise current allocations or make more water available from the schemes.

Within the Burdekin Basin and Fitzroy Basin ROPs, there are some restrictions on the transfer of water between zones. If water allocations were to be realised through the implementation of water efficiency savings, the flexibility may need to be present within the ROP water trading rules to allow allocations to be transferred out of the channel systems and into the river or headworks (depending on from where the demand is to be met).

This allows the SBC to note that scope in the PBC for the ability for water demand outside of the Burdekin Basin ROP and include Mackay & Moranbah needs assessment.

There may need to be some review or change of water trading rules to allow for additional flexibility for water trading within a scheme. Additional allocation made available through scheme efficiency savings may be optimised through the relaxation of water trading rules within ROPs to allow delivery to external (cluster) demands.

3.9 Policy Considerations of Private Proponents in Water

This SBC is produced in accordance with the Building Queensland frameworks for business cases. Whilst the framework is best practice it should be noted that the traditional approach to development of business cases is heavily reliant on assessments conducted by the monopoly provider, SunWater.

SunWater by its statutory role, must preserve tax payer's funds and hold a low tolerance of risk. SunWater has over 5000 customers. That said, the company has only recently moved to advance corporate customers (which currently sit at 11%) to be more customer centric. This change in strategy has related to the policy drive of the National Water Initiative to seek independent pricing (economic regulator) that furthers most of the recommendations made by the Queensland Competition Authority (QCA).

SunWater has faced significant challenges in bringing new bulk assets to market due to its historical customer approach primarily a limited tolerance for volume risk. For this SBC to address these matters outside of SunWater's internal data, the Service Need chapter has made assumptions in meeting the Building Queensland Framework but clearly notes that further work in developing a base case must be produced in the Preliminary Business Case Phase.

This SBC is a privately led base case developed outside the traditional SunWater approach therefore the price cap and capacity to pay modifiers can be changed in agricultural demand assessments. The service demand that will be provided during the PBC will be outside of the Network Service Plans. This is due to the promotion of the Federal government's agricultural approach which promotes increased economic development activity and a degree of rural gentrification.

This study notes that the current State Government is not supportive of this approach and therefore support by the State is expected to be low in considering this SBC.

The major differences in this approach is the treatment of risk in consideration of potential customers. The QCA notes SunWater's risks are:

- Short Term Volume Risk
- Long Term Volume Risk (Planning & Infrastructure)
- Market Cost Risks
- Risk of Government Imposts

Whilst the movement of modern water (irrigation) is to ensure modernisation of investments to reach full potential, customer engagement beyond the scope of the risks above is critical to ensuring a whole of life approach (and the economy) of the asset is taken. This will include modelling and measuring water budgets, technologies to reduce infrastructure transport costs and provide flexibility, on-farm change management, early planning processes for soil management and crop financing. These approaches sit apart of the monopoly's provision of service and networks plans in the development of the Service Need.

4 SERVICE NEED

4.1 Industrial & Mining Demand

There are currently twenty-four (24) underdeveloped mining leases in the northern Bowen Basin between Dysart and Collinsville. Current resource projects such as Byerwen, Jax and Drake mines near Collinsville have recently commenced operation. Glencore's Sarum Mine at Collinsville and BMA's Red Hill mine near Moranbah are currently completing advanced development plans with a total of 11 coal projects waiting to be developed. Desktop assessments of the forward demand indicate a gradual increase of the long-term average of 16,000ML/a of up to 35,000ML/a. These assessments, based on anecdotal discussions with users in the formation of the SBC, will be confirmed during the next phase.

It is known that the Collinsville Power Station and some mines in the area have closed down from 2013 onwards, however recent approvals and improving commodity prices have seen recommissioning of 4 mines in the first half of 2018. Existing re-allocations currently held by companies are subject to trading changes and will be assessed throughout the study of Urannah.

The now decommissioned Collinsville Power Station site has been identified as the preferred location for the development of a new Base Load Power Station in North Queensland should it be required.

The expansion of the port at Abbot Point is proposed to cater for Coal Mining Developments in the Bowen and Galilee Basins. The Whitsunday Regional Water Supply Security Assessment states there is a possibility that some High Priority water may be requested from within the Proserpine River WSS should the Abbot Point Port expansion proceed.

4.2 Agricultural Demand

The Collinsville Irrigation Soil Survey (Hyder 1997) prepared for the Department of Natural Resources identified a total of 40,790ha suitable for cropping forms and a further 3,530ha for marginal cropping with restricted irrigation methods. The irrigation district was defined to be 5km either side of the Bowen River for the 100 km reach from the Broken River junction of the Burdekin River to the George Weir. Initial assessments are based on loam soil assumptions with average depths of 1.4 to 2.5m allowing most crops to grow.

The Hyder study assessed the suitability of soils in the study area for growing the following crops:

- Sugar cane
- Cotton
- Cereals
- Peanuts
- Small crops
- Tree crops and vines requiring free drainage
- Tree crops and vines tolerant of poor drainage
- Lucerne or grass for hay production

The study determined that approximately:

- 8,310 ha were suitable for all crops
- 3,840 ha were suitable for all crops except tree crops needing free drainage

- 11,320 ha were suitable for sugar cane, cotton, cereals, small crops, hay and tree crops tolerant to poor drainage
- 2,290 ha were suitable for sugar cane, cotton, cereals, hay and tree crops tolerant to poor drainage
- 7,170 ha were suitable for cereals, hay and tree crops tolerant to poor drainage
- 7,860 ha were suitable for sugar cane only

In summary, approximately 8,300 ha is suitable for all crops and as much as 40,000 ha is suitable for some form of irrigated cropping.

Since the 1990's we have witnessed the emergence of strong demand both domestic and internationally for a wide variety of tree crops including Avocado, Macadamia Nut, Mandarins and Mango and the returns and potential markets for these crops will be assessed for the purposes of the PBS as well as other emergent high value crops.

At this stage of assessments, it is assumed that crop demand will range from 6ML/ha/a to 12ML/ha/a with a perennial crop area of 0% to 30%. During the Preliminary Business Case further studies will be conducted to assess higher perennial rates should that prove necessary.

4.3 Tourism and Urban Demand

The Peter Faust Dam at Proserpine is 96% allocated. The Whitsunday Regional Water Supply Security Assessment and the Queensland Bulk Water Opportunities Statement confirms Whitsunday Regional Council holds water allocations that should be sufficient to meet projected water demand for the Whitsunday and Bowen communities to the mid 2020's and that council will need to consider additional allocations and measures to improve security.

4.4 Network Rationalisation

In addition to the demand for new water to promote regional growth thre is also an opportunity to rationalise the water distribution network given the proximity of Urannah Dam to both existing and future mines in the region. Providing water from Urannah to supplement towns and mines in the Northern Bowen Basin could help reduce the cost of pumping water to existing customers, make water available for other parts including the Galilee Basin and allow the retirement of pipelines which may be approaching the end of their economic life. These matters will be investigated further in the development of the PBC.

4.5 Current Situation.

The catchment area for service need is defined as the Bowen Broken Water Supply Scheme[6] area (BBWSS) comprising Eungella Dam, Bowen River Weir, Gattonvale Off-Stream Storage as shown in Figure 1 - Project Location and includes the Urannah Dam location on the Broken River.

The BBWSS area is defined by SunWater under its Network Service Plans as part of its statutory requirements to the State of Queensland (Queensland Competition Authority).

The region has service demands in the coal industry, agricultural and community (urban) needs. This SBC identifies a range of baseline assessments by SunWater in the broader Bowen and Galilee Basin Infrastructure Frameworks and the Central Resource Supply Chain reports conducted by the Department of State Development.

The CSIRO Northern rivers and dams report[7] identified, on regional scale survey data (1:250,000), over 100,000 ha of land suitable for irrigated agriculture noting that Urannah could reliably irrigate approximately 10,000 to 15,000 ha and provide for multi-purpose uses.

4.6 Bowen Broken Water Supply Scheme (BBWSS)

The BBWSS is comprised of Eungella Dam, Bowen River Weir, Gattonvale Off-Stream Storage and the following:

- The part of the Bowen River from its confluence with the Broken River (AMTD 115.5 km) downstream to Node 12 (AMTD 5.5 km)
- The part of the Broken River from and including the impounded area of Eungella Dam (AMTD 71.8 km) downstream to its confluence with the Bowen River (AMTD 15.5 km).

The BBWSS is broken into five (5) sub zones from A through E and the Urannah Dam is situated in Zone D.

While the BBWSS supplies some MP allocations for agriculture, the primary use of water from this scheme is mining. High priority allocations are distributed by a number of pipelines (including the Eungella Water Pipeline, BMA Eungella Pipeline, Collinsville Pipeline and Newlands Pipeline) to a number of mines and the urban communities of Collinsville, Glenden and Moranbah.

The 2015 SunWater assessment of demand in the area noted that

Urannah Dam was proposed for construction at AMTD 36 km on the Broken River. If constructed to the FSL of 278 m Australian Height Datum, this would produce 863,000 ML of storage. Yield assessments provided by DEWS indicate that this storage would generate about 133,000 ML/a of HP yield (>95% annual reliability). At an estimated construction cost of $207.7 M (indexed to 2013), this equates to an approximate cost of $195/ML/a (HP).

The bulk water assets in the BBWSS are:

- Eungella Dam is situated on the Broken River, approximately 40 km west of the township of Eungella and 133 km west of Mackay
- Bowen River Weir is located on the Bowen River about 88 km downstream from Eungella Dam. The weir was constructed to capture flows from the Bowen and Broken Rivers as well as releases from Eungella Dam

[6] Defined by SunWater in 2015 Service Demand Review
[7] Northern rivers and dams: A preliminary assessment of surface water storage potential for northern Australia, CSIRO, 2000

- The Gattonvale Offstream Storage is located upstream of the Bowen River Weir. Its purpose is to augment the Bowen River Weir storage. The Gattonvale Offstream Storage incorporates a river pump station. The Resource Operations Plan (ROP) specifies that pumping may start when the flow in the Bowen River exceeds 1,037 ML/day at the Myuna Gauging Station, but must stop when it drops to 750 ML/day at the Bowen River Weir. The pump station has a nominal capacity of 250 ML/day, but this increases as the river level rises.

The challenge in development of the service need statement for Urannah is the project location between existing clusters of demand and the proximity to the Fitzroy basin as shown in Figure 3 - Supply Study Area . The project as determined to assess a broader area of demand as to examine the options assessment in further stages. This will allow more accurate transportation costs to be benchmarked to the SunWater levels of service. It is proposed to examine these options during the Preliminary Business Case in the development of the Base Case due to the water supply balance works that need to be assessed.

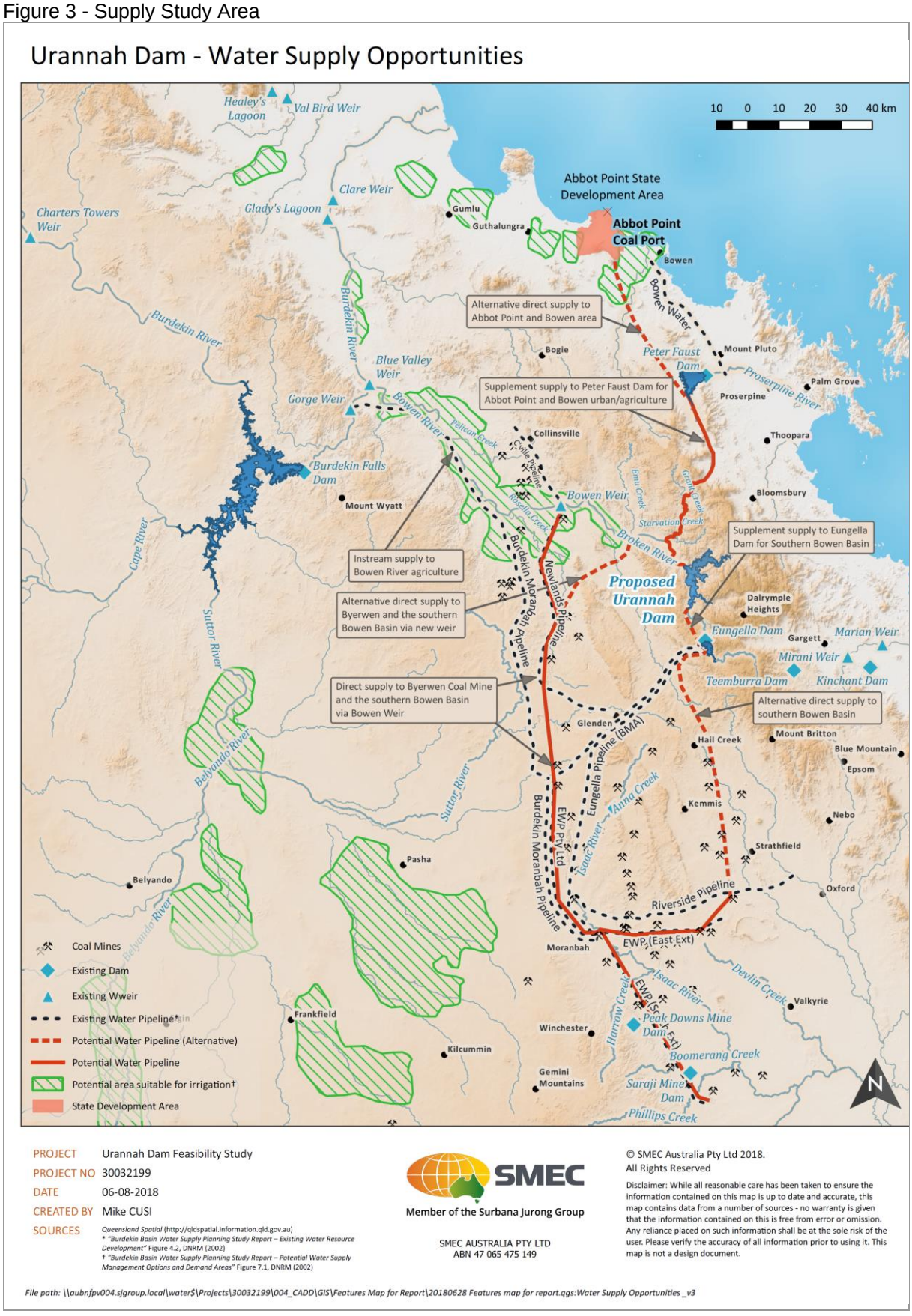
4.6.1 Bowen Broken River Cluster

At 2018, the BBWSS had a total of 51 customers, 38 of whom take water for non-irrigation use from pipelines supplied in the scheme. As shown in Table 1 below, the scheme allocation comprises 5,676 ML of medium priority and 33,254 ML of High Priority. There is a reservice volume of 8,744 ML in the Bowen River sub-catchment and the strategic reservice of 150,000 ML (the subject of this study).

Table 1 - BBWSS Customers

BBWS Cluster	Customers	Water Entitlement (ML)	High Water Priority (ML)	High-A1 Water Priority (ML)	High-A2 Water Priority (ML)	Medium Water Priority (ML)
Industrial	≈ 38	30,299	0	9,090	21,209	0
Irrigation		5,676	0	0	0	5,676
Urban		1,785	0	1,785	0	0
Other		290	0	108	182	0
SunWater		880	0	666	214	0
Total	**51**	**38,930**	**0**	**11,649**	**21,605**	**5,676**
Revenue	**2016 Actual**	**$5,854,000**				

Figure 3 - Supply Study Area



PROJECT	Urannah Dam Feasibility Study
PROJECT NO	30032199
DATE	06-08-2018
CREATED BY	Mike CUSI
SOURCES	*Queensland Spatial* (http://qldspatial.information.qld.gov.au) * *"Burdekin Basin Water Supply Planning Study Report – Existing Water Resource Development"* Figure 4.2, DNRM (2002) † *"Burdekin Basin Water Supply Planning Study Report – Potential Water Supply Management Options and Demand Areas"* Figure 7.1, DNRM (2002)

SMEC
Member of the Surbana Jurong Group

SMEC AUSTRALIA PTY LTD
ABN 47 065 475 149

File path: \\aubnfpv004.sjgroup.local\water$\Projects\30032199\004_CADD\GIS\Features Map for Report\20180628 Features map for report.qgs:Water Supply Opportunities _v3

4.7 Existing Allocation

At 2018, SunWater advised the BBWSS has a total of 51 customers, 38 of whom take water for non-irrigation use from pipelines supplied from the scheme. The scheme allocation comprises 5,676 ML of MP Water Access Entitlement (WAE) and 33,254 ML of HP WAE as confirmed by the data available on the DNRME Water Trading Allocations website.

A SunWater reserve volume of 8,744 ML is held in sub-catchment area C (Bowen River), and there is also a strategic reserve for infrastructure in the Bowen and Broken sub-catchments of 150,000 ML. The WAE detailed below in Table 2 - BBWSS Water Allocations includes the yield of Eungella Dam and the Gattonvale Off-Stream Storage.

The BBWSS Network Service Plan identified that during the period 2003-2010, total water use from all sectors was 41% of the WAE. For irrigation, water use averaged 11% of WAE over the same period, showing that the majority of allocations are delivered to industrial (mining) uses.

Table 2 - BBWSS Water Allocations summarises the available water allocations and deliveries for the BBWSS over the past five years as sourced from SunWater Annual Reports.

Table 2 - BBWSS Water Allocations

Water Year	Water Entitlements (ML)	Water Available (ML)	Water Deliveries (ML)	Announced Allocation (HP/MP)
2008-09	38,092	38,204	16,551	100% / 100%
2009-10	38,930	47,657	18,065	100% / 100%
2010-11	38,930	38,930	10,914	100% / 100%
2011-12	38,930	38,930	13,748	100% / 100%
2012-13	38,930	38,581	15,554	100% / 100%

The Service Demand and entitlements for 2013 – 2017 will be updated in the technical studies.

The Eungella Water Pipeline Pty Ltd (a fully owned subsidiary company of SunWater) holds 5,793 ML of HP allocation. This volume can be delivered via the Eungella Water Pipeline (EWP) to Moranbah. Alternatively, it may be possible for the water to be released from the dam into the Bowen River, but a significant volume is likely to be lost through in-stream losses.

5 STAKEHOLDERS

Communications and consultation is critical to the success of a Project. Engaging and communicating with the right people at the right time informs a considered planning process, as well as linking stakeholders and consumers at all levels of to the aspirations, requirements, and benefits of the Project.

This Communication and Consultation Plan is the single reference point for stakeholder communication and consultation activity and outlines a best practice approach to managing communications for the for the development of this Strategic Business Case and the next phase being the Preliminary Business Case.

5.1 Objectives

The overarching objectives of the Communication and Consultation Plan are to:

- set out the key principles for project communication and consultation activities
- set out a clear governance framework for managing project consultation and communication
- clearly articulate the timeframes, processes and milestones for the planning phase
- identify and engage with key stakeholders throughout the planning phase regarding the rationale, impact, benefits and outcomes of the project
- encourage proactive and effective communication and feedback from stakeholders (including but not limited to Department of Natural Resources, Mines & Energy, Building Queensland, Queensland Treasury, Department of State Development, Manufacturing, Infrastructure & Planning, Local Government and Planning, Department of Premier and Cabinet, and other key stakeholders).

These objectives apply to the development of the Strategic and the Preliminary Business Case.

5.2 Principles

The following overarching principles will guide communication and consultation:

- Proactive stakeholder engagement. Identify and engage stakeholders from the outset of the Project to ensure everyone is informed throughout the planning process.
- Proactive communications. Direct contact with targeted stakeholders to build trusted relationships prior to and as planning continues.
- Relevant information. Information should be current and accessible to all stakeholders as and when required in accordance with the scheduled and agreed communication delivery dates.
- Collaboration. Encourage collaboration with key stakeholders to ensure a unified approach to the Project and its objectives.

These are shown in Table 3 - Stakeholder Principles.

Table 3 - Stakeholder Principles

Name	Description
Proactive	• Implement a proactive communication and consultation approach, set clear milestones and meet them.
Explain the rationale	• Continue to clearly explain the rationale for the dam focusing on the tangible benefits of what is means for local agricultural and mining users e.g. increasing agricultural output in the region.
Evidence based	• Support the communications messages with evidence, to back up what we say.
Right timing	• Give careful consideration to the timing of communications and consultations. This will be critical to maintain focus and effort on achieving the objectives and timeframes for the Strategic & Preliminary Business Case.
Manage Expectations	• It is critical to manage expectations when engaging about the Urannah Dam, and in particular scope and key parameters. The potential for a new storage in the region has to be an integrated approach and not a market led approach as SunWater has regional supply but not engaged customers. Further, the owners of the land are an Indigenous land Corporation that will require to be engaged and the understanding of how the project can sit outside of land ownership if it proceeds (although this is not a preferred outcome). • Clearly articulate with stakeholders key timeframes for consultation, the scope for feedback, and how we will close the loop with them.
Integration	• Integrate the endorsed communication and community engagement frameworks of DNRME / BCE into the communications processes.
Executive Engagement	• Adopt a proactive approach for interface with BCE / DNRME to ensure understanding and commitment to the key messages and the objectives of the Plan.
Early Engagement	• Develop the communications strategy early in the Preliminary Business Case process in collaboration with DNRME
Appropriate	• Use simple and direct messaging. Minimise the use of unnecessary information.
Personalised	• Use language which is personalised and meaningful for stakeholders.
Branding	• Integrate BCE philosophy into the Plan and key messaging, and develop a brand which links this regional approach to economic infrastructure for Water and what it can do for communities.
Transparent	• Keep a schedule of communication and consultation activities for transparency.

The following information in Table 4 outlines the levels of participation for engagement with various stakeholders and the methods of engagement that will be used.

Table 4 - Stakeholder Level of Participation & Methods

Tools Methods		Level of Engagement		
Engagement and Communication		**Inform**	**Consult**	**Involve**
Written Correspondence	A	✓	✓	✓
Fact Sheets	B	✓	✓	✓
Notice in Paper	C	✓	✓	✓
Media Release	D	✓	✓	✓
Social Media	E	✓	✓	✓
Website (BCE)	F	✓	✓	✓
Drop in Session (Public)	G	✓	✓	✓
Feedback Forms	H	✓	✓	✓
Personal Contact	I		✓	✓
In Person Meeting	J		✓	✓
Workshop Session	K			✓

The following Table 5 - Key Stakeholders outlines the level of engagement that the Project Manager, Communications Manager and BCE will undertake.

Table 5 - Key Stakeholders

Stakeholder Group	Interest	Level	Method
Department of Agriculture & Water	Supporting water infrastructure that is in the national interest that delivers economic and social benefits to the public.	Inform	A, I, J
Great Barrier Reef Marine Park Authority	Reef Protection & Environment	Inform	A, I, J
Regional Development Australia	Regional Economic Development	Inform	A,G
Qld DNRME	Administration and Approval of the NWIDF Grant. Mandated Consultation with State and Federal Agencies. Water Planning, Resources, Allocations, Reef Planning.	Involve	A, B,C,D G
Qld Ag & Fisheries	Productivity in Agriculture and Growth in Food Markets, Biofuels	Consult	A
Qld Environment & Heritage	Environmental Impacts & Great Barrier Reef	Consult	A, I, J
Department of State Development, Manufacturing, Infrastructure & Planning	State Development, Infrastructure & Planning.	Consult	A, I , J
State Members	Development opportunities,	Inform	A,G
Local Councils	Growth and in local economy, environmental protection	Involve	A,G-K
SunWater	Operator, catchment management		A,G-K
QCoal & Landholders	Key Customers		A,G-K
Federal Members	Key community leaders, public policy		A, I, J
State Members	Key community leaders, public policy		A, I, J
Mineral Council of Australia	Customers Advocate		A, I, J
Mackay Conservation Group	Environmental Advocate		A, I, J
Media (Mackay Mercury)	Public Interest		A, I, J
Queensland Resource's Council	Customers Advocate		A,G, K
Bowen Coal Mines	Customers		A,G-K
Galilee Coal Miners	Customers		A,G-K
Bowen Farmers	Customers		A,G-K
Agforce	Integrated Agriculture		A,G-K
GrowCom	Integrated Agriculture		A,G-K
Urannah Properties Association	Leasehold land holders of the subject property.		A, I, J, K
Birri / Wirri Traditional Owners	Claimants of the traditional owner rights to the subject area.		A,G
Bowen – Burdekin LMAC	Marine Advisory Committee for the catchment area.		A,G-K

It is envisaged that the stakeholders will be engaged once the Strategic Business Case has been completed and during the development of the Preliminary Business Case.

6 BENEFITS SOUGHT

6.1 Anticipated Benefits

It is anticipated that addressing the service need may provide the following benefits:

Table 6 - Anticipated Benefits from Addressing the Service Need

Benefit-related project outcome	Benefit description	Benefit type	Benefit unit of measure
• Increase in agricultural production	• The extent to which producers improve land activities to increase productivity through water certainty	• Quantitative Non-Financial	• ML of increased use as a portion of nominal entitlements
	• The additional Gross Value Product (GVP) of regional agricultural activities (2015 baseline) related to intervention	• Quantitative Financial	• Dollars ($)
• Increase in regional employment from enhanced agricultural productivity	• The number of direct additional agricultural and mining jobs created	• Quantitative Non-Financial	• FTEs
• Increase in mining expansion and project certainty	• The additional Gross Value Product (GVP) of regional mining activities (2015 baseline) related to intervention	• Quantitative Financial	• Dollars ($)
• Improved use of existing resources through changing water business practices	• The extent to which producers use more of their annual allocation and maximise the utilisation of existing water resources	• Quantitative Non-Financial	• ML of increased use as a portion of nominal entitlements
• Improved market available renewable energy	• The additional energy from renewable hydroelectricity in the NQ energy grid	• Quantitative Financial	•
• Certainty of long term water supply to at risk urban areas	• Connection supply to Peter Faust Dam (Whitsundays) catchment for residents and tourists	• Quantitative Financial	• Dollars ($)
• Change in land use to higher value per hectare crops in suitable areas. Monetised in the CBA	• The additional GVP of regional agricultural activities (2015 baseline) related to the intervention	• Quantitative Financial	• Dollars ($)
• Enhanced confidence to invest in long term business operations and succession opportunities	• The level of business confidence within the agricultural sector to make long term investment	• Quantitative Financial	• Dollars ($)
• Increase in value and flexibility of existing water allocations	• The extent to which additional water trading will be undertaken and increase the value of water traded	• Quantitative Non-Financial	• Volume and dollar value of water traded
• Equitable allocation of additional water may add to sense of social cohesion	• Extent to which additional water supply adds to the sense of social cohesion	• Qualitative	•
• Reinforce importance of agriculture to the study area (character and identity)	• Extent to which additional agricultural production adds to the sense of place and identity	• Qualitative	•
• Positive impacts in relation to community vitality – increase in employment opportunities help to retain/attract people to the area	• Amount that implementation adds to the employment and population of the region	• Quantitative Non-Financial	• Hours
• Development of additional community support services and improved community facilities and health	• Number of additional community support services developed due to additional short and long term investment	• Quantitative Non-Financial	• Other Benefit Measure 1
• Opportunities for indigenous business development and employment	• Number of additional indigenous businesses developed due to additional short and long term investment	• Quantitative Non-Financial	• Other Benefit Measure 1
• Development of new governance and planning support arrangements	• Success of implementation of new governance and planning activities	• Qualitative	•
• Opportunities for additional recreation areas	• Number of additional recreational activities delivered through new bulk water supply	• Quantitative Non-Financial	• Hours

6.1.1 Dependencies

There are a number of dependencies in relation to the achievement of these anticipated benefits.

The first key dependency is irrigators responding to any intervention to address the service need, by either:

- changing water use practices
- taking up new water allocations to increase agricultural production (which includes consideration of volume, location, willingness to pay and capacity to pay)
- investing in on-farm infrastructure to service new agricultural production
- changing land use to higher value agriculture.

6.1.2 Criticality of Intended Outcomes and Benefits

The anticipated outcomes and benefits are **considered critical** to the ongoing functioning of the regional economy or to underpin the future wellbeing of the community in the Bowen Collinsville Area. The delivery of large scale water supply for domestic purposes into the Whitsunday region is a long term issue.

However, community issues including unemployment and an aging population (health and services) may be considered important to address by local governments, Queensland Government and the Australian Government. The Australian Government's NWIDF has stated that regional development is an important objective of the NWIDF.

6.1.3 Conflicts or Opportunities for Collaboration Between Stakeholders

Urannah Dam is located on the traditional grounds of the Wiri people which is partially represented through the grant of the Urannah Properties Association (UPA) which comprises of some of the traditional owners. The engagement with the surrounding landholders, those impacted by inundation and those with land uplift will be deeply engaged.

6.2 Potential Dis-benefits and Risks to Achieving the Benefits

The Social Impact Evaluation and Environmental Assessment chapters outline the potential low to high areas of dis-benefit for addressing the service need, including impacts on the environment from increased irrigation activity and potential adverse cultural and social impacts.

6.3 Potential Initiatives

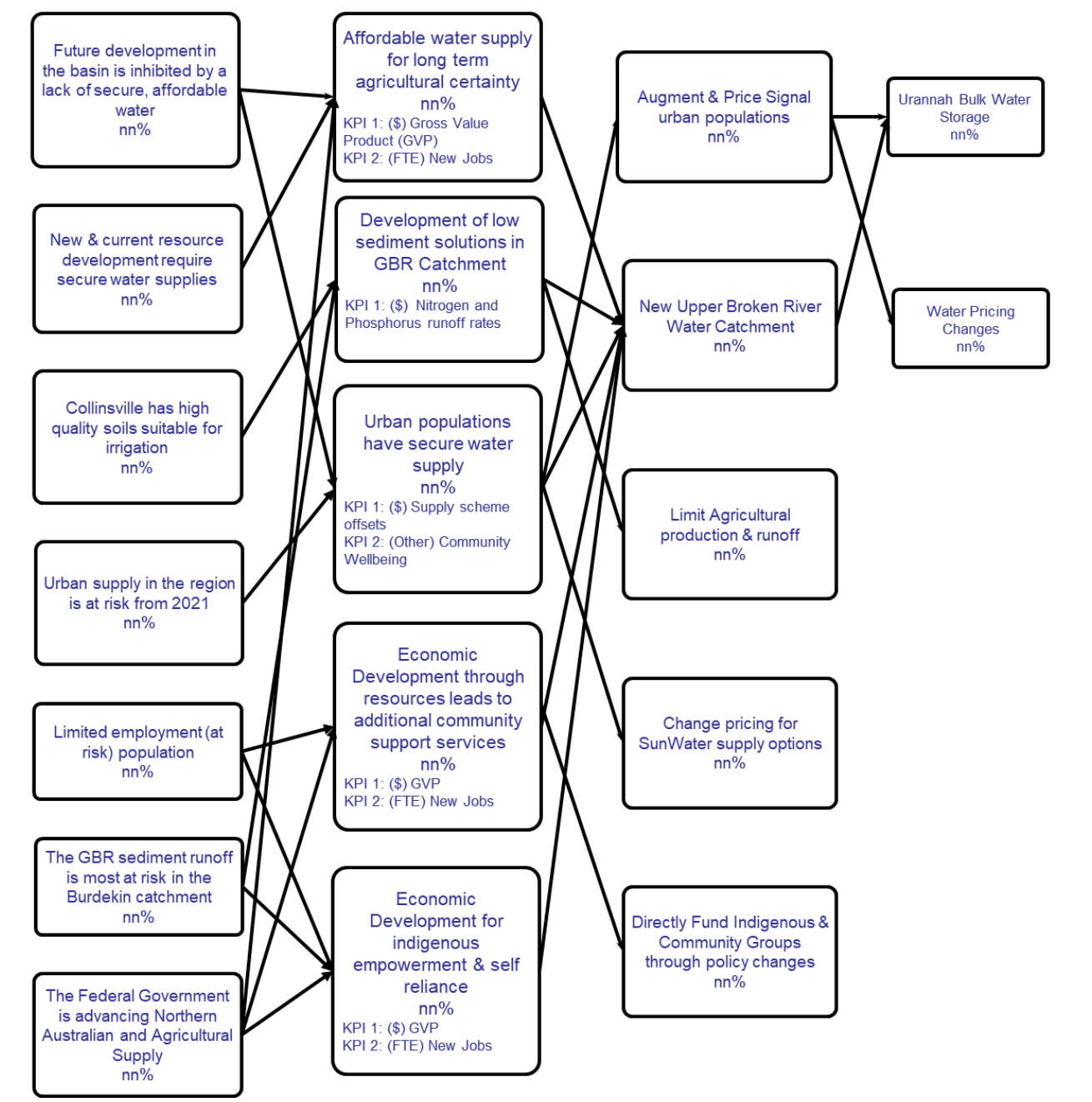
The potential initiatives that could address the service need are outlined in Investment Logic Map.

7 INVESTMENT LOGIC MAP

Bowen Collinsville Enterprise Association

Urannah Dam Project

INVESTMENT LOGIC MAP
Project



Investor:	Bowen Collinsville Enterprise Assocation	Version no:	SBC Rev C
Facilitator:	<Kerry Huston	Initial Workshop:	25 May 2018
Accredited Facilitator:	Yes	Last modified by:	K. Huston
		Template version:	5.0

8 FURTHER WORK AND GOVERNANCE PROPOSAL

The demand need from this report will be used to develop an approach to the development of the PBC (Preliminary Business Case) development for risk, stakeholder engagement and options selection.

The project team will develop (with its consultants) a risk assessment based on a DNRME risk matrix. The assessment which will identify and qualify a risk register through a series of agency and internal advisor workshops to develop the risk register.

A full stakeholder engagement approach and stakeholder engagement plan has developed and implementation has commenced. Further consultation via a series of channels, meetings comprising of regional representatives from a wide variety of stakeholder organisations, including government, industry and economic development groups shall be undertaken.

Options selection will be conducted through the Preliminary Feasibility study by SMEC and will consider the State Infrastructure Plan (SIP) categories for options assessment (reform, better use, improve existing and new build) and the approach that a range of solutions have the potential to achieve a desired outcome. This assessment will also include consideration of the QBWOS.

The methodology will assess the service need, a long list of options, options filtering and shortlisted options process which will be undertaken through workshops with key agency stakeholders.

APPENDIX 1 - PREVIOUS STUDIES

No.	Year	Title
1	1957	Report on the proposed upper Broken River Hydro-electric power scheme / by E.M. Shepherd. (1957) General 621.312134 SHE 1957
2	1960	Department of National Development - Bureau of Mineral Resources, Geology and Geophyics, Pelican Creek 9.0M, and Broken River at 3.0M and 4.8M Dam Sites Geophysical Surveys
3	1966	Isbell R.F. 1966, Soils of the East Bald Hills Area, Collinsville District, North
4	1967	Queensland Irrigation & Water Supply Commission, Report on Bowen-Broken Irrigation Scheme
5	1968	Venz B 1968, Soils and Land capability of the Bowen/Broken Rivers Region, unpublished draft report and maps to the QDPI.
6	1969	Snowy Mountains Hydro-Electric Authority 1969, A Report on Preliminary Investigations into the Broken River Damsite at 22.4M.
7	1969	A report on preliminary investigations into the Broken River damsite at 3.0m / prepared by Snowy Mountains Hydro-electric Authority. (1969) Stack 627.81099436 BRO 1969
8	1971	Geological Survey of Queensland, Bowen Geological Map
9	1973	Bowen - Broken Rivers region land capability / produced by the Division of National Mapping, Department of Minerals and Energy Canberra for the Bureau of Agricultural Economics Department of Primary Industry. (1973) General 333.7099436 AUS 1973
10	1974	Department of Northern Development, Burdekin Basin Development-Urannah Dam and Clare Weir Project, Queensland.
11	1974	Burdekin Basin development : Urannah Dam and Clare Weir Project Queensland : a report on a proposal to develop the water resources of the Broken, Bowen and Burdekin Rivers in the Burdekin Basin, North Queensland. (1974) General 333.913 AUS 1974
12	1974	Department of Minerals and Energy - Bureau of Mineral Resources, Geology and Geophysics, Geology of the Northern Half of the Bowen 1:250 000 Sheet Area, Queensland (with additions to the Geology of the Southern Half)
13	1975	Report to Irrigation and Water Supply Commission re Burdekin Basin Study revision of cost of access to Urannah, Burdekin Falls, Leichhardt and Blue Valley Dam sites / prepared by Ullman & Nolan. (1975) Stack 627.81099436 BUR 1975
14	1976	Snowy Mountains Engineering Corporation 1976, Pre-Feasibility Study for Enlargement of Urannah Dam, Report for the QWRC
15	1977	Burdekin Project Committee 1977, Resources and Potential of the Burdekin River. (also known as Resources and potential of the Burdekin River Basin, Queensland / Commonwealth/State Burdekin Project Committee. (1977) Stack 333.7099436 BUR 1977)
16	1977	Queensland Irrigation & Water Supply Commission – Surface Water Resources Branch, Broken River – Basin 120 Urannah Dam Site 36.0 km Flood Study
17	1977	Queensland Irrigation & Water Supply Commission – Surface Water Resources Branch, Urannah Dam and Collinsville Weir Yield Studies

No.	Year	Title
18	1978	Snowy Mountains Engineering Corporation 1978, Staged Construction of Urannah Scheme
19	1978	Broken River 36 km Urannah Dam site geology : appraisal report / R. Purser. (1978) Departmental Reports (Archive) 627.81099436 URA 1978
20	1978	Urannah Dam site seismic refraction survey / by J.E. Doherty. (1978) Mines REC Other branch
21	1980	Queensland Water Resources Commission 1980, Source of Water Supply Supply Report, Proposed Coal Export Studies-Collinsville and Newlands, report for the Collinsville Coal Company
22	1980	Broken - Bowen - Burdekin Rivers system reanalysis / W.D. Weeks. (1980) Departmental Reports (Archive) 551.483099436 WEE 1980
23	1981	Basin 120 Broken River Eungella Dam flood studies / K. Brauer. (1981) Departmental Reports (Archive) 551.489099436 BRA 1981
	1984	V. Palmieri, Conodont Analysis of Limestone Samples from the Broken River Embayment, North Queensland
	1985	I.W. Withnall, Pre-devonian Geology of the Graveyard Creek Subprovince, Broken River Province (Embayment), North Queensland
24	1990	Irwin M.J. 1990, Bowen Area, Don River and tributaries : Report on preliminary investigations for the Menilden Creek Dam site – 0.6 km. Departmental Reports (Archive) 627.81099436 DON 1990 1 Copy Not For Loan
	1992	Queensland Department of Minerals and Energy, Broken River Special map
	1993	I.W. Withnall and S.C. Lang, Geology of the Broken River Province, North Queensland
	1993	Queensland Department of Minerals and Energy, Camel Creek Special map
25	1995	Department of Primary Industries 1995, Water Supply from Eungella Dam for Central Queensland Coalfields. Departmental Reports (Archive) 627.81099436 QIF 1995 1 Copy Not For Loan
26	1996	Connell Wagner 1996, The Urannah Scheme, Report to the Mackay Tourism 627.81099436 URA 1996 1 Copy Available List
27	1996	Jensen G.R. 1996, Preliminary Report on Groundwater Investigations, Collinsville, Departmental Reports (Archive) 628.114 MAR 1996 1 Copy Not For Loan List
28	1996	The Urannah Dam scheme. (1996) Stack 627.81099436 URA 1996
29	1997	Department of Natural Resources 1997, Report on Additional Water Supply, Proposals for the Don River/Euri Creek Basin
30	1997	C.M. Allen & J.L. Wooden & B.W. Chappell, Late Paleozoic crustal history of central coastal Queensland interpreted from geochemistry of Mesozoic plutons: The effects of continental rifting
31	1998	Hyder Consulting 1998, Collinsville Irrigation Soil Survey
32	1998	D. W. Burrows, A. S. Kutt and J. E. Kemp - Australian Centre for Tropical Freshwater Research James Cook University, Burdekin Catchment Study – A Desktop Study of Environmental Issues Associated with Dam and Irrigation Area Development
33	1999	C.M. Allen, Evolution of a post-batholith dike swarm in central coastal Queensland, Australia: arc-front to backarc?
34	1999	Sattler P.S. and Williams R.D., The Conservation status of Queensland Bioregional Ecosystems, Department of Environment

No.	Year	Title
35	1999	D. W. Burrows - Queensland Department of Natural Resources – Regional Infrastructure Development Program North Region, An Initial Environmental Assessment of Water Infrastructure Options in the Burdekin Catchment
36	1999	Queensland Department of Natural Resources – Regional Infrastructure Development Program, Scoping study of water infrastructure development options and related issues in the Burdekin River catchment.
	2001	Queensland Department of Primary Industries – Queensland Fisheries Service, Broken River Fish Fauna Survey
37	2001	Department of the Environment and Energy, Directory of Important Wetlands in Australia - Broken River, Urannah Creek and Massey Creek Aggregation - QLD199
38	2002	Palaeozoics of NE Queensland : Broken River region 11-17 July 2002 : Post-5 field excursion guidebook / John A Talent ... [et al.]. (2002) Mines 560.99436 INT 2002
39	2002	Bowen Collinsville Enterprise, Smart Water for the Smart State, Urannah Dam, Water for the New Millennium
40	2002	CSIRO Land and Water, Overview of key Natural Resource Management Issues in the Burdekin Catchment, with particular reference to Water Quality and Salinity - Burdekin Catchment Condition Study Phase I
41	2005	Queensland Department of Natural Resources and Mines, QTOPO Urannah Map
42	2006	QLD DNRMW, Burdekin Basin Draft WRP Stage 1 Report
43	2006	QLD DNRMW, Burdekin Basin Draft WRP Stage 2 Report
	2006	QLD DNRMW, Central Queensland Regional Water Supply Strategy
44	2007	QLD Government, Water Plan (Burdekin Basin) 2007 Water Act 2000
	2007	N.S. Reilly and M.E. Lech A Bibliographic Index for Natural Management in the Upper Burdekin and Fitzroy Catchments
	2009	The Australian National University - Centre for Aboriginal Economic Policy Research, Northern Australia Land and Water Science Review full report - 07 Indigenous interests in land & water
45	2009/10	QLD DERM, Burdekin Basin Resource Operations Plan
46	2011	Byerwen Coal Pty Ltd, Initial Advice Statement February 2011
47	2013	Great Barrier Reef Marine Park Authority, Don Basin Assessment Burdekin Dry Tropics NRM Region
48	2013	SunWater, Bowen and Galilee Basins Water Supply Strategy Report
49	2014	CSIRO, Northern rivers and dams: A preliminary assessment of surface water storage potential for northern, Australia
50	2014	Queensland Department of Water Supply, Regional Water Supply Security Assessment Townsville
51	2014	Queensland Government, Abbott Point State Development Area Designation Map
	2014	MainStream Economics and Policy, The economics of new water supply infrastructure for irrigated agriculture
	2014	Jared Dent and Michael B. Ward, Food Bowl or Folly? The economics of irrigating Northern Australia
52	2016	Queensland Department of Water Supply, Regional Water Supply Security Assessment Whitsunday
53	2016	QLD DNRM, Stream Gauging Station Index, July 2016

No.	Year	Title
54	2016	Mackay Conservation Group, An Economic Analysis of the Urannah Dam Project
55	2017	SunWater, Water for Bowen - Summary of Final Business Case March 2017
56	2017	SunWater, Galillee Basin Water Supply Report August 2017
57	2017	QLD DNRM, Lower Burdekin Groundwater Strategy Project Discussion Paper
58	2017	QLD DNRM, Bowen Broken Water Supply Scheme Resource Operations Licence
59	2017	SunWater, SunWater 2016-17 Annual Report
60	2017	Queensland Department of Natural Resources and Mines, Queensland coal – mines and advanced projects
61	2018	Queensland Major Pipelines Projects 2018, Joint Initiative of the QMCA, CSQ and IAQ
62	2018	Qcoal.com.au - Annual Production Capacity at Sonoma, Cows, Drake, Jax and Byerwen Coal Mines
63	2018	Glencore.com.au - Annual Production Capacity at Collinsville and Newlands Coal Mines
64	2018	Sunwater.com.au - Dam Statistics, Pump Stations & Pipelines, Operations and Infrastructure Map
65	2018	Queensland Government Water Monitoring Information Portal for the Broken River - Streamflow data at Urannah station no: 120207A for the period 1/1/1962 to May 2018
66	2018	QLD DNRM, Streamflow data from the ROP IQQM model for node 402 for the period 1/1/1890 to 30/6/2004
67	2018	Queensland State Government Longpaddock SILO website - Climate data including temperature, humidity, rainfall, pan evaporation, FAO56 evapotranspiration and evaporation

APPENDIX 2 - RISK REGISTER

Risk Identification			Risk Analysis					Risk Management Plan					
Nature of Risk	Identified Risk / Hazard (opportunities & threats)	Leading to . . .	Existing Controls of Identified Risk / Hazard (If any)	Likelihood (1 - 5) *	Consequence (1 - 5)	Risk Rating	Is the Risk Significant? Yes ≥8 No <8	Treatment / Action	Responsibility	Timing	Residual Likelihood (1 - 5)	Residual Consequence (1 - 5)	Residual Risk Rating
Financial	Other water supplies adequate for demand profile and Urannah Dam not required	Urannah project unable to establish Foundation Customer base to support demand projections or not attractive to further Federal Government funding.	Previous water security and demand studies and recent engagements in the region.	4	5	20	YES	Analysis of the relative advantages of Urannah Dam to other water storages, tailoring project to serviceable demands and/or investment drivers.	Future work	Current stage	3	3	9
Financial	Uncertain or inaccurate demand profiles	Future storage requirement cannot be determined with sufficient confidence, under or over estimation of project viability and risks.	Previous demand studies.	3	5	15	YES	Analysis of historical regional water usage patterns. Market analysis of key industries to estimate the scale, timing and likelihood of demands. Tracking of high usage prospective projects.	Future work	Current stage	2	5	10
Financial	Uncertain or inaccurate cost estimates	Under or over estimation of project viability, risks.	Previous project studies, recent engagements in the region.	3	5	15	YES	Comparison of cost estimates with previous studies and relevant recent projects.	Future work	Current stage	2	5	10
Financial	Operator return on investment makes scheme unviable	High water prices and less development.	Evolved region with long history of agricutlutral and industrial development. Data on water prices and uptake in the region.	3	5	15	YES	Capacity to pay market analysis. Early discussion with Government about operating models that optimise water charges to the end user. These may include options such as public private partnerships for distribution schemes.	Future work	Current stage	2	4	8
Financial	Uncertain or unacceptable scheme model to secure investment	Unable to finance project or unacceptable controls placed on project to obtain finance.	Project history since obtaining NWIDF funding and preparedness for subsequent project phases.	3	4	12	YES	If project is shown to be viable - Early engagement with Government to explore preferred funding arrangement. Identify areas to optimise scheme to maximise viability. Close out uncertainty by testing sensitivity.	Future work	Later project stages	2	4	8
Financial	Land acquisition, pipeline/channel easement acquisition	Delays and increased project costs which threaten project viability.	Engagement with landholders to provide information and identify opportunities and challenges.	2	4	8	YES	Pursue preliminary agreements (eg. MOUs) for future acquisition negotiations. Separation of early works such as land acquisition/negotiations from definition of controlled action. Consider opportunities for early acquisition of land, State Development Area. Identify potential project advantages (eg. irrigable agricultural land held by QCoal, existing infrastructure associated with Eungella Dam)	Future work	Current stage	2	2	4
Financial	Not meeting expectations of BQ, NWIDF or other bodies such as Infrastructure Australia which may influence progression to DBC	Timing, quality or outcome of deliverables below expectations resulting in unfavourable consideration of DBC proposal.	Understanding of BQ/NWIDF requirements through recent NQ engagements.	2	4	8	YES	PBC documentation being prepared in accordance with BQ framework. Project management plan for PBC ensuring adequate resourcing, reviews and communications with stakeholders. Ensure at least two appreciably different options are recommended for further assessment in a DBC to meet Infrastructure Australia requirements. Ensure sources of information (eg. GIS data) are properly referenced in deliverables.	Future work	Current stage	2	2	4

Risk Identification			Risk Analysis					Risk Management Plan					
Legislative	Increased nutrient and sediment run off from irrigation area	Downstream impact from increased areas of irrigation with potential impact to Great Barrier Reef which risk Government/public support for the project.	Evolved region with long history of agricultural, industrial and tourism development. Significant long term Government commitment to concurrently fund both increased agricultural / industrial development and GBR protections through the Reef 2050 Plan - signals both interests will be managed and balanced.	4	5	20	YES	Review GBR requirements with respect to runoff and address through scheme design. Stakeholder engagement, analysis to support future decision making, preparation of community awareness/support strategy.	Future work	Current stage	3	5	15
Legislative	Planning approvals (eg. risk to habitat of Irwin Turtle, proximity to Eungella National Park)	Will be referred to federal government for approval under the EPBC Act leading to implementation risks associated with timeframes, controls and costs. Impact on fisheries and State based conservation areas may present more challenges than Federally managed issues associated with EPBC Act.	Urannah project has been considered for more than 50 years. Substantial knowledge base through previous studies and recent engagements in the region.	4	4	16	YES	Early identification of State and Federal approvals and planning to mitigate impact to project. Early consultation with State based stakeholders/agencies to streamline approvals pathway. Engage in early studies with local expertise (eg. JCU TropWATER) to address potential requirements of EPBC Act. Modify scheme to facilitate easier approval (eg. ensure Eungella Dam can flow freely with inundation area).	Future work	Current stage	3	3	9
Legislative	Environmental offsets	Environmental offsets and associated monitoring imposed by the Federal Government adding significant costs to dam CAPEX (up to 50% for new dams) and OPEX (eg. 30% of Rookwood Weir OPEX is WQM).	Knowledge from comparable previous projects, established relationships with key Federal agencies.	4	4	16	YES	Ongoing engagement with Federal agencies to identify potential offset requirements and factor into to scheme optimisation economic analysis.	Future work	Current stage	4	3	12
Legislative	Cultural heritage (Indigenous groups have land tenure and reside within proposed inundation area)	Potential for project layout changes and delays should significant items of cultural heritage be encountered.	Established relationships with key indigenous groups and understanding of practices and requirements.	3	5	15	YES	Undertake cultural heritage field assessment of the entire project area, ensuring local landholders are consulted to identify and manage site issues such as access, sensitive issues etc. Develop a Cultural Heritage Management Plan including management of early works such as geotechnical investigations.	Future work	Current stage	2	3	6
Legislative	Land rights (Indigenous groups have land tenure and reside within proposed inundation area)	Inability to obtain support from landholders for new dam on a viable basis.	Proponent represents many key landholders.	3	5	15	YES	Early identification of approvals will allow mitigation of impacts. Engagement with native title land holders to facilitate land tenure negotiations.	Future work	Current stage	1	4	4
Legislative	Impacts of the tabled Vegetation Management and Other Legislation Amendment Bill 2018	Regulation of high value regrowth on freehold land and restricted farming practices reducing irrigation demand and water uptake.	Knowledge/confidence from recent projects in the region which have had little or no community opposition.	4	3	12	YES	Engage with regulators to understand process of clearing regrowth vegetation and impacts to potential demand development in the catchment. Consider opportunities for State Development Area.	Future work	Current stage	3	2	6

Risk Identification			Risk Analysis					Risk Management Plan					
Legislative	Irrigation impacts on groundwater	Rising groundwater levels and salinity in the lower Burdekin may result in reduced irrigation and water uptake in some areas. Aquifer recharge to prevent salt water intrusion may also increase uptake in other areas.	DNRME groundwater study currently underway.	4	3	12	YES	Engage with DNRME to understand implications of study and adapt demand profiles and project risks. Target areas for future development without significant groundwater issues.	Future work	Current stage	3	2	6
Legislative	Obstruction to use of existing water infrastructure in scheme design	Unable to reach agreement with SunWater to potentially use existing infrastructure such as the Newlands Pipeline or Eungella Dam to facilitate supply of water.	Previous studies/data indicating security risks of existing storages and potential need for future supplementation.	4	3	12	YES	Engage with Government to explore opportunities for supplement supply to Eungella Dam and Peter Faust Dam and use of existing pipelines.	Future work	Current stage	3	2	6
Legislative	Community legal issues	Community groups oppose project and present legal challenges.	Little or no opposition to other recent water infrastructure projects in NQ.	2	3	6	NO	Ongoing engagement with government and community stakeholders to refine project approach and to allow early addressing of emerging issues.	Future work	Current stage	2	2	4
Water	Water availability	Environmental flow conditions imposed during approvals process impact on availability of water.	The current Water Plan (and ROP) for the catchment includes provision of strategic reserves of 150,000ML for water infrastructure for industrial purposes.	3	4	12	YES	Consultation with Government agencies will minimise risk of approval conditions being significantly different to planning assumptions.	Future work	Current stage	2	3	6
General	Timing of other water projects vying for NWIDF funding	No or insufficient Federal funding to make Urannah Dam an economically viable project.	Comparative knowledge of other projects through recent engagement in the region.	4	4	16	YES	Engage with NWIDF to gauge competing bids, closure of current funding round and potential for further funding rounds. Develop strategy to trump other bids.	Future work	Current stage	3	4	12
General	Pet projects of politicians	Unfair or unfavourable consideration of bid for NWIDF funding.	Commitment to relatively large PBC funding.	3	4	12	YES	Engage with NWIDF to gauge competing bids. Monitor announcements from key NQ politicians and responsible ministers.	Future work	Current stage	3	3	9
General	Competing land uses with low or no water usage requirements	Uncertainty in demand profiles and project viability, risks.	Knowledge of historical and potential future development within the catchment.	3	4	12	YES	Identification of emerging industries within the catchment and other comparable catchments.	Future work	Current stage	2	2	4
General	Impact of other external studies	Scheme changes with respect to demand, yield, offsets, operating models, timeframes or another factor which impacts on project viability and risks.	Developed agricultural and industrial region. Knowledge through recent engagements in the region.	3	3	9	YES	Engage with relevant State and federal agencies to track the status of current and planned studies which may impact the viability of Urannah Dam.	Future work	Current stage	2	2	4
Technical	Hydrology inaccuracy	Inaccurate estimation of inundation area and impacts, yield.	Previous project studies have identified potential dam FSLs. ROP has sizeable allocation for new water infrastructure in the catchment that could only be achieved through a large dam.	3	4	12	YES	Review previous studies. Undertake water balance and hydraulic modelling to confirm impacts and requirements. Ensure accuracy of data sources such as river flow gauges is checked.	Future work	Current stage	2	3	6

Risk Identification			Risk Analysis					Risk Management Plan					
Technical	Survey inaccuracy	Inaccurate estimation of inundation area and impacts, distribution opportunities.	LIDAR proposed as part of PBC to survey potential inundation areas, pipeline routes with +- 0.5m accuracy.	2	4	8	YES	Review survey and update technical analysis. Consider value of preparing DTM for potential scheme irrigation areas.	Future work	Current stage	2	3	6
Technical	Unfavourable geological conditions	Required design or construction technique not viable.	Desktop and field geological mapping incorporated in to previous studies. Conservative cost and design to allow for uncertainty.	2	4	8	YES	Geological reconnaissance includes site investigation for further mapping/core logging to enhance geological understanding.	Future work	Current stage	2	3	6
Technical	Seismic activity	Required design or construction technique not viable.	Seismic monitoring data.	2	4	8	YES	Technical analysis of seismic loading data. Conservative cost and design to allow for uncertainty.	Future work	Current stage	2	2	4