

DETAILED BUSINESS CASE

LOWER FITZROY RIVER INFRASTRUCTURE PROJECT

OCTOBER 2017



ABOUT THIS DOCUMENT

Building Queensland finalised the Lower Fitzroy River Infrastructure Project Detailed Business Case in October 2017. The Detailed Business Case reflects government arrangements in place at that time. The core elements of the Detailed Business Case are presented in this document.

This document has been publicly released to ensure that stakeholders and community members are aware of the outcomes of the Detailed Business Case, and have access to information that supports these outcomes. However, in making this Detailed Business Case publicly available, commercially sensitive information has been removed to protect the state's commercial position during future Project stages.

This detailed business case has been prepared with the support of funding from the Australian Government National Water Infrastructure Development Fund (NWIDF), an initiative of the Northern Australia and Agricultural Competitiveness White Papers.

A glossary is provided following the table of contents.



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GLOSSARY

Abbreviation	Description
A	
ACH Act	Aboriginal Cultural Heritage Act 2003
AEIS	Additional Environmental Impact Statement
AEP	Annual Exceedance Probability
AHD	Australian Height Datum
ALA	Acquisition of Land Act 1967
AMTD	Adopted Middle Thread Distance
ANCOLD	Australian National Committee on Large Dams
B	
BCDF	Business Case Development Framework
C	
CG	Coordinator-General
CGER	Coordinator-General's evaluation report on the environmental impact statement
CHMA	Cultural Heritage Management Agreement
CHMP	Cultural Heritage Management Plan
CHRC	Central Highlands Regional Council
CID	Community Infrastructure Designation
COAG	Council of Commonwealth Governments
CQRWSS	Central Queensland Regional Water Supply Strategy
CSS	Contingent Supply Strategy
D	
DAF	Department of Agriculture and Fisheries (Queensland)
DBC	Detailed Business Case
DEHP	Department of Environment and Heritage Protection
DEWS	Department of Energy and Water Supply
DMP	Drought Management Plan
DNRM	Department of Natural Resources and Mines
E	
EFO	Environmental Flow Objective
EHP	Department of Environment and Heritage Protection (Queensland)
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EP Act	Environmental Protection Act 1994
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999 (Cth)
ERA	Environmentally Relevant Activity
ESCP	Erosion and Sediment Control Plan
F	
Fitzroy WP	Water Plan (Fitzroy Basin) 2011



Abbreviation	Description
FSL	Full Supply Level
G	
GAWB	Gladstone Area Water Board
GBR	Great Barrier Reef
GBRMP	Great Barrier Reef Marine Park
GBRWHA	Great Barrier Reef World Heritage Area
GFP	Gladstone-Fitzroy Pipeline
GOC	Government Owned Corporation
GOC Act	Government Owned Corporations Act 1993
GRWSSA	Gladstone Regional Water Supply Security Assessment
H	
ha	Hectares
I	
IQQM	integrated quantity and quality model
J	
JV	Joint Venture
L	
LFRIP	Lower Fitzroy River Infrastructure Project (this 'Project'). This includes the delivery and operations of a new Rookwood Weir, and associated infrastructure.
LL	Land Lease
LOS	Level of Service
LSC	Livingstone Shire Council
M	
m ³ /s	cubic metre per second
MCU	Material Change of Use
ML	Megalitre
MNES	Matter of National Environmental Significance
MSES	Matters of State Environmental Significance
N	
NC Act	Nature Conservation Act 1994 (Qld)
NWI	National Water Initiative
NWIDF	National Water Infrastructure Development Fund
O	
ORC	Optimised Replacement Cost
P	
PAF	Project Assessment Framework
(the) Project	Refer LFRIP
Proponent	Gladstone Area Water Board and SunWater Limited
Q	
QBWOS	Queensland Bulk Water Opportunity Statement



Abbreviation	Description
QCA	Queensland Competition Authority
R	
RAB	Regulated Asset Base
ROL	Resource Operations Licence
ROP	Resource Operations Plan (Fitzroy Basin)
RRC	Rockhampton Regional Council
RWSSA	Regional Water Supply Security Assessment
S	
SDPWO Act	State Development and Public Works Organisation Act 1971 (Qld)
SIP	The State Infrastructure Plan
SMP	Species Management Program
SPA	Sustainable Planning Act 2009 (Qld)
T	
TEC	Threatened ecological community
TI Act	Transport Infrastructure Act 1994 (Qld)
TMR	Transport and Main Roads
ToR	Terms of Reference
U	
USL	Unallocated State Land
W	
WASC	Woorabinda Aboriginal Shire Council
WASO	Water Allocation Security Objective
Water Act	Water Act 2000 (Qld)
Water Supply Act	Water Supply (Safety and Reliability) Act 2008
WHA	World Heritage Area
WHS	Work Health and Safety
WSS	Water Supply Scheme
WTP	Water Treatment Plant



1 EXECUTIVE SUMMARY

1.1 Purpose

This Chapter provides a summary of the Lower Fitzroy River Infrastructure Project (LFRIP) Detailed Business Case (DBC). It summarises the Project's:

- background
- service need and opportunities
- anticipated benefits
- scope of options
- analysis and findings
- recommendations.

This DBC has been prepared by Building Queensland, on behalf of the proponents, Gladstone Area Water Board (GAWB) and SunWater.

1.2 Background

The potential need and/or opportunity for augmented water storage to service water users in the Fitzroy Basin and Gladstone Region has been the subject of, and raised in, various regional and state government reports over the last few decades. The Central Queensland Regional Water Supply Strategy (CQRWSS), released in 2006, identified:

- Lower Fitzroy as the next main source of supply for the urban and industrial needs of the Rockhampton, Fitzroy and Livingstone council areas and GAWB
- the development of a new weir at Rookwood, or the raising of the existing Eden Bann Weir as the preferred infrastructure solutions to provide high reliability water to meet the urban and industrial needs of the region.

Figure 1-1 shows a summary of the key activities that have taken place since the release of the CQRWSS.

Figure 1-1 Key activities in LFRIP development





In July 2007, the state government made the declaration that GAWB, SunWater and the former Rockhampton and Livingstone councils (now Rockhampton Regional Council) form as members of the Lower Fitzroy Joint Venture (JV). The Coordinator-General appointed the Lower Fitzroy JV to be the proponent responsible for the delivery of a business case to government that investigated the options available for the construction of additional water storages on the Fitzroy River in accordance with the CQRWSS. Rockhampton Regional Council has since pulled out of the joint venture. At the same time, the Coordinator-General appointed GAWB as the sole proponent of the Gladstone–Fitzroy Pipeline (GFP) Project.

Importantly, the Water Plan (Fitzroy Basin) 2011 and the Fitzroy Basin Resource Operations Plan (ROP), identified the ‘strategic water infrastructure reserve’ in the Lower Fitzroy River as being 76,000 ML per annum. The ROP may accept a submission from GAWB for making 30,000 ML per annum of unallocated water available from this strategic water infrastructure reserve for urban and industrial supplies. Likewise, Livingstone Shire Council (LSC) can make a submission for 4,000 ML per annum of the unallocated water. The remaining 42,000 ML per annum may be released from the strategic water infrastructure reserve for any purpose.

In 2013, GAWB’s Strategic Water Plan identified the GFP as GAWB’s preferred delivery mechanism for a second water source and would deliver its 30,000 ML per annum of water, which would be accommodated through new storage capacity made available by the development of the LFRIP. It is noted that the GFP is not part of the LFRIP and has been subject to a separate Environmental Impact Statement (EIS) and a future business case process. According to GAWB’s Strategic Water Plan, development of the GFP will proceed should either drought conditions occur or should forecast water demand exceed GAWB’s water allocation from Awoonga Dam.

In May 2016, the Commonwealth Government allocated \$2 million for the Queensland Government to prepare a business case for the LFRIP. In addition, the Commonwealth Government made an election commitment to provide \$130 million towards the construction of Rookwood Weir, subject to the outcomes of the business case, and the LFRIP receiving environmental and planning approvals and other matters.

An EIS has been prepared for the LFRIP. The Coordinator-General’s Report on the EIS was released on 8 December 2016. This recommended the LFRIP proceed subject to conditions and implementation of the proponents’ commitments in the EIS. The Commonwealth Government granted conditional Project approval under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) on 28 February 2017.

In September 2016, Building Queensland entered an arrangement with SunWater and GAWB to manage the development of this DBC, to consider the delivery of infrastructure on the Lower Fitzroy.

1.3 Need and drivers

Currently, water is supplied to urban, commercial, industrial and agricultural customers across the Lower Fitzroy and Gladstone regions primarily under one of three Water Supply Schemes (WSS), including the Lower Fitzroy WSS, Fitzroy Barrage WSS and the Awoonga Dam WSS. The water allocations and a snapshot of 2015–16 water usage is provided below.



Table 1-1 Summary of water allocation and usage

SUPPLY SOURCE	TOTAL ALLOCATION (ML)	RESIDENTIAL USE (ML)	AGRICULTURAL USE (ML)	INDUSTRIAL USE (ML)	WATER TO CAPRICORN COAST (ML)	SUNWATER / NON-REVENUE/ OTHER USE (ML)	TOTAL USAGE (ML PER ANNUM)
Fitzroy Barrage	62,093	9,704.3	4,729.8	5,589.3	2,893.4	2,116	25,032.8
Eden Bann	28,621	0	0	19,793	n/a	86	19,879
Awoonga Dam	78,000	10,590	n/a	~37,885	n/a	n/a	48,475
TOTAL	168,714	20,294.3	4,729.8	63,267.3	2,893.4	2,202	93,386.8

Total water usage across the Study Area (refer Section 2.2) typically runs less than 60 per cent of the total allocation on any given year. The water use is linked to a range of factors, including population, environmental conditions and market forces, including pricing. For the Study Area, it is noted:

- Gladstone’s population is expected to grow by an average of 2.13 per cent per annum, followed by Livingstone at 2.06 per cent per annum from 2016 to 2036. Over the same period, the population of Rockhampton is expected to grow at 0.98 per cent per annum. Collectively, the Study Area is expected to see an average annual growth of approximately 1.63 per cent per annum. This is comparable to the overall Queensland state population growth rate of 1.67 per cent per annum over this 20-year period.
- Temperatures across the Study Area are projected to continue to rise over the remainder of the century. By 2030, it is anticipated there will be longer, drier periods, interrupted by more intense rainfall events. By 2070, under a ‘high emissions scenario, it is likely that eastern parts of the region will experience more time in drought’¹, including Rockhampton and Gladstone.
- Strong demand for beef and macadamia nuts has resulted in higher prices for these agricultural activities. Recent Department of Agriculture and Fisheries (DAF) analysis of land suitability for different irrigated crops across the Lower Fitzroy area identified a higher proportion of lands suitable to wheat crops, using overhead spray irrigation—approximately 36,617 hectares (ha)—than there is for sorghum, using furrow/row irrigation techniques (approximately 10,197 ha).
- Irrigation in and around Central Queensland is largely supplied through medium priority allocations, and range from as low as \$60 per ML to as high as \$1,982 per ML. There has been limited trading of high priority allocations in Queensland in the last few years, noting Dawson Valley scheme has 1 ML traded at \$1,800 and Boyne Tarong scheme has 24 ML traded at \$3,000.

While residential growth across the Study Area is unlikely to result in additional water demand above existing allocations until after 2036, all water user groups are exposed to the water security risks associated with GAWB’s single supply source risks and Rockhampton’s risk exposure associated with just one ‘failed’ wet season. As previously noted, it is anticipated there will be longer, drier periods, interrupted by more intense rainfall events based on current climate projections for the Study Area. Additionally:

- modelling commissioned in by GAWB in 2013 as part of the development of its 2013 Strategic Water Plan estimated a 10 per cent probability of additional capacity being required by 2020 and a 50 per cent probability by 2030.
- the Fitzroy Barrage is heavily reliant on seasonal inflows from the Fitzroy River to maintain continuity of supply, particularly in the occurrence of annual wet season events. The Rockhampton Regional Water Supply Security Assessment (RWSSA) ‘estimated that at current levels of demand, the storages could fall from full to empty in about 16 months’². However, further analysis demonstrates storage levels could fall

¹ Draft Climate Change in the Central Queensland region, DEHP, 2016.

² Rockhampton RWSSA, page 15.



from full to below minimum operating level well under 12 months (assuming no further inflows to the storages during this period and minimal groundwater contributions from the surrounding area to the storage).

- agricultural producers, through a Request for Information (RFI) process, indicated a demand of 13,400 per annum of high priority water at between \$2,800 to \$3,200 per ML, with an additional 12,000 per annum of medium priority water at an equivalent price. A majority of potential customers interviewed indicated a preference for medium priority water, should it meet their required price and reliability needs

The service need for the LFRIP is defined as the continuing need to reduce current and ongoing water supply risks, and an opportunity to increase water available for economic opportunities (see Table 1-2).

Table 1-2 Service need defined for each user group

User group	Need and/or opportunity
Rockhampton urban water users	Rockhampton is reliant on annual inflows to meet its water requirements and is susceptible to supply security risk, after just one failed wet season.
Livingstone urban water users	The development of the Reference Project allows LSC to meet its stated immediate need to manage its own water supply and security risks.
Gladstone (all user groups)	While it is less likely that Gladstone will need additional water supply before 2030 especially in the absence of drought conditions, it is considered more likely than not (greater than 50 per cent likelihood) that there will be a need for access to this water by no later than 2037 due to either drought and/or demand growth.
Industrial water users	No service need has been identified for large-scale industrial water users within the Fitzroy Basin.
Agricultural water users	There is an opportunity to expand agricultural production adjacent to the Fitzroy River. The Reference Project would address this potential opportunity despite it having a number of uncertainties associated with demand for agricultural water from this Project.

Anticipated benefits from meeting the needs and opportunities include:

- additional water made available for customers along the Lower Fitzroy River
- an increase in regional employment from increased agricultural production
- reduced costs associated with a 'failed wet season' for Rockhampton
- the avoidance of the costs associated with the future development and operation of a weir on the Lower Fitzroy River
- improved access and connectivity.

It is noted that the availability of \$130 million from the Commonwealth Government would reduce the capital costs attributable to user groups, resulting in lower water prices and enhancing the benefits from meeting the identified needs and opportunities.

1.4 The reference project

The Reference Project will result in the construction of a new weir at Rookwood, capable of supplying 76,000 ML per annum of high priority water for customers. Table 1-3 provides a summary of key characteristics of the Reference Project.



Table 1-3 Summary of key characteristics

CHARACTERISTIC	REFERENCE PROJECT
Weir type	An uncontrolled gravity ogee weir constructed using roller compacted concrete and conventional concrete and earth embankment on the left abutment. Addition of 14 flap gates (3.5 m high)
Full supply level	49 m Australian Height Datum (AHD)
Storage at full supply level	117,290 ML
Yield at full supply level	86,000 ML per annum
Proposed allocation	76,000 ML of high priority water
Impoundment extent at full supply level	Mackenzie River: 335 km Adopted Middle Thread Distance (AMTD); Dawson River: 15 km AMTD
Impoundment length (main channel) at full supply level	84 km
Dead storage level	RL 31.0 metres
Dead storage volume	2,640 ML
Weir length	460 m
Height above riverbed	Approx. 17 m
Design life	100 years
Associated infrastructure	<ul style="list-style-type: none"> ▪ Augmentation to and construction of access roads: Thirsty Creek Road and the intersection with the Capricorn Highway at Gogango ▪ Construction of low level bridges upstream at Riverslea and Foleyvale crossings, inclusive of augmented approaches ▪ Installation of culverts at Hanrahan Crossing downstream of Rookwood Weir to facilitate access during operation releases

For the purposes of the DBC, it has been assumed that the LFRIP will be delivered through a JV arrangement between SunWater and GAWB, noting a final decision has yet to be made on the final proponent at the time of this DBC.

1.5 The analysis

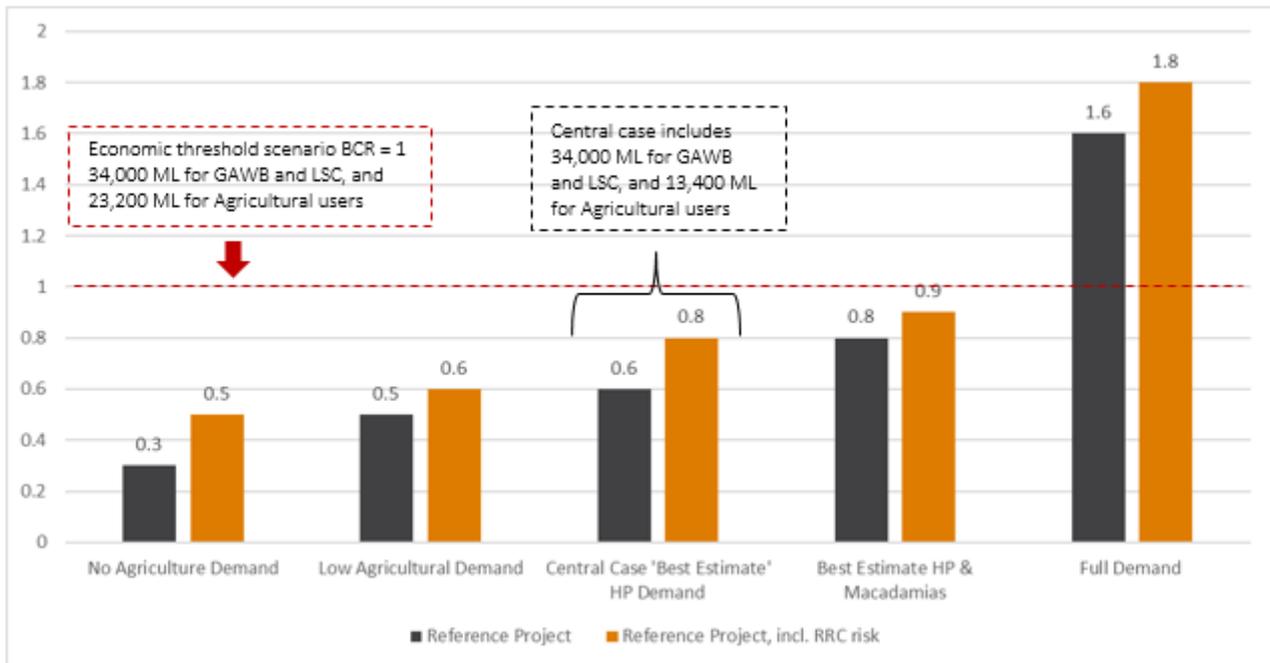
The economic, financial and affordability analysis (refer Chapter 13, 16 and 18 respectively) considered the Reference Project with a central case 'best estimate' demand scenario, along with a range of demand and pricing scenarios, particularly as relates to agricultural user demand. Figure 1-2 provides a summary of the findings from the economic analysis. Under all scenarios, it is assumed and accepted that:

- GAWB will pay for 30,000 ML per annum (as per GAWBs entitlement under the ROP)
- LSC will pay for 4,000 ML per annum (as per the Capricorn Coast entitlement under the ROP).

Determination of the likely agricultural demand is more uncertain, and as such, Figure 1-2 presents the findings from a range of key demand scenarios and includes Benefit cost ratios (BCRs) with and without the recognised forgone risk exposure for Rockhampton (i.e. the risks associated with a failed 'wet season' requiring Rockhampton Regional Council to source emergency supply from another supply source).



Figure 1-2 BCRs for different agricultural demand scenarios



The central case 'best estimate' high priority demand shown above is based on the feedback from respondents to the RFI (refer Section 5.4). It is recognised that there are constraints and uncertainties based on the demand estimates, and as such, there is ongoing demand risk for the state under each scenario. One way to alleviate this risk would be to adopt an 'economic' threshold approach, i.e. ensure the proponent can deliver approximately 23,200 ML for agricultural use (based on an assumed proportional increase in volume of water to users as recognised under the 'best estimate' high priority and macadamia scenario), to ensure a BCR of 1 can be achieved.

Even taking into consideration the committed funding from the Commonwealth Government, a number of demand scenarios result in a net funding gap for the LFRIP.

To support existing and new agricultural users in the Study Area, and to move the demand scenario closer to a 'full demand' outcome the average annual price for water needs to reflect the known capacity and willingness to pay.

In considering the average annual pricing for agricultural users, further analysis was undertaken on a range of pricing points and the resulting net cost, for a range of potential demand scenarios.

Investment in the Reference Project, without addressing the current known uncertainties, particularly as pertains to agricultural users, would expose the proponent and the state government to capital and operating costs that may not be able to be recouped through potential water users.

To mitigate the demand risks, the LFRIP requires sufficient commitments (or signed memorandums of understanding) from customers to allow the Project to proceed with an acceptable level of risk to the proponents, and ultimately, the state. To support such a condition precedent, an economic 'hurdle' can be adopted (i.e. what will it take to ensure the benefits for the people of Queensland exceed the costs from investment in Rookwood Weir). The economic analysis has concluded that approximately 23,200 ML per annum of water allocations towards productive agricultural developments would be required to address the required economic hurdle. This volume may consist of either high priority or medium priority allocations, or



a combination of the two, as the volume of water supporting productive agricultural development is the primary driver of economic benefits from the Project.

The net funding gap could be reduced further should high agricultural demand be realised and the proponent and/or relevant state government agencies pursue the opportunities identified in Section 20.2.3, namely:

- engage with the Commonwealth Government on the funding commitment
- undertake further value management/engineering activities to identify any cost savings that may be achievable
- consider the best timing for commencement of construction activities if additional time is required to identify and achieve commercial commitments with customers
- continue consultation with Department of Natural Resources and Mines (DNRM) to agree on the process, calculation and conversion of high-priority water allocation into a medium-priority water product

continue consultation with Department of Energy and Water Supply (DEWS) and Rockhampton Regional Council (RRC) on the potential for RRC to access a contingent supply from Rookwood Weir.

1.6 Cost to government

The analysis in this DBC suggests that adoption of an ‘economic hurdle’ approach could result in a net funding gap. The financial position may be improved by the proponent signing additional agricultural customers or through achieving a better price per ML.

1.7 Delivery and implementation

The preferred contracting strategy for the LFRIP is a construct-only approach, through an Early Tenderer Involvement (ETI) model. Under this approach, the proponent will be responsible for the early preparatory and design works. Milestones identified in Table 1-4 are subject to satisfactory completion of conditions precedent set out as part of the recommendations (refer Section 1.89).

Table 1-4 Key implementation milestones

ACTIVITY	START	FINISH
Key event		
Project approval	October Year 1	
Preparatory works (concurrent to DBC)		
Site surveying and land access activities	April Year 1	October Year 2
Early procurement activities	August Year 1	October Year 2
Preliminaries (including some preparatory work)		
Land access and acquisition	April Year 1	November Year 4
Permits and approvals	July Year 1	October Year 4
Design	July Year 1	July Year 2
Procure	August Year 1	March Year 3
Construction		
Construction award	November Year 2	



ACTIVITY	START	FINISH
Early works (including prep work by proponent)	July Year 2	February Year 3
Weir construction	November Year 2	February Year 5
Weir construction craneage	July Year 1	February Year 5
Weir construction indirect resources	November Year 2	February Year 5
Hanrahan's Crossing	July Year 3	October Year 3
Riverslea Bridge and approaches	April Year 3	September Year 3
Foleyvale Bridge and approaches	April Year 3	November Year 3
Commissioning		
In river works complete		January Year 5
Dry commissioning complete		January Year 5
Construction complete, commence weir impoundment filing		February Year 5
Wet commissioning commences		February Year 5

The project director will be responsible for developing, communicating and managing a detailed schedule of all implementation activities.

1.8 Key risks

The key risks for the LFRIP are outlined below.

- Commonwealth Government funding is predicated on meeting the terms and conditions outlined in the NWIDF capital component EOI guidelines and is contingent upon the business case findings and subsequent Infrastructure Australia review.
- The GFP will need to be delivered in order to distribute the water to Gladstone. The GFP is subject to a separate DBC process.
- In addition to the net funding gap for the LFRIP, the Queensland Government is also subject to an additional financial exposure associated with GAWB's upfront payment to access the 30,000 ML per annum high priority allocation.
- It is uncertain, at the time of this DBC, what specific measures will be adopted by the water supply strategy under development by RRC. The measures adopted will impact on the water security risks faced by Rockhampton and, consequentially, the benefits associated with the development of Rookwood Weir.
- There is uncertainty with regards to the likely agricultural demand that can be attributed to the Reference Project. Building Queensland demand analysis indicates there is limited demand for high priority water at a price that would deliver full cost recovery for the Project. The Project would require sufficient commercial commitments from agricultural customers to allow the Project to proceed with an acceptable level of risk to the proponent and, ultimately, the state.

1.9 Recommendations

It is noted that the DBC and associated recommendations are prefaced on the assumption that a capital funding contribution of at least \$130 million will be made by the Commonwealth Government and finalised through the National Partnership Agreement.



With consideration to the findings, opportunities and risks and mitigation activities identified in the DBC, the following recommendations can be made.

RECOMMENDATION 1

A final proponent be decided by the Queensland Government.

RECOMMENDATION 2 (following completion of Recommendation 1)

The proponent proceed with the Reference Project only when the identified risks are understood, and appropriately mitigated and it is further recognised that the LFRIP is likely to require additional government funding to achieve marketable water prices. In addition, it is recommended the Queensland Government consider imposing the following conditions on the proponent prior to proceeding with the Reference Project.

▪ CONDITION A

Prior to preparatory works commencing and to achieve, at a minimum, the economic threshold as identified in the DBC, establish a memorandum of understanding (or commitments-in-principle) addressing volume and price between the proponent, GAWB, LSC and agricultural producers to achieve an economic threshold outcome of 57,200 ML high-priority or equivalent, comprising 30,000 ML for GAWB, 4,000 ML for LSC and a minimum of 23,200 ML for agricultural producers. Contributions to be payable upon construction, completion and commissioning of the Rookwood Weir, with GAWB subject to appropriate due diligence activities by the proponent and will require Ministerial approval to make this commitment.

[NB should the proponent meet condition B, this condition would no longer be necessary]

▪ CONDITION B

Prior to construction works commencing and to achieve, at a minimum, the economic threshold as identified in the DBC, establish binding commitments or contracts addressing volume and price between the proponent, GAWB, LSC and agricultural producers to achieve an economic threshold outcome of 57,200 ML high-priority or equivalent, comprising 30,000 ML for GAWB, 4,000 ML for LSC and a minimum of 23,200 ML for agricultural producers. Contributions to be payable upon construction, completion and commissioning of the Rookwood Weir. GAWB will be subject to appropriate due diligence activities by the proponent and will require Ministerial approval to make this commitment.

In addition to the recommendations and associated conditions, it is recognised that relevant Queensland Government agencies, including Queensland Treasury, in conjunction with the proponent will need to continue discussion with:

- the Commonwealth Government on the funding commitment
- DNRM to develop the process, calculation and conversion of high priority water allocation into a medium priority water product
- DEWS and RRC on the potential for RRC to access a contingent supply from Rookwood Weir.

It is also recognised that the proponent, in conjunction with relevant Queensland Government agencies including Queensland Treasury, will undertake further work in consultation with:

- DNRM to develop operational rules that meet the Fitzroy Basin Water Plan, including water allocation security objectives (WASO) and environmental flow objectives (EFO)

Queensland Competition Authority (QCA) to seek to understand on the potential customer pricing implications and balance sheet treatment of the LFRIP (outside of the pricing determination cycle).



PART A – BACKGROUND AND OVERVIEW



2 PROPOSAL BACKGROUND

CHAPTER SUMMARY AND CONCLUSIONS:

- The potential need and/or opportunity for augmented water storage in the Fitzroy Basin and Gladstone Region has been the subject of, and raised in, various regional and state government reports over the last few decades.
- The CQRWSS, released in 2006, identified the:
 - Lower Fitzroy as the next main source of supply for the urban and industrial needs of the Rockhampton, Fitzroy and Livingstone council areas and GAWB
 - development of a new weir at Rookwood, or the raising of the existing Eden Bann Weir as the preferred infrastructure solutions to provide high reliability water to meet the urban and industrial needs of the region.
- The Water Plan (Fitzroy Basin) 2011 and the Fitzroy Basin ROP, identified the ‘strategic water infrastructure reserve’ in the Lower Fitzroy River as being 76,000 ML per annum. The ROP may accept a submission from GAWB for making 30,000 ML per annum of unallocated water available from this strategic water infrastructure reserve for urban and industrial supplies. Likewise, LSC could make a submission for 4,000 ML per annum of the unallocated water.
- In 2013, GAWB’s Strategic Water Plan identified the GFP as GAWB’s preferred delivery mechanism for a second water source delivering GAWB’s 30,000 ML per annum of water, made available by the development of the LFRIP. Development of the GFP will most likely be driven by the need to respond to drought or should forecast water demand exceed GAWB’s water allocation from Awoonga Dam.
- GAWB’s Contingent Supply Strategy (CSS) provides it with a strategic mechanism to effectively and efficiently respond to the need for the augmentation of water supply, either due to a prolonged period of low inflows into Awoonga Dam (drought trigger) or demand growth (demand trigger). The CSS was developed as a result of the critical water supply constraints experienced by GAWB during the 1996–2003 drought. After evaluation against other potential augmentations options, the CSS identified GAWB’s preferred largescale augmentation option as the development of the GFP (with associated infrastructure development on the Lower Fitzroy River).
- In May 2016, the Commonwealth Government allocated \$2 million for the Queensland Government to prepare a business case for the LFRIP. In addition, the Commonwealth Government made an election commitment to provide \$130 million towards the construction of Rookwood Weir, subject to the outcomes of the business case, and the LFRIP receiving environmental and planning approvals and other matters.
- An EIS has been prepared for the LFRIP. The Coordinator-General’s Report on the EIS was released on 8 December 2016. This recommended the LFRIP proceed subject to conditions and implementation of the Proponents’ commitments in the EIS. The Commonwealth Government granted conditional Project approval under the EPBC Act on 28 February 2017.
- In September 2016, Building Queensland entered into an arrangement with SunWater and GAWB to manage the development of a DBC.
- An options assessment was undertaken in confirming the Reference Project for the DBC is the design and delivery of a new weir at Rookwood.



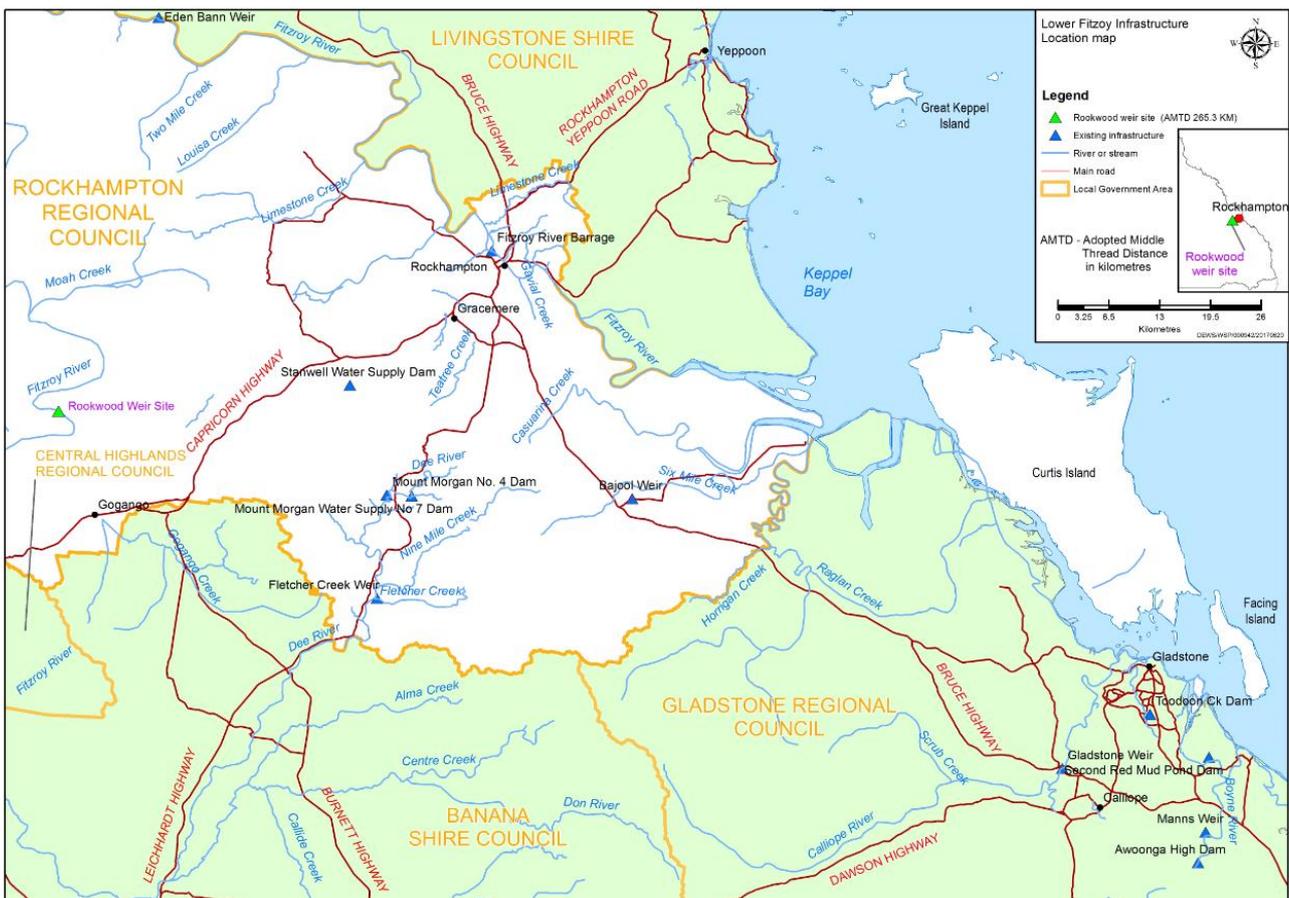
2.1 Purpose

This Chapter provides an overview of the Study Area, the regions and summary of the history of the LFRIP, including documentation of when the need for additional augmentation in the area was identified and the scope of previous studies and investigations and prior decisions.

2.2 The study area

The Study Area (Figure 2-1) for this Project encompasses urban, industrial/commercial and agricultural water users, as well as water infrastructure and services within three council areas: RRC, LSC and Gladstone Regional Council (GRC).

Figure 2-1 Study area



Further information on the Fitzroy Basin and Gladstone Region is provided below.

2.2.1 Fitzroy Basin

The Fitzroy Basin is the largest coastal basin in Queensland, and the second largest in Australia, covering an area of approximately 142,600 square kilometres (km)³. It contains a vast and diverse landscape, incorporating several major towns and regional centres such as Rockhampton, Biloela and Emerald. As shown in Figure 2-2, the catchment stretches from Clermont in the west to Rockhampton in the east, and as far north as Nebo and south to Wandoan.

³ <http://www.fba.org.au/fitzroy-basin/>



Figure 2-2 Fitzroy Basin



The Fitzroy Basin includes eleven catchments and contains six major river systems that all flow into the Fitzroy River, discharging into Keppel Bay and the Great Barrier Reef (GBR).

The Fitzroy Basin is home to around 230,000 people and supports a wide variety of industries and agriculture, as well as urban water demands. Agriculture makes up 90 per cent of the land use within the basin, as well as including 44 of Queensland’s 55 coal mines. Other sectors that contribute to regional production include metals manufacturing, energy generation and transport.

The basin is renowned for its agriculture, with Rockhampton referred to as the beef capital of Australia. Grazing is the largest land use in the Fitzroy Basin, accounting for just over 80 per cent of total land use⁴.

The Fitzroy Barrage (Figure 2-3) is located on the Fitzroy River in Rockhampton and was constructed in 1970. Flows in the Fitzroy River are captured in the Fitzroy Barrage as well as subsequent releases from Eden Bann Weir. The Fitzroy Barrage is owned and operated by Fitzroy River Water, a business unit of RRC. The Fitzroy Barrage is used to supply water for urban, irrigation and recreation purposes. It is the primary water supply source for Rockhampton and provides roughly half of the urban water needs of the Capricorn Coast region.

⁴ <https://www.fba.org.au/access-support/grazing-support>



Figure 2-3 Fitzroy Barrage



Eden Bann Weir is located approximately 62 km north-west of Rockhampton. It was completed in 1994 and is owned by SunWater and operated under the Lower Fitzroy WSS. Eden Bann Weir is primarily used to supply cooling water to Stanwell Power Station via releases downstream to a pipeline accessing water from the ponded area of the Fitzroy Barrage.

Contained in Queensland's *Water Act 2000*, the Fitzroy Basin Water Plan (2011) provides the framework for the sustainable management of current and future water demand. The Fitzroy ROP prepared under the provisions of the *Water Act 2000*, provides legislative and contract requirements for the allocation and drawing of raw water from the Fitzroy Barrage area.

2.2.2 The Gladstone region

The Gladstone region is home to approximately 67,500 people⁵, and has an estimated regional output of approximately \$11.674 billion⁶, with close to 40 per cent directly attributed to the manufacturing sector. Gladstone is home to two of the world's largest alumina refineries, Queensland's largest multi-commodity port and three Liquefied Natural Gas plants.

Gladstone is located in the Boyne River catchment. Encompassing an area of 2,230 square km, the Boyne river catchment feeds into the Awoonga Dam, which is the primary source of water for the Gladstone region and the fourth largest dam in Queensland. Awoonga Dam, constructed in late 1984 and raised to its current

⁵ <http://www.economyprofile.com.au/gladstone/trends/population>

⁶ <http://www.economyprofile.com.au/gladstone/industries/output#pie-chart>



Full Supply Level (FSL) in 2002, is owned and operated by GAWB, which holds a 78,000 ML per annum water entitlement under the Boyne ROP.

Figure 2-4 Awoonga Dam



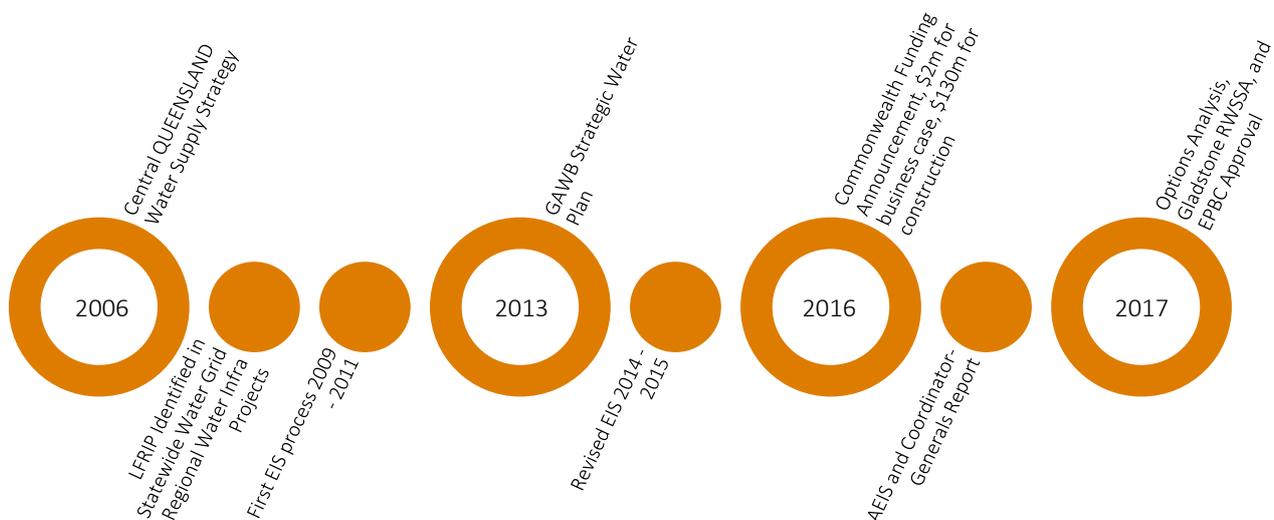
77 per cent of the raw water drawn from the Awoonga Dam is supplied in an untreated form to various large industrial customers in the region, as well as the Callide Valley near Biloela. The other 23 per cent is treated to drinking water standards and supplied to drinking water customers, such as homes and commercial businesses.

2.3 Development of the proposal

The LFRIP has been the subject of various strategies and plans, with several state government department reports in the 1990s identifying possible water infrastructure developments on the Lower Fitzroy River, including construction of Rookwood Weir and augmentation of the existing Eden Bann Weir.

More recently, in 2006, the need for expanded storage in the Fitzroy Basin and Gladstone Region a focus of the (then) Queensland Department of Natural Resources and Water in the CQRWSS, which was followed by a series of activities, investigations and reports (refer Figure 2-5).

Figure 2-5 Key activities in LFRIP development





The CQRWSS notes the urban and industrial water resource demands of the RRC, LSC and GAWB 'cannot be met by trading and demand management savings alone'⁷. The CQRWSS, as with many subsequent studies and plans, identified several augmentation options that could be undertaken along the Lower Fitzroy River that could be used to reliably meet the identified water needs of these areas. In particular, the CQRWSS identified the potential solutions of raising the existing Eden Bann Weir and/or construction of a new weir at Rookwood.

The Water Plan (Fitzroy Basin) 2011 and the Fitzroy Basin ROP, identified the 'strategic water infrastructure reserve' in the Lower Fitzroy River as being 76,000 ML per annum. The ROP may accept a submission from GAWB for the provision of 30,000 ML per annum of unallocated water from this strategic water infrastructure reserve for urban and industrial supplies. Likewise, LSC could make a submission for 4,000 ML per annum of the unallocated water. The remaining 42,000 ML may be made available for other uses within the Lower Fitzroy region, including agricultural use or to supplement supply to the Rockhampton reticulation network.

In 2013, GAWB released its Strategic Water Plan which included its CSS. The CSS set out GAWB's approach to meeting the current and future water needs of its customers, taking into account demand, security and reliability of supply, and price. The Strategic Water Plan states:

Any water supply system that relies upon a single water source has, compared to other water supply systems that have multiple integrated sources, a higher inherent risk as it has a single point of failure. Ideally a water supply system will consist of multiple water sources with different yet complementary hydrological characteristics.

The Plan 'identified the GFP as the preferred water source augmentation option'⁸ as GAWB's preferred delivery mechanism for a second water source and would deliver GAWB's 30,000 ML per annum of water, made available by the development of the LFRIP.

In May 2016, following the revised LFRIP EIS process, the Commonwealth Government allocated \$2 million for the Queensland Government to develop a business case for the LFRIP. In addition, the Commonwealth Government made an election commitment to provide \$130 million towards the construction of Rookwood Weir, subject to the outcomes of the business case, and the LFRIP receiving environmental and planning approvals and other matters.⁹

The Coordinator-General's Report released on 8 December 2016 recommends 'that the Project proceeds subject to the conditions and in accordance with the recommendations set out'¹⁰ in the report, and subject to the implementation of the proponents' commitments in the EIS. The Commonwealth Government Minister granted conditional Project approval under the EPBC Act on 28 February 2017.

In September 2016, Building Queensland entered into an arrangement with SunWater and GAWB to manage the development of a DBC, with an options assessment undertaken in confirming the Reference Project for the DBC is the design and delivery of a new weir at Rookwood.

Table 2-1 provides an overview of the key activities and milestones for the LFRIP.

⁷ CQRWSS, page 50.

⁸ NB the Gladstone-Fitzroy Pipeline Project is outside the scope of the LFRIP and retains an approved EIS from the state and Commonwealth governments.

⁹ AEIS, Chapter 8.

¹⁰ Lower Fitzroy River Infrastructure Project. Coordinator-General's evaluation report on the environmental statement (Dec 2016).
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Table 2-1 Key activities and milestones

DATE	ENTITY	ACTIVITY / MILESTONE
Dec-2006	Queensland Department of Natural Resources	CQRWSS. This strategy identifies the Lower Fitzroy as a future main source of supply for the urban and industrial needs of the Rockhampton, Fitzroy and Livingstone council areas and GAWB customers
Dec-2007	Queensland Department of Infrastructure and Planning	LFRIP identified in the Program of Works, Statewide Water Grid Regional Water Infrastructure Projects
Oct-2009	Minister for the Environment	Project referred
Jan-2010	Minister for the Environment	Project determined to be a 'controlled action'
Nov-2010	Queensland Department of Infrastructure and Planning	Initial Advice Statement submitted (prepared by GHD on behalf of GAWB and SunWater)
May-2011	Coordinator-General, Queensland	Gazettal of 'coordinated Project' declaration
Nov/Dec-2011	Coordinator-General, Queensland	Draft terms of reference for EIS public consultation
Apr-2012	Coordinator-General, Queensland	Final terms of reference for EIS
Nov-2013	GAWB	Strategic Water Plan (and incorporating GAWB's Contingency Supply Strategy)
Mar-2014	Coordinator-General, Queensland	Coordinator-General stated a new Project declaration lapse date of 30 October 2014
July/Aug-2014	Coordinator-General, Queensland	Revised draft terms of reference for EIS public consultation
Sep-2014	Coordinator-General, Queensland	Revised final terms of reference issued
July/Aug-2015	GAWB and SunWater	DRAFT EIS complete
July/Aug-2015	Coordinator-General, Queensland	Draft EIS public consultation
Nov-2015	Coordinator-General, Queensland	Revised draft EIS requested by the Coordinator-General
Dec-2015	Coordinator-General, Queensland	Amended Project declaration
Jan-2016	Infrastructure Australia	The LFRIP is identified as a 'Priority Initiative' on the Infrastructure Priority List
May-2016	Deputy Prime Minister and Minister for Agriculture and Water Resources	\$2 Million in funding for the LFRIP Business Case



DATE	ENTITY	ACTIVITY / MILESTONE
May-2016	Deputy Prime Minister and Minister for Agriculture and Water Resources	\$130 Million in funding for the construction of Rookwood Weir, subject to the development of a final business case
May/Jun-2016	GAWB and SunWater	Additional information to the draft EIS
Aug-2016	GAWB and SunWater	Addendum to the additional information to the draft EIS
Sep-2016	Coordinator-General, Queensland	The Coordinator-General accepted the revised draft EIS and the Additional EIS (AEIS) Addendum as the final EIS
Sep-2016	Building Queensland, SunWater and GAWB	Business Case Development Arrangements between Building Queensland and the proponents
Sep-2016	GAWB and SunWater	Business Case Preparation commences
Dec-2016	Coordinator-General, Queensland	The Coordinator-General report on the EIS
Dec-2016	Building Queensland	Options analysis for the Reference Project undertaken
Feb-2017	Queensland Department of Energy and Water Supply	Gladstone RWSSA. This provides valuable information to the community and water supply planners about the water supply security for Gladstone and provides a foundation for future water supply planning
Feb-2017	Minister for the Environment	Project determined to be a 'controlled action' (subject to conditions).
Feb-2017	Building Queensland	Project Initiation - LFRIP. Noted by the Building Queensland Board

2.4 Related infrastructure

The GFP is a related infrastructure initiative that would be required to transfer GAWB's allocation, approximately 30,000 ML per annum, from the Fitzroy River to GAWB's existing water infrastructure at Yarwun. The GFP would broadly include:

- an underground pipeline approximately 115 km long and 1 m in diameter from Laurel Bank near Rockhampton to Yarwun just north of Gladstone
- an intake and pump station on the Fitzroy River at Laurel Bank
- a water treatment plant, reservoir and pump station at Alton Downs
- a booster pump station and reservoir at Raglan
- reservoir at Aldoga.

An EIS has been prepared for the GFP, with the Coordinator-General's Report on the EIS released on 2 February 2010. This recommended the GFP proceed subject to conditions and implementation of proponents' commitments in the EIS. The Commonwealth Government granted conditional Project approval under the EPBC Act on 4 November 2011. The Coordinator-General has extended the currency period for the EIS evaluation Report to 2 February 2018.

A number of known risks that could impact on the delivery of the GFP include:

- pipe material and suppliers. Strong competition for MSCL pipe manufactured in Queensland and Australia could cause procurement delays (alternative pipe materials and/or suppliers should be considered)



PROPOSAL BACKGROUND

- power. Preliminary advice indicates that it could take three years (from lodgement of an application) for power upgrades to be implemented
- environmental. GAWB, the nominated proponent of the GFP, is required to meet the conditions and commitments outlined in the EIS, noting failure to meet or adequately manage these commitments could cause delays and/or additional costs.
- delays in obtaining all other necessary approvals required for the construction of the pipeline and associated infrastructure.

In 2007, GAWB prepared a business case for the GFP. It is a recommendation of the LFRIP DBC future investment approval that the GFP will be subject to an updated and revised DBC prior to any Queensland Government decisions being made. For the purposes of the LFRIP DBC, the costs and benefits associated with GAWB accessing and distributing the 30,000 ML per annum are not considered in the economic assessment. Only the financial payment for the 30,000 ML is recognised in the financial and affordability assessment (i.e. GAWB is treated as a customer for the purposes of the analysis undertaken in this DBC).

Regulator risk/s associated with GAWB's ability to 'pass-through' the associated water charges for GAWB's water allocation under the LFRIP to existing customers is further discussed in Section 20.2.2.



3 METHODOLOGY

CHAPTER SUMMARY AND CONCLUSIONS:

- This DBC has been developed in accordance with the Building Queensland *Business Case Development Framework* (BCDF) and the Queensland Treasury’s *Project Assessment Framework* (PAF).
- Part D (Analysis) and Part E (Delivery) have utilised a range of assessment and evaluation methodologies, in accordance with current Building Queensland BCDF guidelines and requirements.
- Adopted methodologies for ongoing management strategies, including risk and stakeholder management, are in line with requirements under BCDF and other industry practices (including risk management principles and practices as outlined in ISO 31000:2009).

3.1 Purpose

This chapter outlines the approaches underpinning the overall DBC development process and the methodologies utilised in the development and assessment of the options.

The DBC has been developed in accordance with the requirements and guidance material under Queensland Treasury’s PAF and the Building Queensland BCDF.

3.2 Methodologies utilised

A range of methodologies have been employed across all sections of the DBC with a summary of the methodologies used in the different components of the DBC outlined below. Further detail on methodological approaches, particularly for the Project Analysis and Recommendations are in the relevant Chapters.

Table 3-1 Methodologies utilised throughout the DBC

DBC COMPONENT	METHODOLOGY
PART A	Background and Overview
All Chapters	Summary of: <ul style="list-style-type: none"> ▪ regional information and historical findings based on previous studies and publicly available information ▪ Methodological approaches utilised ▪ Governance arrangements established for the development and oversight of the DBC
PART B	Strategic Requirements
Service Need	Examination of current and future water user needs, identified problems / opportunities and the evidence from investigations and studies Identification of benefits anticipated from a solution that meets the service needs and examination of the current and known policy environment and drivers for intervention and provides context for timing rationale
PART C	Options



DBC COMPONENT	METHODOLOGY
Options Considered	Summary of options considered
Base Case and Reference Project	Defined scope based on technical investigations and expert advice
Strategic, Legal, Market and Public Interest Considerations	Examination of the Reference Project in terms of the current and known policy environment, legal and regulatory requirements, market conditions and public interest test
PART D	Analysis
Economic Analysis	Cost Benefit Analysis (CBA) methodology utilised, with an assessment of the incremental costs and benefits from the Base Case to the Reference Project. This assessment complies with the current Building Queensland CBA guidance material
Social Impact Evaluation	The Social Impact Assessment (SIA) undertaken for the EIS has been reviewed and updated in accordance with the Building Queensland <i>Social Impact Evaluation (SIE)</i> guidance material
Environmental Assessment	Relevant regulatory and legislative approvals and requirements were identified and the timing and cost implications adopted into the implementation plan and the budget and funding requirement for the Reference Project
Financial / Commercial	Whole-of-life financial analysis has been prepared, with key commercial assumptions and inputs identified.
PART E	Delivery
Delivery Model Analysis (including Public Sector Comparator and Affordability)	Different staging, contracting and financing strategies were considered against public interest and the value for money proposition (including retained and transferred risk profiles).

In addition to the methodologies described above, the approach utilised in the risk and stakeholder management processes are further discussed below.

3.3 Ongoing management strategies

In the development of the DBC, several management strategies are undertaken in conjunction with, and parallel to, the business case process. These include benefit, risk and stakeholder engagement management processes and strategies.

Benefit management activities for the LFRIP, developed in accordance with Building Queensland’s BCDF, include identification of:

- benefits sought in responding to the need and/or opportunities
- further beneficiaries and other stakeholders (and articulating the relationship between benefits sought and stakeholders)
- monetary and non-monetary benefits (as well as dis-benefits) to be achieved for the Reference Project. This includes documenting benefits dependencies, assumptions and risks associated to realising benefits.

As emerging benefits were identified and analysed they were included in the various chapters of the DBC. Ongoing monitoring, management and update of the Benefits Register is the responsibility of the nominated Project Director as the LFRIP moves into the delivery phase.



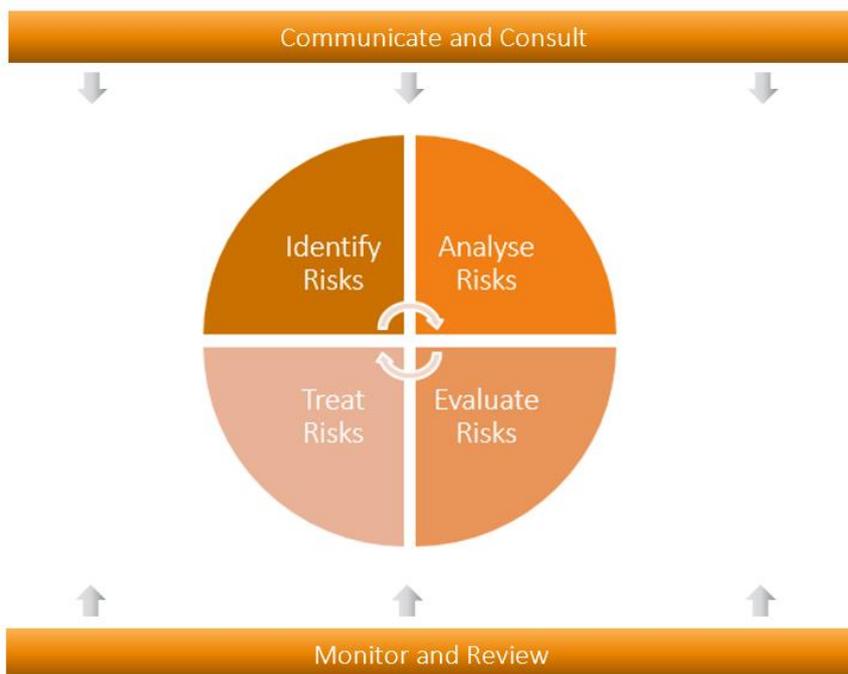
Further information on the Risk Management approach has been provided below.

3.3.1 Risk framework and approach

The risk management process is embedded into the overall business case development process featuring in the development of the estimate, program and risk mitigation strategies.

The risk-management process implemented to assess the Project risk is based upon the practices of the ISO 31000:2009 risk management standards (refer to Figure 3-1). Throughout the process there is constant communication and consultation with the team and monitoring and reviewing of the risks as understanding is developed.

Figure 3-1 Risk management process



The risk management approach is to continuously identify risks, develop strategies to manage the risks, monitor the effectiveness of these strategies and update as required.

Importantly, the development, delivery and operational risks identified and captured will require ongoing management, overseen by the nominated Project Manager. For the delivery phase of the LFRIP, the nominated Project Manager will be responsible for the update of the Risk Register, monitoring and review of risks and responsibilities for instigation or

mitigation measures if deemed appropriate (or communication of required treatments to the appropriate parties).

The risks identified in the Risk Register have been given due consideration and managed during DBC development. This has ensured the Reference Project has accounted for key risks and risk considerations and has ensured that these have been incorporated into cost estimates.

Following a review of the existing risk matrices of both SunWater and GAWB, it was determined that a Project specific risk matrix (refer to Figure 3-2) would need to be developed to best represent the criteria and magnitude of the risks expected to be encountered.



Figure 3-2 Business case risk matrix

			Consequences				
			Insignificant	Minor	Moderate	Major	Severe
Time			< 1 day	1 day – 1 week	1 week – 2 weeks	2 weeks – 1 month	>1 month
Financial			<100k	100 – 750k	750k – 3m	3-5m	>5m
Likelihood	Almost Certain	>90%	Medium	High	High	Extreme	Extreme
	Likely	70 – 90%	Medium	Medium	High	High	Extreme
	Possible	30-70%	Low	Medium	Medium	High	High
	Unlikely	11-30%	Low	Low	Medium	Medium	High
	Rare	<10%	Low	Low	Low	Medium	Medium

Guidance from SunWater and GAWB was initially used to interpret the likelihood of risks and consequences.

The likelihood is linked to a probability range which in turn is lined to a probability represented during the statistical analysis. The mid-point of the range is used as the value to represent the range for modelling purposes (refer to Table 3-2).

Table 3-2 Likelihood rating

LIKELIHOOD	RANGE	MIDPOINT
Almost Certain	>90%	95%
Likely	70-90%	80%
Possible	30-70%	50%
Unlikely	10-30%	20%
Rate	<10%	5%

The risk analysis considered both quantitative and qualitative implications from identified risk events. These included risks associated with:

- land (acquisition/easement and compensation)
- approvals
- environmental
- cultural heritage
- design and construction
- operations



- process risks (including governance, business case development, technical, financial and commercial, legal, stakeholders)
- revenue and demand risk.

For the purposes of the DBC, those risks determined to have a cost and/or time impact were quantified and included in the risk cost analysis and associated provisions. Table 3-3 provides a summary of the cost impacts and time delays used for each consequence category.

Table 3-3 Consequence categories

CONSEQUENCE	COST	TIME
Severe	> \$5 million	> 1 month delay
Major	\$3 million to \$5 million	2 weeks to 1 month
Moderate	\$0.75 million to \$3 million	1 week to 2 weeks
Minor	\$0.1 million to \$0.75 million	1 day to 1 week
Insignificant	< \$0.1 million	< 1 day



4 GOVERNANCE

CHAPTER SUMMARY AND CONCLUSIONS:

- GAWB and SunWater are the joint Proponents for the development of the LFRIP DBC.
- Each Proponent entered into a formal agreement with Building Queensland in September 2016 to lead development of the DBC.
- A Project Working Group (PWG) has operated to develop the content of the DBC, with representation of Building Queensland personnel and Proponent representatives and others as required.
- DBC development was overseen by the LFRIP Steering Committee, which operated under the Project Terms of Reference. The Steering Committee considers and accepts/rejects the final DBC recommendations and submits to Building Queensland Board
- The Building Queensland Board considers, endorses / rejects, resolves / recommends the final DBC, which is then submitted to the GAWB and SunWater Boards.
- The Proponents' Boards will consider, endorse / reject, resolve / recommend the final DBC and the recommendations presented in this report and submits the DBC to the relevant Ministers for consideration. In conjunction, the Building Queensland Board presents a copy of this report to the Deputy Premier.
- Should the responsible Ministers approve proceeding with the delivery of the recommended initiative, the DBC will be used to support a submission to the Cabinet Budget Review Committee (CBRC) where required, with CBRC the body responsible for Queensland Government funding approval

4.1 Purpose

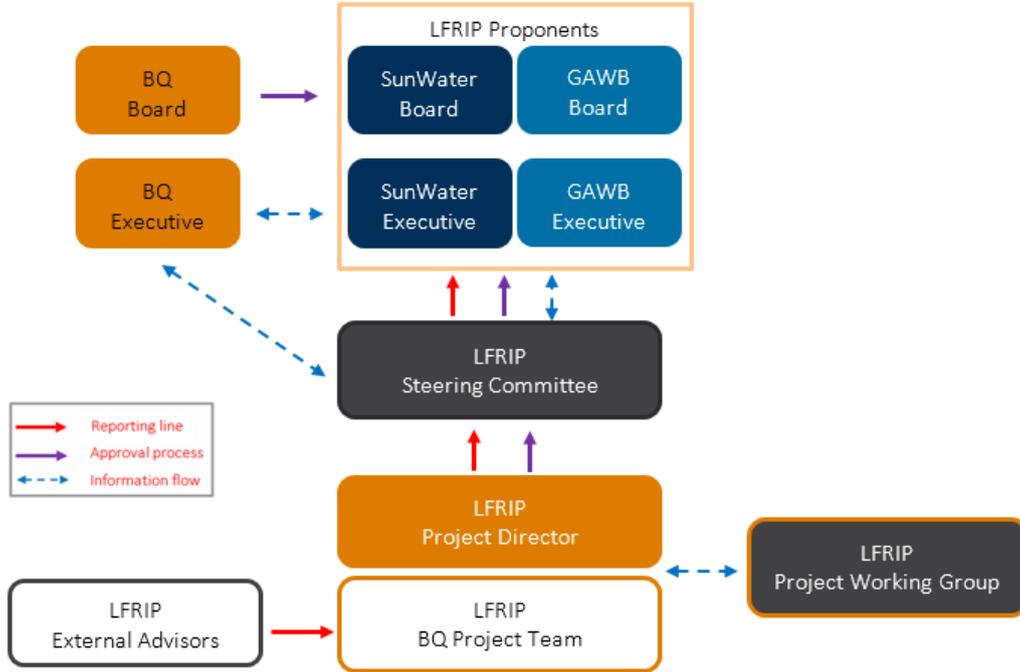
This Chapter sets out the Governance structure and arrangements for the LFRIP during the development of the DBC. The Implementation Plan Chapter includes a summary of the governance arrangements during delivery and operations.

4.2 Governance structure and ownership

A governance framework was established by Building Queensland in conjunction with the joint proponents, SunWater and GAWB. The governance structure illustrated in Figure 4-1 was adopted for DBC development, to guide and inform decision making and to facilitate a transparent and accountable reporting framework.



Figure 4-1 Governance structure for the DBC



GAWB and SunWater are the designated joint proponents for the LFRIP, with the proponents’ joint development of the LFRIP.

Figure 4-2 Overview of the proponents



GAWB was established in 1973 as a Project Board under State and *Regional Planning and Development, Public Works Organisation and Environmental Control Act 1971-73*. GAWB is a Category 1 water authority under the *Water Act 2000*, and reports to DEWS.

GAWB owns and operates Awoonga Dam on the Boyne River, as well as the associated network of delivery pipelines and water treatment facilities. GAWB currently holds a 78,000 ML per annum license from Awoonga Dam under the Water Resource (Boyne River) Plan 2000.



SunWater was established as a statutory Government Owned Corporation (GOC) on 1 October 2000 under the *Government Owned Corporations Act 1993*.

SunWater manages and develops bulk water supply infrastructure that spans Queensland. It is Queensland’s largest regional supplier, owning and managing around \$13 billion in water infrastructure assets and supplying approximately 40% of all water used commercially in the state.



Building Queensland, an independent statutory body established under the *Building Queensland Act 2015*, is responsible for leading the preparation of business cases for infrastructure initiatives proposed by government agencies with an estimated capital cost of \$100 million or more¹¹, which includes the LFRIP.

Each proponent entered into a formal agreement with Building Queensland in September 2016 to lead the development of the DBC.

DBC development was overseen by the LFRIP Steering Committee, which operated under the Project Terms of Reference.

4.3 Roles and responsibilities

Table 4-1 provides an overview of the roles, responsibilities and composition of the oversight and management bodies for the LFRIP.

Table 4-1 Roles, responsibilities and composition

ATTRIBUTE	DESCRIPTION
LFRIP Business Case Steering Committee	
Role	<p>The role of the Steering Committee is to:</p> <ul style="list-style-type: none"> ▪ provide leadership and direction to the development of the DBC ▪ endorse key elements of the DBC as it was developed, in accordance with specified 'control points' ▪ consider the final DBC and make a recommendation to the Building Queensland, SunWater and GAWB Boards.
Composition	<p>Members of the Steering Committee included:</p> <ul style="list-style-type: none"> ▪ Independent Chair (nominated jointly by SunWater and GAWB) ▪ SunWater Chief Executive Officer (CEO) ▪ GAWB CEO ▪ Building Queensland CEO ▪ DEWS representative ▪ Queensland Treasury representative ▪ Department of the Premier and Cabinet representative. <p>The Steering Committee can agree to vary the membership of the Steering Committee as required. Observers were invited to attend from Queensland and Commonwealth Government agencies with specific interest in the LFRIP. Observers included representatives from Infrastructure Australia, the DNRM, Department of State Development (DSD) and the DAF.</p>

¹¹ Building Queensland's functions and powers are set out in the *Building Queensland Act 2015* and include leading the development of business cases for projects with potential government investment over \$100 million.



ATTRIBUTE	DESCRIPTION
Responsibilities	<p>The responsibilities / functions of the Steering Committee include:</p> <ul style="list-style-type: none"> ▪ meet monthly (with special meetings called by the Chair to discuss critical issues as appropriate) ▪ issue an agenda prior to all meetings and record minutes ▪ the functions described in 'Role' above ▪ being the primary 'control point' approval body, addressing key components of the Business Case systematically as the Business Case was developed ▪ endorsing key Business Case outputs and documentation. ▪ budget review and acceptance. <p>Further responsibilities for Steering Committee members are outlined in the Project Terms of Reference.</p>
LFRIP Project Director	
Role	Manage the day-to-day activities required to develop and deliver the DBC
Composition	Project Director, appointed by Building Queensland
Responsibility	The Project Director is responsible for managing the LFRIP Project Team, overseeing the management of a wide number of advisors, coordinating and responding to key stakeholder interest and needs, and progressing Project related recommendations to the Steering Committee.
LFRIP Project Working Group	
Role	Provide a forum for the Project Team, Project proponent representatives and government agency representatives to discuss DBC progress, critical and emerging issues, resolution strategies, and the DBC work program.
Composition	<p>The membership of the Project Working Group included:</p> <ul style="list-style-type: none"> ▪ Building Queensland Project Director (Chair) ▪ Building Queensland Project Team members ▪ SunWater Project Manager ▪ GAWB Project Manager <p>The PWG could invite observers and parties to participate as required.</p>
Responsibility	<p>The PWG was required to:</p> <ul style="list-style-type: none"> ▪ meet weekly to consider progress of the DBC, discuss and respond to critical emerging issues, devise resolution strategies, and discuss the budget for developing the DBC ▪ provide a forum for PWG members to access information to brief their respective agencies ▪ issue an agenda prior to all meetings and record minutes ▪ document the meetings and actions raised at all meetings ▪ identify issues to be raised with the Steering Committee ▪ budget review, forecasting and recommendations.

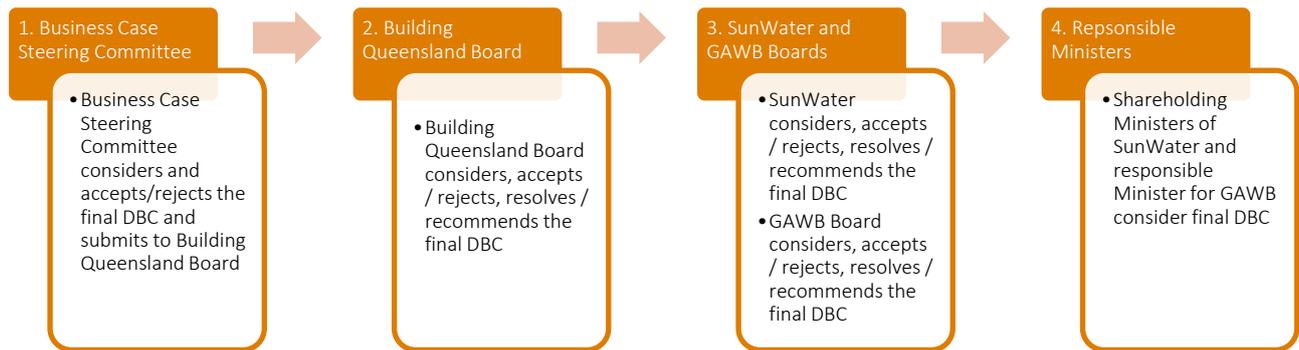


ATTRIBUTE	DESCRIPTION
LFRIP Project Team	
Role	To support the nominated Project Director to develop the DBC
Composition	<ul style="list-style-type: none"> ▪ Project Manager/s ▪ Business Case Manager ▪ Project Officer (DEWS) ▪ Project Officer (Building Queensland)
Responsibility	Under the direction of the Project Director, the Project Team was responsible for: <ul style="list-style-type: none"> ▪ addressing and resolving issues to ensure the successful completion of a DBC ▪ assisting the Project Director to manage and oversee external advisors ▪ responding to issues raised by the proponents ▪ maintaining appropriate records of issues and responses ▪ budget Preparation and management.
LFRIP External Advisors	
Role	Building Queensland engaged external advisors (through competitive tendering processes) to assist with development of the DBC.

4.4 Approvals and ministerial oversight

Upon finalisation of the DBC by the LFRIP Project Team, the DBC is to be considered in accordance with the process outlined in Figure 4-3.

Figure 4-3 Approvals Process for the LFRIP DBC



Should the responsible Ministers approve proceeding with the delivery of the recommended initiative, the DBC will be used to support a submission to the CBRC where required, with CBRC the body responsible for Queensland Government funding approval.

The roles and responsibilities of the relevant Ministers are discussed in Table 4-2.



Table 4-2 Roles of Relevant QLD Government Ministers (for the LFRIP)

ATTRIBUTE	DESCRIPTION
Minister for Energy, Biofuels and Water Supply	
Role	<p>Role in relation to the LFRIP DBC includes:</p> <ul style="list-style-type: none"> ▪ a Shareholding Minister for SunWater (in addition to the QLD Treasurer) ▪ the Shareholding Minister in GAWB.
Responsibilities	<p>Responsibilities in relation to the LFRIP DBC:</p> <ul style="list-style-type: none"> ▪ Consider the findings and recommendations of the DBC and approve / reject subsequent SunWater Board resolutions, in conjunction with the other Shareholding Minister (the QLD Treasurer). ▪ Consider the findings and recommendations of the DBC and approve / reject subsequent GAWB Board resolutions.
Treasurer	
Role	<p>Role in relation to the LFRIP DBC Include:</p> <ul style="list-style-type: none"> ▪ A Shareholding Minister for SunWater (in addition to the Minister for Energy, Biofuels and Water Supply)
Responsibility	<p>Responsibilities in relation to the LFRIP DBC.</p> <ul style="list-style-type: none"> ▪ Consider the findings and recommendations of the DBC and approve / reject subsequent SunWater Board resolutions, in conjunction with the other Shareholding Minister (the QLD Treasurer).
Minister for Infrastructure and Planning	
Role	Ministerial oversight of Building Queensland
Responsibility	<p>Responsibilities in relation to the LFRIP DBC</p> <ul style="list-style-type: none"> ▪ Consider the findings and recommendations of the DBC.



SERVICE NEED

PART B – STRATEGIC REQUIREMENTS



5 SERVICE NEED

CHAPTER SUMMARY AND CONCLUSIONS:

- This chapter considers the service need for the LFRIP and utilises the information and findings from the CQRWSS (2006), the Rockhampton RWSSA (2016), Gladstone RWSSA (2017) and the demand analysis undertaken.
- Current state:
 - Water is supplied to urban, commercial, industrial and agricultural customers across the Lower Fitzroy and Gladstone regions primarily under one of three water supply schemes, including the Lower Fitzroy WSS, Fitzroy Barrage WSS and the Awoonga Dam WSS. The water allocations and a snapshot of 2015-16 water usage is provided below.

SUPPLY SOURCE	TOTAL ALLOCATION (ML)	RESIDENTIAL USE (ML)	AGRICULTURAL USE (ML)	INDUSTRIAL USE (ML)	WATER TO CAPRICORN COAST (ML)	SUNWATER / NON-REVENUE/ OTHER USE (ML)	TOTAL USAGE (ML PER ANNUM, 2015-16)
Fitzroy Barrage	62,093	9,704.3	4,729.8	5,589.3	2,893.4	2,116	25,032.8
Eden Bann	28,621	0	0	19,793	N/a	86	19,879
Awoonga Dam	78,000	10,590	N/a	~37,885	N/a	N/a	48,475
TOTAL	168,714	20,294.3	4,729.8	63,267.3	2,893.4	2,202	93,386.8

- Total water usage across the Study Area typically runs less than 60 per cent of the total allocation on any given year. The water use is linked to a range of factors, including economic activity (including commodity prices, income, employment and production), weather and demographics (including population and household size and make-up).
- Demand drivers and influencers:
 - Gladstone’s population is expected to grow by an average of 2.13 per cent per annum, followed by Livingstone at 2.06 per cent per annum from 2016 to 2036. Over the same period, the population of Rockhampton is expected to grow at 0.98 per cent per annum. Collectively, the Study Area is expected to see an average annual growth of approximately 1.63 per cent per annum. This is comparable to the overall Queensland state population growth rate of 1.67 per cent per annum over this twenty-year period.
 - Temperatures across the Study Area are projected to continue to rise over the remainder of the century. By 2030, it is anticipated there will be longer dryer periods, interrupted by more intense rainfall events. While the assessment period for the LFRIP is 30 years, the asset has a useful life of 100 years. As such, it is noted that by 2070, ‘under a high emissions scenario, it is likely that eastern parts of the region will experience more time in drought’¹², including Rockhampton and Gladstone.

¹² Draft Climate Change in the Central Queensland region, DEHP, 2016



- Irrigation in and around Central Queensland is largely supplied through medium priority allocations, and range from as low as \$60 per ML to as high as \$1,982 per ML. Very little high priority allocations are currently utilised for irrigation purposes, noting Dawson Valley has 1 ML at \$1,800 and Boyne Tarong has 24 ML at \$3,000.
- The Lower Fitzroy is one of Queensland and Australia’s premier agricultural regions in terms of soil, rainfall, proximity to market and access to supporting infrastructure such as transport and ports. However, the region has a great deal more latent agricultural potential – including high value crops which could be grown on quality soils that are currently only used for grazing.
- Strong demand for beef and macadamia nuts has resulted in higher prices for these agricultural activities. Recent DAF analysis of land suitability for different irrigated crops across the Lower Fitzroy area identified a higher proportion of lands suitable to wheat crops, using overhead spray irrigation (approximately 36,617 ha) than there is for sorghum, using furrow/row irrigation techniques (approximately 10,197 ha).
- Future demand and ongoing security:
 - While residential growth across the Study Area is unlikely to result in additional water demand above existing allocations until after the forward 30 years (post 2036), all water user groups are exposed to the water security risks associated with GAWB’s single supply source risks and Rockhampton’s risk exposure associated with just one ‘failed’ wet season. As previously noted, it is anticipated there will be longer dryer periods, interrupted by more intense rainfall events based on current climate projections for the Study Area.
 - In 2013, GAWB undertook stochastic modelling of its future demand, based on its understanding of the requirements of both existing and future customers at that time, as part of the development of its 2013 Strategic Water Plan. The modelling suggested a 10 per cent probability of additional capacity being required by 2020 and a 50 per cent probability by 2030.
 - The Fitzroy Barrage is heavily reliant on seasonal inflows from the Fitzroy River, in particular the occurrence of annual wet season events, to maintain continuity of supply. The Rockhampton RWSSA ‘estimated that at current levels of demand the storages could fall from full to empty in about 16 months’¹³. However, further analysis demonstrates storage levels could fall from full to below minimum operating level well under 12 months (assuming no further inflows to the storages during this period and minimal groundwater contributions from the surrounding area to the storage).
- Service need
 - there is a continuing need to reduce current and ongoing water supply risks, and an opportunity to increase water available for economic opportunities. The below table summarises the service need by user group.

User Group	Need and/or opportunity
Rockhampton urban water users	Rockhampton is reliant on annual inflows to meet its water requirements and is susceptible to supply security risk, after just one failed wet season.

¹³ RRWSSA, page 15



Livingstone urban water users	The development of the Reference Project allows LSC to meet its stated immediate need to manage its own water supply and security risks
Gladstone (all user groups)	While it is less likely that Gladstone will need additional water supply before 2030 especially in the absence of drought conditions, it is considered more likely than not (greater than 50 per cent likelihood) that there will be a need for access to this water by no later than 2037 due to either drought and/or demand growth.
Industrial water users	No service need has been identified for large-scale industrial water users within the Fitzroy Basin
Agricultural water users	There is an opportunity to expand agricultural production adjacent to the Fitzroy River. The Reference Project would address this potential opportunity despite it having a number of uncertainties associated with demand for agricultural water from this Project

Anticipated benefits from meeting the needs and opportunities include:

- Additional water made available for customers along the Lower Fitzroy River, an increase in regional employment from increased agricultural production, mitigation of the economic impacts associated with a 'failed wet season' for Rockhampton, the avoidance of the costs associated with the future development and operation of a weir on the Lower Fitzroy River and improved access and connectivity.

5.1 Purpose

This chapter details the service need for the LFRIP, through examination of the current and future water supply, use and demand factors, identification of the problems and opportunities which define the service need and the benefits sought from any solution.

Importantly, this chapter utilises and is supported by information and findings provided by:

- CQRWSS (2006)
- Rockhampton RWSSA (2016) and Gladstone RWSSA (2017)
- demand analysis for the Lower Fitzroy (Rookwood Weir)

5.2 Current state

This section outlines the current state for water supply, use and security in the Lower Fitzroy (including Rockhampton) and Gladstone areas.

5.2.1 Water supply

Water is supplied to urban, commercial, industrial and agricultural customers across the Lower Fitzroy and Gladstone regions primarily under one of three water supply schemes, as identified in Figure 5-1.



Figure 5-1 Relevant water supply schemes for the LFRIP study area

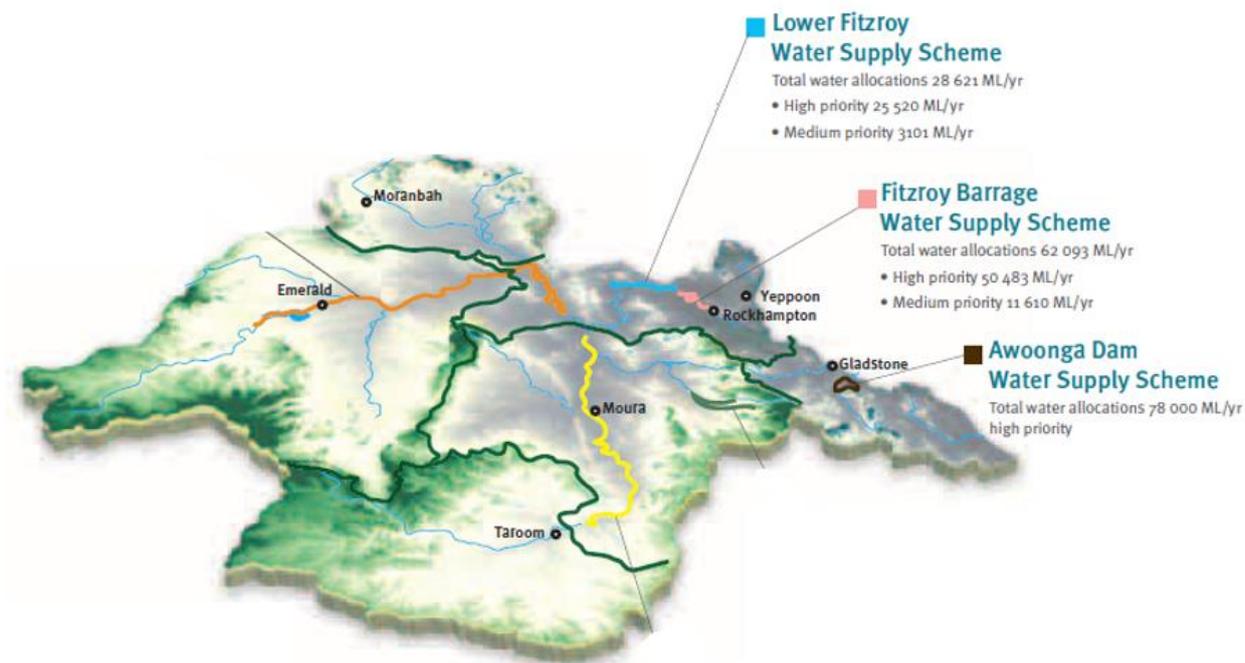


Table 5-1 provides a summary of the three WSSs, including primary water storage infrastructure, water volumes and allocations.

Table 5-1 Relevant water supply schemes

	LOWER FITZROY WSS	FITZROY BARRAGE WSS	AWOONGA DAM WSS
Primary Water Storage*	Eden Bann Weir	Fitzroy Barrage	Awoonga Dam
Storage Volumes ¹⁴	Full supply volume 35,900 ML Usable volume 26,250 ML	Full supply volume 74,400 ML ¹⁵ Usable volume 49,850 ML	Full supply volume 776,854 ML Usable volume 770,454 ML
Allocations under the WSS	Total allocation 28,621 ¹⁶ ML per annum Consisting of: 3,101 ML of medium priority 25,520 ML of high priority	Total allocation 62,093 ML per annum Consisting of: 11,610 ML of medium priority 50,483 ML of high priority	Total allocation 78,000 ML per annum Contracted commitments of approx. 60,000 ML, including 10,300 ML per annum reserved for urban use.

*There are a large number of smaller, private water supplies in the region accessing un-supplemented stream flows. These smaller supplies divert water under natural and high flow conditions (water harvesting) and do not benefit from an assured supply being supplied by WSS infrastructure.

¹⁴ Department of Energy and Water Supply (2016 & 2017). Rockhampton Regional Water Supply Security Assessment and Gladstone Regional Water Supply Security Assessment

¹⁵ From a bathometric survey undertaken in 2015. The authorisation for the Fitzroy Barrage states the volume to be 81,300 ML

¹⁶ Includes system losses associated with the Stanwell pipeline.



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Further discussion on the above water supply schemes is provided below.

5.2.1.1 Lower Fitzroy Water Supply Scheme

The Eden Bann Weir, owned and operated by SunWater, is the primary water storage for the Lower Fitzroy WSS. Under this scheme:

- total volume for Eden Bann Weir is 35,900 ML with a usable volume of 26,250 ML
- water allocations total 28,621ML per annum¹⁷ consisting of 3,101 ML per annum of medium priority and 25,520 ML per annum of high priority water
- high priority water is pumped from the ponded area of the Fitzroy Barrage to Stanwell Power Station via the Stanwell Pipeline. Stanwell holds a high priority allocation of 24,000 ML per annum
- other customers receive medium priority water allocations for irrigation and stock and domestic. Allocations for agricultural purposes are drawn from the Eden Bann Weir pond and from downstream of Eden Bann Weir to the upstream limit of the Fitzroy Barrage.

SunWater is required, in accordance with the operating rules of the Fitzroy ROP, to make releases from Eden Bann Weir to the Fitzroy Barrage. This includes a requirement to make releases necessary to maintain the Fitzroy Barrage at its nominal operating level.¹⁸

5.2.1.2 Fitzroy Barrage Water Supply Scheme

The Fitzroy Barrage is the primary source of water supply for the Rockhampton reticulation network. The Barrage is owned by Fitzroy River Water, a commercialised business unit of the RRC. Under this scheme:

- total volume for the Fitzroy Barrage is 74,400 ML with a usable volume of 49,850 ML (i.e. 24,550 ML¹⁹ is 'dead storage', being water that is not available for use or diversion)²⁰
- water allocations total 62,093 ML per annum consisting of 11,610 ML of medium priority water and 50,483 ML of high priority water (RRC²¹ holds a high priority allocation of 50,383 ML per annum from the Fitzroy Barrage²²)
- water is supplied to urban users in Rockhampton via the Glenmore Water Treatment Plant (WTP)
- Rockhampton's water allocation is also used to supply LSC.

The Capricorn Coast Water Supply System is supplied by two sources, Water Park Creek and the Fitzroy Barrage, via the Rockhampton-Yeppoon Pipeline.

The Rockhampton-Yeppoon Pipeline, which was constructed in 2010 at a cost of \$50 million²³, enables water to be supplied to the region from the Fitzroy Barrage, supplementing Water Park Creek.²⁴ This is supplied through a commercial bulk water supply agreement between RRC and LSC. This agreement supplies LSC with

¹⁷ Includes system losses associated with the Stanwell pipeline.

¹⁸ Department of Natural Resources and Mines (2015). Fitzroy Basin Resource Operations Plan.

¹⁹ Consists of 20,500 ML below the minimum operating level with the remainder stored in upstream waterholes

²⁰ Department of Energy and Water Supply (2016). Rockhampton Regional Water Supply Security Assessment.

²¹ Noting that water is supplied to urban users in Rockhampton by Fitzroy River Water, the water allocations used to supply users are held by RRC. In addition, RRC is responsible for the water supply planning policy. RRC is therefore referred to as the entity responsible for ensuring reliable water supply to urban users in Rockhampton throughout this chapter.

²² Department of State Development (2015). LFRIP - Draft Environmental Impact Statement.

²³ The pipeline was jointly funded by the Commonwealth Government, Queensland Government and RRC.

²⁴ 'Water Sources'; Livingstone Shire Council; DOA: 23 May 2017; See: <https://www.livingstone.qld.gov.au/964/Water-Sources>



SERVICE NEED

an additional supply of up to 4,000 ML per annum. According to RRC, this accounts for 3,000 ML to 3,500 ML of RRC's 50,383 ML of high priority allocation from the Fitzroy Barrage.

LSC holds a 4,400 ML per annum water entitlement from Water Park Creek, subject to a 17 ML per day extraction limit. However, supply reliability is relatively poor, with a previous analysis undertaken by LSC estimating a reliable yield of 2,400 ML per annum.²⁵

- Urban water for Rockhampton (including Yeppoon and adjacent areas) accounts for 81 per cent of the total water allocation. Rockhampton holds two high priority allocations of 50,000 ML and 383 ML with another 100 ML high priority allocation held for agriculture.
- Irrigation and stock and domestic (medium priority) account for the remaining 19 per cent. There are about 275 medium priority water allocations, 240 of which are for agricultural purposes and 35 for 'any' purpose.²⁶

5.2.1.3 Awoonga Dam Water Supply Scheme

GAWB is responsible for supplying urban and industrial water users in the Gladstone area. GAWB is currently reliant on Awoonga Dam as its sole water supply source, which it owns and operates. Awoonga Dam is the only water source located within the Awoonga WSS.

Under this scheme:

- the full supply volume of the Awoonga Dam is 776,854 ML with a usable volume of 770,454 ML
- GAWB holds all the 78,000 ML per annum allocation from the dam with an average annual use of ~50,000 ML per annum or approximately 64 per cent of the total water allocation
- approximately 63,000 ML per annum of the 78,000 ML per annum allocation is reserved, with the majority of water supplied to industrial businesses close to Gladstone and to power stations in the Callide Valley near Biloela²⁷
- GRC reserves 10,300 ML per annum of drinking quality water for the Gladstone reticulation network which services approximately 53,000 people
- urban water for Gladstone accounts for approximately 20 per cent of the total water extracted
- most of the water delivered is raw water (untreated) for industrial customers. Industry accounts for approximately 80 per cent of the total water extracted
- under the Boyne River Basin ROP 2013, GAWB has access to an additional entitlement of 19,000 ML should GAWB raise Awoonga Dam to 45 m AHD. GAWB can access this entitlement upon Awoonga Dam filling to the limit of this next raising²⁸.

The Fitzroy Basin ROP 2014 includes a process for granting GAWB up to 30,000 ML per annum (in advance of the development of supporting infrastructure). This process would specify the conditions under which GAWB may access its entitlement.

²⁵ Department of Energy and Water Supply (2016). Rockhampton Regional Water Supply Security Assessment.

²⁶ Department of State Development, 'Water Resource Development in the Fitzroy River', April 2016, p 7-8.

²⁷ DEWS/GRC, 'Gladstone Regional Water Supply Security Assessment', p2.

²⁸ Gladstone Area Water Board Submission to the Queensland Competition Authority: Fitzroy River Contingency Infrastructure – 2007 <http://www.qca.org.au/getattachment/4ade0efe-1d98-452f-ac69-6ba1a28bca8f/GAWB-Fitzroy-River-Contingency-Infrastructure.aspx> p25



While Awoonga Dam is currently at near full capacity, the dam has experienced extended periods of low inflows resulting in high drawdown of the storage on several occasions over the past 30 years. The most recent major drawdown occurred during the 'Millennium Drought'²⁹ between 2004 and 2008, during which the total storage volume fell below 300,000 ML or less than half of its full supply volume³⁰.

5.2.2 Water Usage

Water users in the Study Area (refer Section 2.2) comprises urban, commercial/industrial, agricultural customers. These users include:

- Rockhampton urban water users, which are supplied by Fitzroy River Water, a commercialised business unit within the RRC, primarily from the Fitzroy Barrage.
- Livingstone Shire/Capricorn Coast urban water users, which are supplied by a combination of Water Park Creek and the RRC, via the Rockhampton to Yeppoon Pipeline.
- Gladstone area water users (primarily industrial water users), which are supplied by the GAWB from Awoonga Dam.

Additionally, it is recognised that there are other industrial water users other than those supplied by GAWB or the reticulated networks in Rockhampton or the Livingstone Shire/Capricorn Coast region, such as Stanwell Power Station, and agricultural water users located in the Lower Fitzroy region.

A discussion on the current urban, industrial, and agricultural users is provided below.

5.2.2.1 Urban Water Usage

Under the three WSSs identified in Section 5.2.1, there is a combined residential population of approximately 161,000 people who rely on water sourced from the Fitzroy River (including Eden Bann Weir and Fitzroy Barrage) and the Awoonga Dam. The urban centres of Rockhampton, Livingstone and Gladstone are responsible for the vast majority of the total residential demand for water.

Rockhampton

RRC uses its 50,383 ML water allocation to supply water to approximately 84,000 people in the Rockhampton region and to around 24,000 people in communities within the Livingstone/Capricorn Coast region. Water is also supplied to industrial and commercial users via the Rockhampton reticulation network.

Over the six-year period from 2008-09 to 2013-14, water supplied for urban use from the Fitzroy Barrage averaged around 19,300 ML per annum, of which almost 95 per cent was supplied to users within the Rockhampton WSS (the remainder being supplied to users in the Livingstone/Capricorn Coast region). This represents 38.3 per cent of the high priority water allocations held by RRC.³¹

Around 53 per cent of total water usage in the Rockhampton region is accounted for by residential consumption, with the remaining 47 per cent used for commercial and industrial purposes (noting that this does not include Stanwell Power Station, which is supplied as a stand-alone industrial user).

Livingstone Shire Council (Capricorn Coast)

LSC incorporates the towns of Yeppoon, Emu Park, Keppel Sands and Marlborough. Yeppoon and the Capricorn Coast (population of approximately 24,000 persons) access drinking water supplies from the

²⁹ According to the Climate Council, the Millennium Drought lasted from 1996 to 2010 (also known as the Big Dry).

³⁰ Department of Energy and Water Supply (2016). Gladstone Regional Water Supply Security Assessment.

³¹ Ibid



Fitzroy Barrage (up to 4,000 ML per annum) via the Rockhampton reticulation network³² and Water Park Creek (approximately 2,500 ML per annum).

The combined total annual volume of water sourced from Water Park Creek and the Rockhampton reticulation network to supply water users in the Livingstone/Capricorn Coast region between 2008-09 and 2013-14 averaged 3,280 ML³³. During this period, an average of 1,670 ML per annum was supplied to users in the region via the Rockhampton-Yeppoon Pipeline (high of 2,317 ML per annum in 2011-12). Over 85 per cent of water usage in the region is attributable to residential use³⁴.

Gladstone

The Gladstone reticulation network currently provides treated water to approximately 53,000 people as well as raw and treated water to large industrial water users located in Gladstone and surrounding communities, including: Boyne Island, Tannum Sands, Benaraby, Wurdong Heights, Beecher, Calliope, and Mount Larcom.

GAWB is able to extract up to 78,000 ML per annum in order to supply urban and industrial users in Gladstone and surrounding communities through contractual arrangements or 'reservations'³⁵. Currently, these 'reservations' account for around 81 per cent (63,000 ML) of GAWB's total allocation³⁶. In addition, GAWB sets aside an estimated four per cent of GAWB's total allocations (i.e. 3,120 ML) to account for system losses³⁷.

Over 80 per cent of the water supplied by GAWB is contracted for industrial purposes (energy generation, alumina and aluminium production, cement production and waste management and recycling), with the remainder purchased by GRC for urban water supply³⁸. GRC currently reserves 10,300 ML per annum of drinking quality water for the Gladstone reticulation network.

5.2.2.2 Agricultural Water Usage

Approximately 81 per cent of the Fitzroy region's land area used for agriculture, with the majority used for grazing (74 per cent), and 21 per cent under broad-acre cropping.

Water for agriculture (irrigation and grazing) is mostly sourced from the Fitzroy Barrage with a small allocation from Eden Bann. Water allocations available from the Fitzroy Barrage and Lower Fitzroy River (Eden Bann) water supply schemes for agricultural use totalled 14,711 ML and are spread over 282 entitlements or an average of 53 ML per entitlement.

Some 254 of those 282 entitlements are less than 101 ML. Of these some 238 entitlements are for less than 51 ML. There are over 2,700 farms in the Fitzroy region³⁹.

While no agricultural producers hold water allocations in the Awoonga WSS, there are some agricultural users located within the Boyne River catchment which benefit from releases made from Awoonga Dam for downstream water needs. These releases are defined in Sections 51 to 53 of the Boyne ROP.⁴⁰

Figure 5-2 provides a summary of the agricultural water allocation and use across the three WSSs.

³² Rockhampton Regional Water Supply Security Assessment (November 2015), p6

³³ Ibid

³⁴ Department of Energy and Water Supply (2016). Rockhampton Regional Water Supply Security Assessment.

³⁵ Gladstone Area Water Board (2013). Strategic Water Plan.

³⁶ Department of Energy and Water Supply (2016). Gladstone Regional Water Supply Security Assessment.

³⁷ Ibid

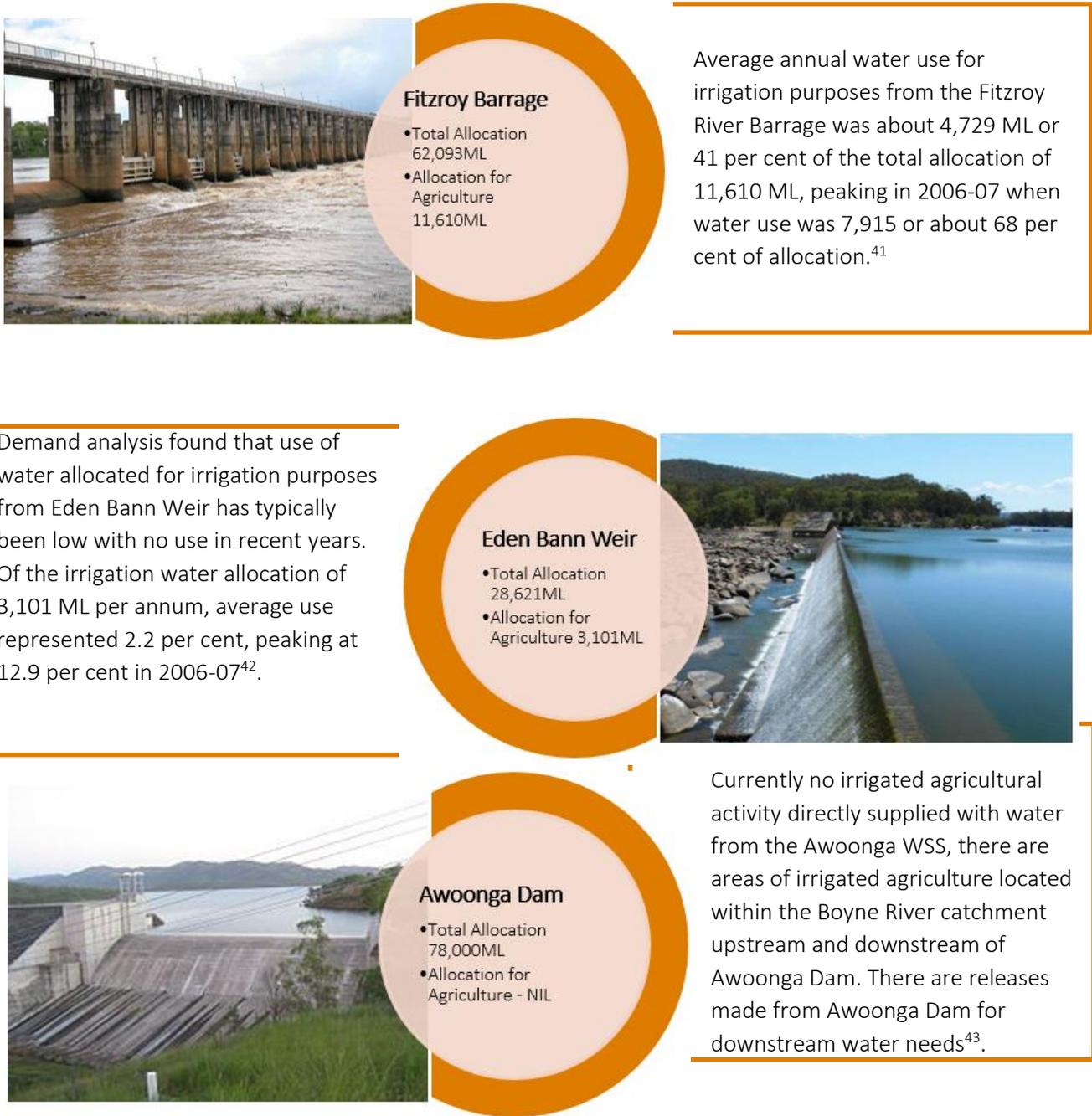
³⁸ Gladstone Area Water Board (2013). Strategic Water Plan.

³⁹ ABARES, 'My Region', December 2016.

⁴⁰ Department of Energy and Water Supply (2016). Gladstone Regional Water Supply Security Assessment.



Figure 5-2 Summary of Water Allocation for Agricultural use



5.2.2.3 Industrial Water Usage

Water for industrial use is primarily centred around Gladstone (from Awoonga Dam) and the supply to Stanwell (from Eden Bann Weir) with some usage in Rockhampton (from Fitzroy Barrage). The primary water users and associated usage includes:

- Stanwell Power Station

⁴¹ Department of State Development, 'Water Resource Development in the Fitzroy River', April 2016, p 9-10

⁴² Department of State Development, 'Water Resource Development in the Fitzroy River', April 2016, p 6.

⁴³ The operational rules for these releases are defined in Sections 51 to 53 of the Boyne ROP. These releases do not impact the water supply for Gladstone or other users of water from Awoonga Dam.⁴³



SERVICE NEED

Primary user of water from the Lower Fitzroy WSS. Stanwell Corporation holds a high priority water allocation of 24 000 ML from the Lower Fitzroy WSS for the Stanwell power station.

The Rockhampton RWSSA⁴⁴ has noted that in recent years Stanwell Power Station has typically used between 18,000 ML and 20,000 ML per annum of its 24,000 ML high priority water allocation from the Lower Fitzroy WSS.

▪ Resources sector

More than 80 per cent of the water currently supplied from Awoonga Dam is contracted to meet industrial water needs including alumina and aluminium production, energy generation, cement products, waste management and recycling, and operations at Port Curtis.

Approximately 52,700 ML per annum (63,000 ML minus Council allocation of 10,300 ML) of the 78,000 ML per annum allocation from Awoonga Dam is supplied to industrial businesses close to Gladstone and to power stations in the Callide Valley near Biloela.⁴⁵

▪ Other Industry

A high proportion of water use from the reticulated water networks of Gladstone, Rockhampton and the Capricorn Coast supplies industrial and commercial operations. These operations largely support the surrounding communities and consequentially, water use is likely to closely align with population growth in the region.

5.2.2.4 Summary of Usage

Table 5-2 provides a summary of the water allocations under the water schemes and a snapshot of the water usage as of 2015-16.

Table 5-2 Summary of Water Allocation and Usage

SUPPLY SOURCE	TOTAL ALLOCATION (ML)	RESIDENTIAL USE (ML)	AGRICULTURAL USE (ML)	INDUSTRIAL USE (ML)	WATER TO CAPRICORN COAST (ML)	SUNWATER / NON-REVENUE/ OTHER USE (ML)	TOTAL USAGE (ML PER ANNUM)
Fitzroy Barrage	62,093	9,704.3	4,729.8	5,589.3	2,893.4	2,116	25,032.8
Eden Bann	28,621	0	0	19,793	N/a	86	19,879
Awoonga Dam	78,000	10,590	N/a	~37,885	N/a	N/a	48,475
TOTAL	168,714	20,294.3	4,729.8	63,267.3	2,893.4	2,202	93,386.8

Total water usage across the Study Area typically runs less than 60 per cent of the total allocation in any given year. The water use is linked to a range of factors, including economic activity (including income, employment and production), weather and demographics (including population and household size and make-up).

Water security across the Study area is further discussed in Section 5.2.3.

⁴⁴ RRWSSA, p 8.

⁴⁵ DEWS/GRC, 'Gladstone Regional Water Supply Security Assessment', p2.



5.2.3 Water Security

DEWS provides support to local governments with longer-term water supply planning, to help ensure availability and reliability of water supplies are well understood and, where necessary, appropriate plans can be put in place to deal with shortfalls⁴⁶. Importantly, while it is recognised that Queensland's water supply systems are owned and managed by a range of GOCs, as well as private entities, the DEWS regulatory framework includes reporting Key Performance Indicators on a range of performance and common industry metrics, including water security measures.

DEWS, in partnership with councils and water service providers, has prepared a number of RWSSA's to provide a shared understanding of potential water supply security risks for prioritised communities across Queensland. RWSSA's provide an overview of the capability of a community's water supply system for both current and future water demand. RWSSA's are informed by hydrologic modelling.

Hydrologic modelling enables a water supply system's performance to be simulated to understand how different infrastructure or operating arrangements affect water security. Stochastic modelling involves generating sequences of river flows, evaporation and other data using key statistical properties of the historical data. 10,000-year sequences of stochastic data have been generated to inform hydrologic models for the Fitzroy and Boyne River catchments. Stochastic modelling can account for a wider variation of potential climatic scenarios than the historical record.

The assessments and reports prepared by DEWS provide valuable insights into the current water supply security across all Queensland regions and have provided information on the current water security issues for water users across Gladstone and Rockhampton (including Livingstone).

5.2.3.1 Gladstone's water supply

The Gladstone RWSSA, prepared by DEWS in partnership with GRC, 'presents a description of the bulk water supply system, current and future water use, and summarises the likelihood of Gladstone potentially experiencing water supply restrictions and water supply shortfalls both now and into the future'.⁴⁷ The Gladstone RWSSA assessed both Awoonga Dam as a stand-alone system along with access to 30,000 ML per annum from the Fitzroy River, as GAWB are entitled to under the Water Plan (Fitzroy Basin) 2011 and the Fitzroy Basin ROP.

Each assessment of demand included an assumed urban demand component reflective of projected population growth. Gladstone's reticulation network currently services approximately 53,000 people.

Figure 5-3 Likelihood of Awoonga Dam triggering water restrictions

⁴⁶ <https://www.dews.qld.gov.au/water/supply/security/overview>

⁴⁷ GRWSSA, page 1

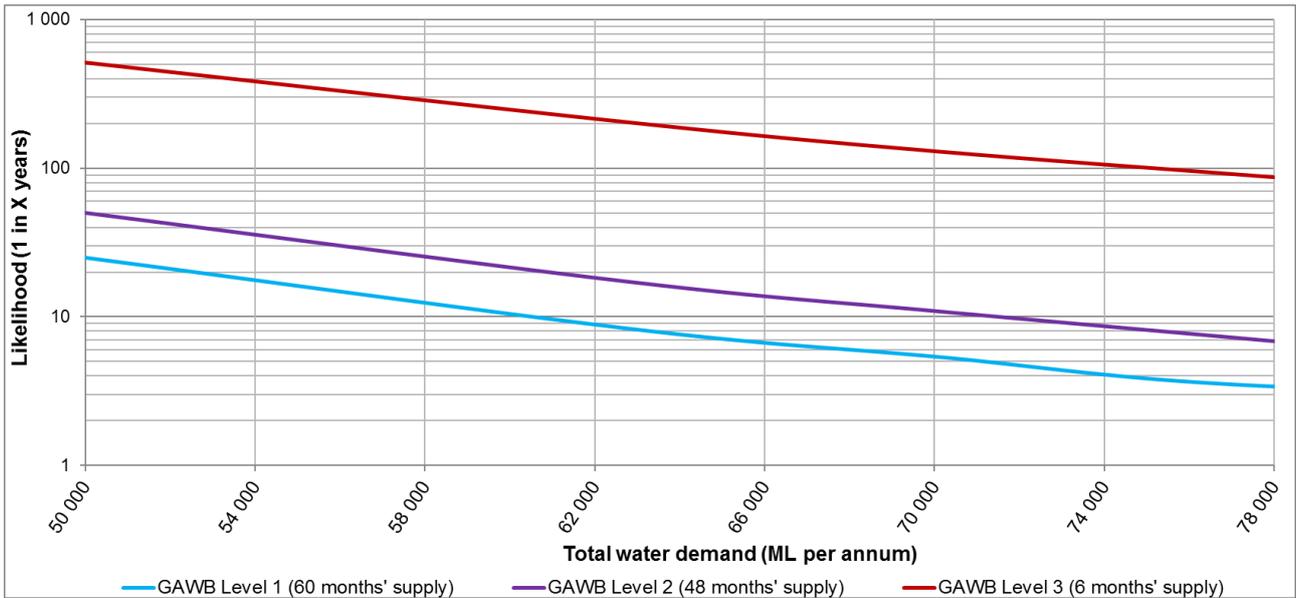


Figure 5-3 shows the likelihood that various water restriction triggers could be expected to be reached for a range of water demands on the existing stand-alone Awoonga WSS. Table 5-3 presents a snapshot of the results of this modelling for level 2 restrictions (10 per cent supply restrictions for all customers), and level 3 restrictions (50 per cent restriction for council customers and supply ceased to all other GAWB customers) at different annual demand volumes.

Table 5-3 Forecast frequency of water restrictions for given levels of demand

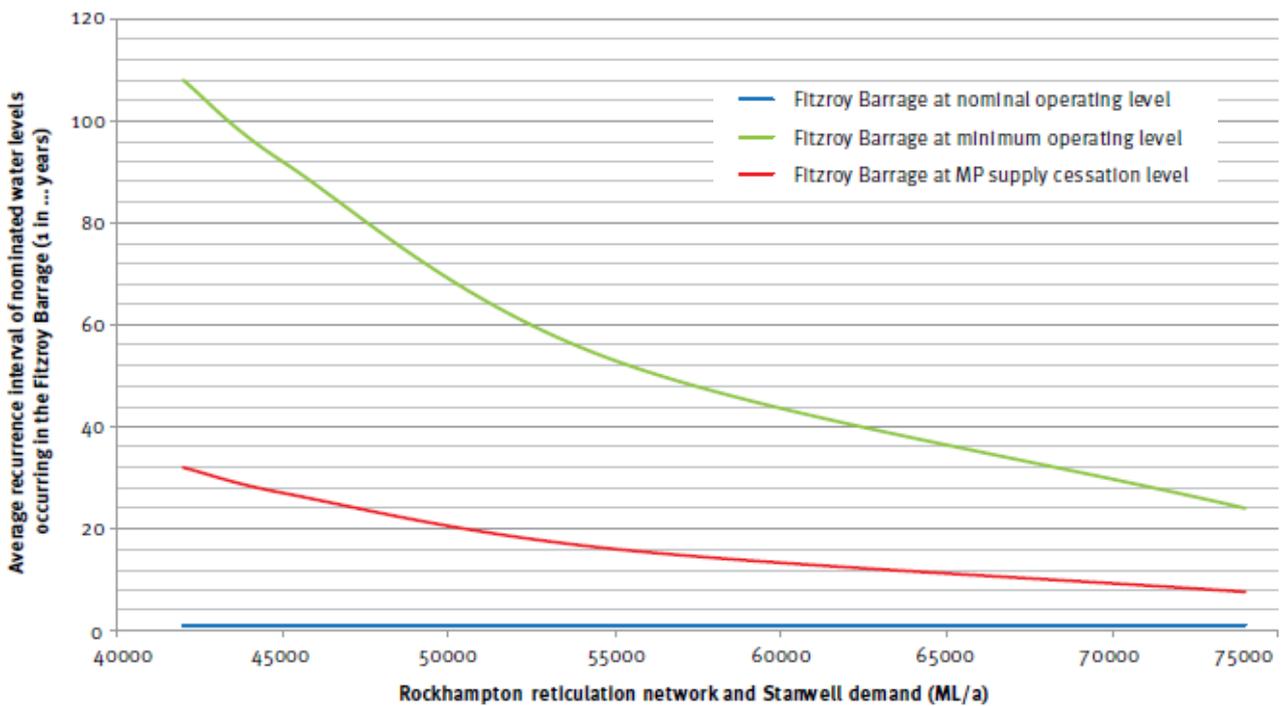
Triggered Restrictions	50,000 ML per annum (current use)	78,000 ML per annum (current allocation)
Level 2 restrictions	1 in every 50 years.	1 every 7 years.
Level 3 restrictions	1 in every 510 years.	1 in every 90 years.

Figure 5-3 also shows the frequency at which the stand-alone Awoonga Dam system could be expected to fall below its dead storage level, at which time Gladstone water demands will not be met. Augmentation of the water supply, through access to the 30,000 ML from the Fitzroy River, as identified in the CSS, would make this even less likely to occur.

5.2.3.2 Rockhampton’s (including Livingstone) water supply

DEWS and RRC committed to a partnership to develop the Rockhampton RWSSA. The Rockhampton RWSSA examined the performance of the Fitzroy Barrage and Eden Bann Weir using hydrologic modelling. The system currently services approximately 108,000 people, including approximately 24,000 people within the LSC area.

Figure 5-4 Likelihood of Fitzroy Barrage falling below nominated water levels



The Rockhampton reticulation network currently takes up to about 22,000 ML per annum from the Fitzroy Barrage, while the Stanwell Power Station takes up to about 20,000 ML per annum. Figure 5-4, illustrates that at this combined level of use (42,000 ML per annum) it is anticipated that the Fitzroy Barrage storage could be below the medium priority water supply cessation level on average about once in 32 years, and be below the minimum operating level on average about once in 108 years.

However, as water demand increases, the frequency at which these levels are reached will also rise. For example, if the combined Rockhampton reticulation network and Stanwell Power Station demand increases to about 55,000 ML per annum, it is anticipated that the barrage storage could on average be below the medium priority supply cessation level about once in 16 years, and below the minimum operating level about once in 53 years.

Where both the RRC’s and Stanwell Power Station’s existing water allocations are to be fully utilised, the Fitzroy Barrage storage could on average be below its minimum operating level about once in 24 years.

In all cases, the implementation of restrictions or other measures to reduce the water demand on the Fitzroy Barrage would reduce the likelihood of the storage falling to its minimum operating level.



Figure 5-5 Fitzroy Barrage: Simulated historical storage behaviour at current water demand (1889-2007)

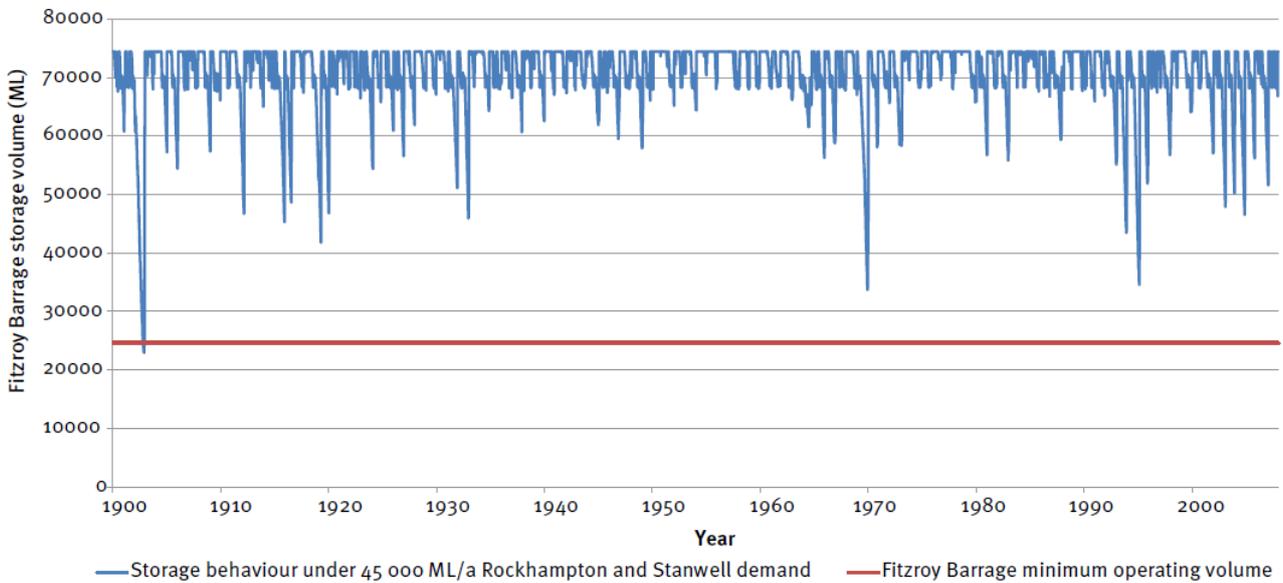
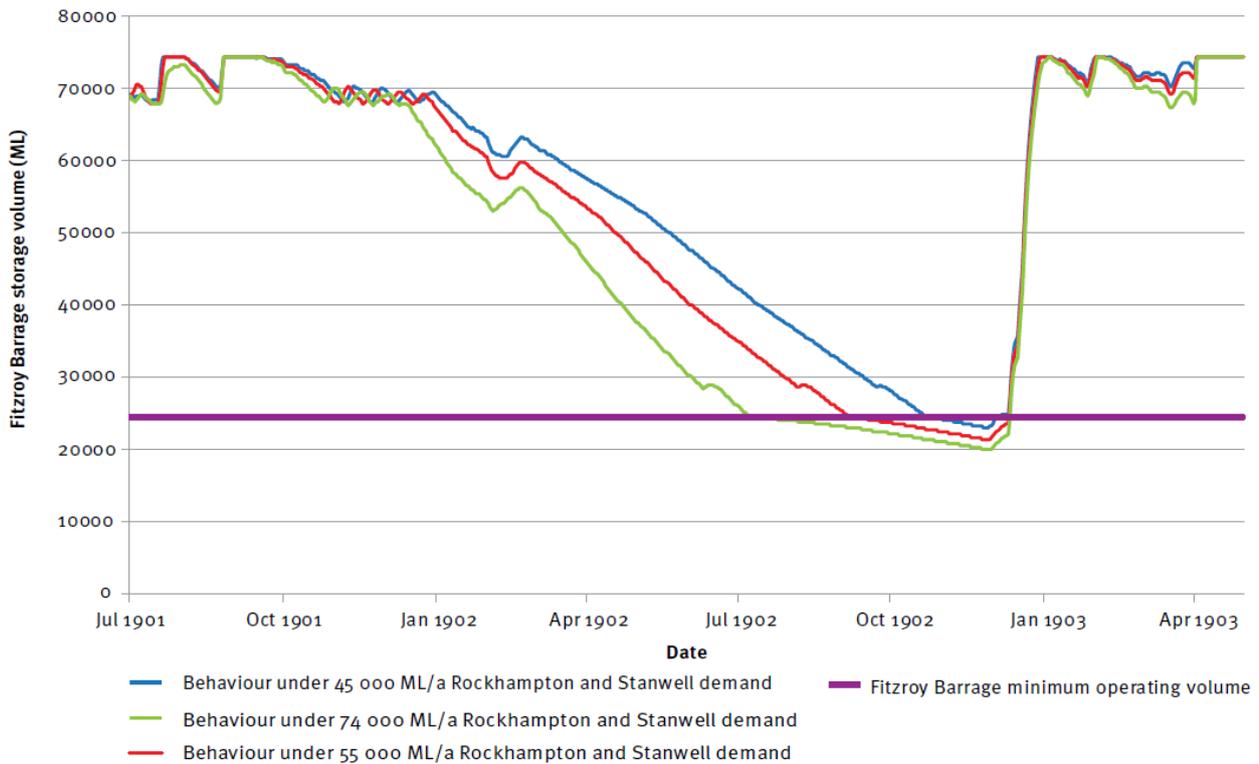


Figure 5-5 shows the simulated storage behaviour of the Fitzroy Barrage at current demand over the historical period from 1889 to 2007. The Fitzroy Barrage’s minimum operating volume (24,550 ML per annum) comprises the water stored in the barrage below the minimum operating level (EL -1.2 metres AHD) and the water stranded in the barrage’s upstream waterholes which are unable to be accessed at Rockhampton’s water supply intake point.

In most years, flows in the Fitzroy River far exceed that required to fill both the Eden Bann Weir and Fitzroy Barrage storages. However, as can be seen from the simulated storage behaviour shown in Figure 5-5, water levels in the Fitzroy Barrage would have fallen to relatively low levels on a number of occasions over the last 100 years and would have fallen below minimum operating levels in 1901. This period is further illustrated in Figure 5-6.



Figure 5-6 Simulated historical storage behaviour (1901-1903) for the Fitzroy Barrage



The Fitzroy Barrage is heavily reliant on seasonal inflows from the Fitzroy River, in particular the occurrence of annual wet season events, to maintain continuity of supply.

Figure 5-6 shows the simulated storage behaviour of the Fitzroy Barrage during the critical period between 1901 and 1903 for a range of total water demands. It can be seen that water levels in the Fitzroy Barrage can fall quite rapidly. The Rockhampton RWSSA 'estimated that at current levels of demand the storages could fall from full to empty in about 16 months'⁴⁸. However, based on Figure 5-6, it can be concluded that storage levels could fall from full to below minimum operating level well under 12 months (assuming no further inflows to the storages during this period and minimal groundwater contributions from the surrounding area to the storage).

5.3 Demand drivers / Influencers

While recognising the identified needs and opportunities in the short and long-term (refer Section 5.5), it is important to consider the broader demand drivers that will influence the take up of water by different user groups in the Study Area have been considered.

Water demand is influenced by a range of drivers, including population, environmental conditions, and market factors. These drivers have an implication for the short and long-term water use by residential (i.e. urban) and non-residential (i.e. agricultural and commercial/industrial) customers. This section examines these drivers and identifies anticipated ongoing and future conditions that may influence the demand for water by existing and future customers. The anticipated future demand for each of the user groups is further discussed in Section 5.4.

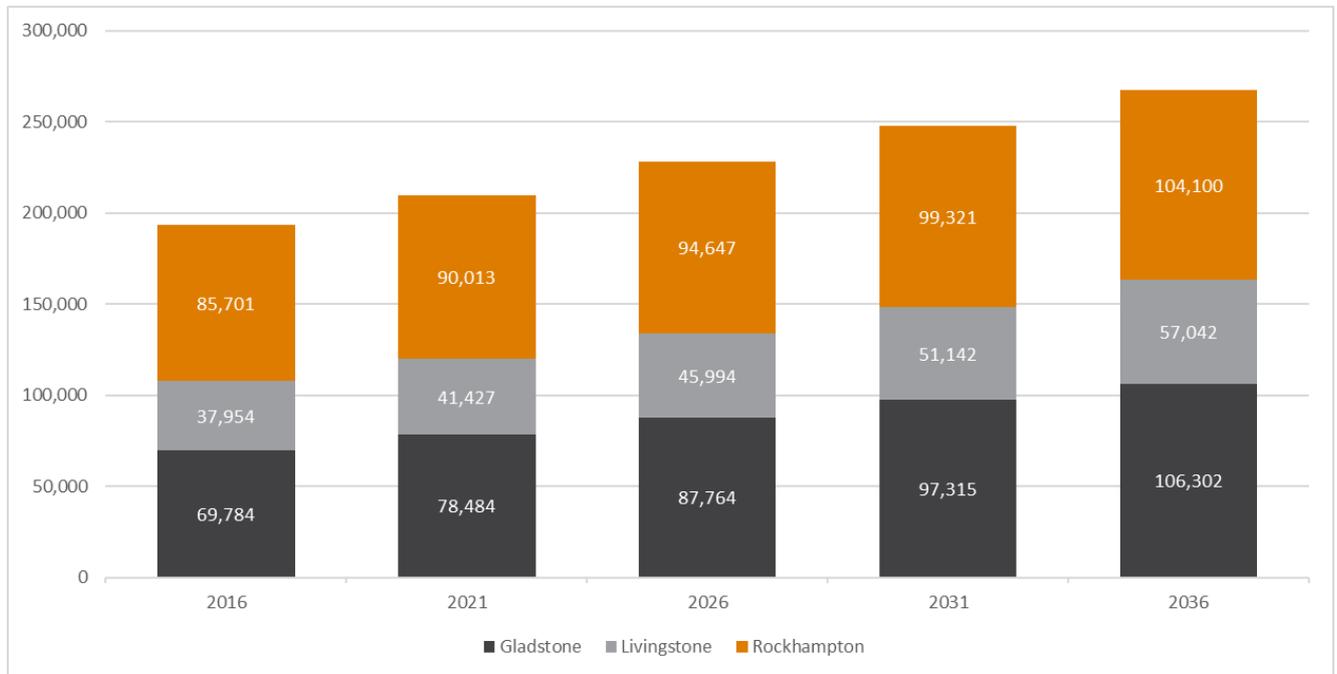
⁴⁸ RWSSA, page 15



5.3.1 Population

The total resident population across the Study Area is estimated to be approximately 193,419 people as of 2016. Figure 5-7 shows the estimated population across the three Local Government Areas (LGA) of Gladstone, Livingstone and Rockhampton, from 2016 through 2036.

Figure 5-7 Population projections for the relevant LGAs⁴⁹



Under the above population projections, Gladstone’s population is expected to grow by an average of 2.13 per cent per annum, followed by Livingstone at 2.06 per cent per annum from 2016 to 2036. Over the same period, the population of Rockhampton is expected to grow at 0.98 per cent per annum. Collectively, the Study Area is expected to see an average annual growth of approximately 1.63 per cent per annum. This is comparable to the overall Queensland state population growth rate of 1.67 per cent per annum over this twenty-year period.

The above population projections are based on 2015 estimates prepared by the Queensland Government Statistician’s Office (QGSO). It is recognised that these projections have a lower growth rate for the three LGAs than population projections utilised in both the Gladstone RWSSA and the Rockhampton RWSSA by DEWS, which utilised 2013 estimates prepared by the QGSO. This is further discussed in Section 5.4.1.

5.3.2 Environmental factors

Central Queensland’s environment, which includes the Study Area (refer Section 2.2), ‘as a sub-tropical climate with hot, moist summers and warm, dry winters, with occasional frost in the south’. The average rainfall across the Study Area is highly variable, ‘ranging from 600 mm inland to 1300 mm along the coast’.

With increasing temperatures recorded across the area since 1910, this trend is projected to continue, and by 2030 it is anticipated that:

⁴⁹ (Medium) Projected population, by local government area, Queensland, 2011 to 2036. Queensland Government Statistician’s Office. <http://www.qgso.qld.gov.au/subjects/demography/population-projections/tables/proj-pop-lga-qld/index.php>



SERVICE NEED

- average annual temperature is expected to be around 1°C warmer than in the 1990's
- average number of days over 35 °C is expected to increase from 16 to 26 in Rockhampton
- longer dry periods interrupted by more intense rainfall events will occur

By 2070, the 'projected range of warming is 1.0 to 3.8°C depending on future emissions' across Central Queensland. While the net rainfall projections for 2070 show 'little change or decrease', largely as a result of more intense rainfalls offsetting dryer periods, it is recognised that 'under a high emissions scenario, it is likely that eastern parts of the region will experience more time in drought'⁵⁰, including Rockhampton and Gladstone.

5.3.3 Market factors

A key influencer for the realisation of demand forecasts is the current and future market conditions, particularly as it relates to current agricultural margins and prices. Activities related to beef production represents the majority of agricultural land use in the Fitzroy River Catchment, accounting for approximately 83 per cent of agricultural land use in the region and 64 per cent of the gross value of agricultural production⁵¹. There are two abattoirs located in the vicinity of Rockhampton. JBS Australia which has a daily processing capacity of 676 head of cattle and Teys Australia which has a daily capacity of 1,731 head of cattle⁵². The Central Queensland Livestock Exchange (CQLX), formerly known as the Gracemere Saleyards, is situated 8 km West of Rockhampton and ranks as one of the major selling centres in Australia.

Recent years of drought across key production areas have reduced supply, and strong demand growth led by Vietnam and China (which increased Australian beef export access via a free trade agreement in 2014) have generated record high beef cattle prices. The Eastern Young Cattle Indicator (EYCI) was over \$5.50 per kilogram of carcass weight (at the time this DBC was written, though this has recently fallen from over \$7.00 per kilogram in 2016).

⁵⁰ Draft Climate Change in the Central Queensland region, DEHP, 2016

⁵¹

http://stat.abs.gov.au/itt/r.jsp?RegionSummaryandregion=308anddataset=ABS_REGIONAL_ASGSandgeoconcept=REGIONanddataset_ASGS=ABS_REGIONAL_ASGSanddatasetLGA=ABS_NRP9_LGAandregionLGA=REGIONandregionASGS=REGION

⁵² <https://rdafcw.com.au/wp-content/uploads/Food-and-Fibre-Report-Dec2013.pdf>



Figure 5-8 Eastern Young Cattle Indicator⁵³

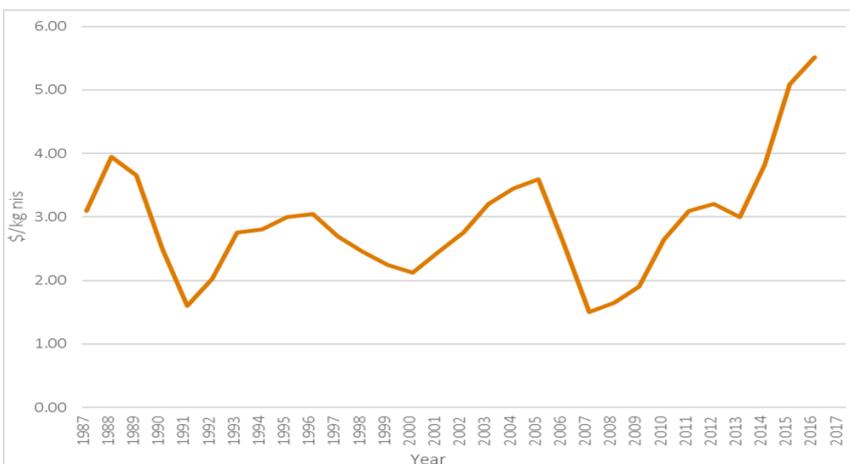


Potential opportunities may exist to support intensive feedlot production in the Lower Fitzroy region.

As with beef cattle, prices for macadamia nuts have risen strongly in recent years. Australia is the world’s largest producer of macadamia nuts, contributing more than 30 per cent of the global crop and exporting to more than 40 countries. In Australia, there are more than 850 macadamia nut growers producing around 50,000 tonnes per year.

As shown in Figure 5-9, macadamia producers can expect to receive in excess of \$5 per kg of nut in shell. Total production volumes have also increased strongly over this period, with an additional 10,000 tonnes of production added in the last three years.

Figure 5-9 Macadamia price, nut in shell⁵⁴



In contrast to beef cattle production, there is presently limited development of macadamia nuts or other irrigated annual or tree crop production in the Study Area. According to the ABS, there are 1,792 ha of fruit and nut orchards, with an additional 2,546 ha of other fruit and nut production. This equates to less than one per cent of the

⁵³ <http://statistics.mla.com.au/Report/RunReport/70587516-e17a-4065-a8aa-e3fe4c512159>

⁵⁴ <http://australian-macadamias.org/industry/site/industry/industry-page/about-aussie-macadamias/statistics/statistics/australian-production-and-indicative-prices-1987-2012>



total area under agricultural production in the region.

In addition to the availability and quality of suitable land, and the potential returns from different agricultural activities, other factors that influence the price irrigators are willing to pay for water, including but not limited to the:

- availability of water from bulk water storages
- existing infrastructure available to access the water
- commercial framework under which the water is provided (Allocation, contract etc.)
- reliability of water products available
- scheme operational and water sharing rules e.g. announced allocations
- volume of water being sought
- rainfall, evaporation and soil moisture profiles
- the mix of irrigated agriculture within the scheme and the willingness to pay for each sector.
- the temporal water demand patterns of the agriculture supported by the scheme
- farm input costs e.g. machinery
- external factors, such as commodity prices, transportation and market access costs and continuity of supply considerations.

Table 5-4 presents recent water trading data for adjacent WSSs. For high priority water, there is limited data available, with seven parcels totalling 25 ML traded (from 2011 to 2017). For medium priority water, which is predominately used for irrigation, there has been extensive trading in both the Bundaberg and Nogoa Mackenzie water supply schemes. Both schemes are established, with reliable bulk water supplies, developed bulk water distribution infrastructure, established farming operations and existing distribution networks.

Table 5-4 Water Pricing in adjacent water schemes (2011-2017) ⁵⁵

WATER SUPPLY SCHEME	PRIORITY	NUMBER OF PARCELS	TOTAL VOLUME (ML)	WATER PRICE (\$)
Fitzroy Barrage	medium priority	51	461	\$862 - \$2,000
Lower Fitzroy	medium priority	1	5	\$60
Bundaberg	medium priority	370	27,561	\$109 - \$1,982
Nogoa Mackenzie	medium priority	140	47,468	\$1,079 - \$1,736
Boyne Tarong	high priority	6	24	\$3,000
	medium priority	13	1,470	\$533 - \$1,000
Dawson Valley	high priority	1	1	\$1,800
	medium priority	11	1,200	\$1,000 - \$2,000

⁵⁵ Excludes water trades where a price was not indicated. Source: SunWater, August 2017



Herron Todd White⁵⁶ produce monthly reviews of the Agricultural Sector. In August 2017, Herron Todd White indicated that medium priority water sales in Central Queensland ranged from \$1,700 to \$1,900 per ML. There were a limited number of high priority water sales, with prices peaking at \$2,500 per ML. The review identifies that these prices were achieved in a mature water trading market with established high gross margin industries supported by developed infrastructure.

5.3.4 Land and Regional Factors

The Lower Fitzroy is one of Queensland and Australia's premier agricultural regions in terms of soil, rainfall, proximity to market and access to supporting infrastructure such as transport and ports. However, the region has a great deal more latent agricultural potential – including high value crops which could be grown on quality soils that are currently only used for grazing.

DAF advises that agriculture in Queensland is well positioned and is adapting quickly to the growing export market opportunities available to Australian Primary Producers. These market opportunities are driven by increased demand from Asian communities whose affluence and expectations are growing, facilitated by greater market access through free trade agreements. The rising affluence of Asia's middle class is anticipated to continue and aligns well with the high value and high-quality produce that can be grown using water from Rookwood Weir – including fodder crops and macadamias.

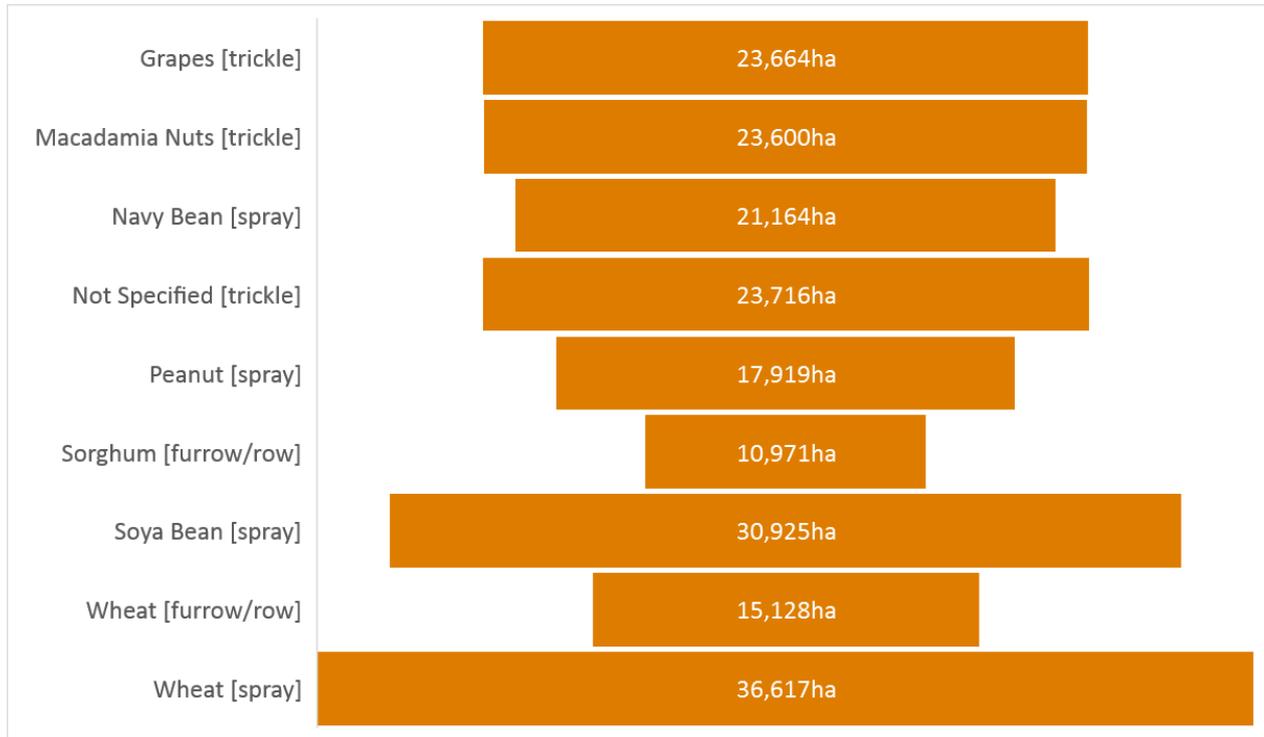
The Central Queensland region, including the Lower Fitzroy Zone which would be served by Rookwood Weir, also benefits by being able to achieve premium prices per tonne for crops. So not only does this region produce high quality agriculture but the regions' picking/harvesting season occurs earlier than other regions and therefore products reach markets before market supply peaks and while prices are highest.

In August 2017, DAF published an Irrigated Crop Suitability Mapping Tool for land adjacent the Lower Fitzroy River, to support industry and producers to identify opportunities for irrigated crops upon delivery of the Rookwood Weir. Three irrigation methods were considered, including furrow/row, overhead spray and trickle, against a number of crops. The area of suitable land for each crop is presented in Figure 5-10.

⁵⁶ Rural Herron Todd White, August 2017



Figure 5-10 Suitable land in the Lower Fitzroy area by irrigated crop type⁵⁷



The land areas identified in Figure 5-10 are not mutually exclusive, with many of these areas overlapping. With 42,000 ML per annum available to support irrigated agricultural development, the soil suitability mapping suggests the availability of land is not an impediment to the development of irrigated agriculture in the Lower Fitzroy region. The soil suitability mapping also indicates there is a higher proportion of land suitable to wheat crops, using overhead spray irrigation (approximately 36,617 ha) than there is for sorghum, using furrow/row irrigation techniques (approximately 10,197 ha)

5.4 Future Demand

This section considers the forecast and potential water demand for each of the water user groups.

5.4.1 Urban Water Demand

This section provides a summary of the ongoing and future water needs for the residential population in the Study Area. In particular, this relates to the urban centres of Rockhampton, Livingstone and Gladstone. These forecasts are based on the findings of the Rockhampton RWSSA, Gladstone RWSSA and responses to the Request for Information (RFIs) carried out as part of the demand analysis.

5.4.1.1 Gladstone

Future water demand in the Gladstone area is expected to be driven primarily by additional demand from the industrial sector. This represents a challenge for demand forecasting, as demand profiles for industrial water use differ from those that apply to most urban water providers, whose demand increases in line with population growth. As has been noted by GAWB, water demand for Gladstone typically increases in step-changes in accordance with the establishment of new or expansion of existing industrial activity.

⁵⁷ <https://www.daf.qld.gov.au/business-trade/development/rookwood-weir>



Exposure to single source risk, combined with the profile of its customer base (i.e. large industrial water users with high reliability requirements), requires GAWB to proactively manage its water supply-demand balance. GAWB undertakes demand forecasting on an ongoing basis as part of its supply planning process. For industrial demand, GAWB maintains estimates for three categories of demand:

- Base Case, highly certain projections based on current customer contracts.
- Upper bound, based on sufficiently credible customer projections.
- Potential demand, upper bound demand plus demand from projects for which a proponent has sought an indication from GAWB as to whether it could meet the proponent's water requirements.

In the development of the Gladstone RWSSA, it was assumed (based on the most recently available population projections) that the population serviced by the Gladstone reticulation network would double over the next 20 years, with demand projected to increase from its currently level of 10,000 ML per annum to around 20,000 ML per annum by 2036.⁵⁸ The most recent population QGSO projections, as presented in Section 5.3.1, indicate a lower population growth rate for Gladstone over the next 20 years (total growth of 52.3 per cent), which would imply lower growth in residential and commercial water demand over the study period.⁵⁹

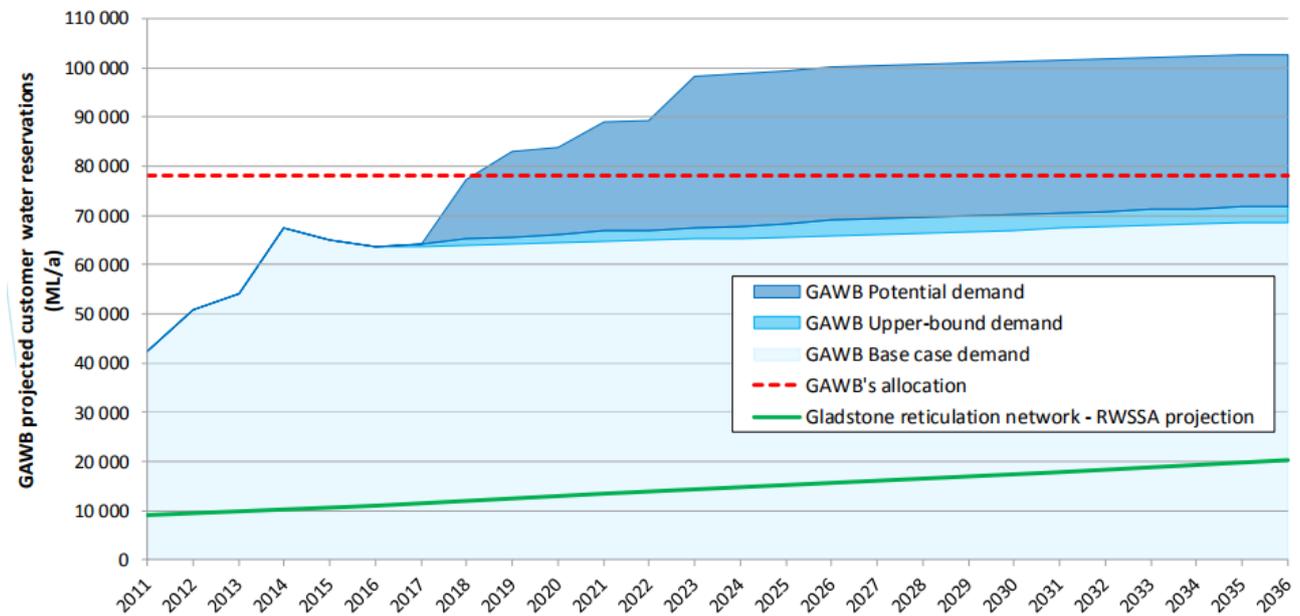
Figure 5-11 sets out GAWB's demand projections under the above three scenarios (i.e. base, upper bound and potential) as reported in the Gladstone RWSSA. The projections show that, while GAWB holds sufficient allocations to meet projected demand under the 'base' and 'upper bound' scenarios, the current volume of water available from Awoonga Dam is insufficient to meet 'potential demand' over the medium-term. The implications of these demand forecasts on water supply planning are outlined below.

⁵⁸ Department of Energy and Water Supply (2016). Gladstone Regional Water Supply Security Assessment.

⁵⁹ 'Projected population, by local government area, Queensland, 2011 to 2036'; Queensland Government Statistician's Office; See: <http://www.qgso.qld.gov.au/subjects/demography/population-projections/tables/proj-pop-lga-qld/index.php>; DOA: 14 July 2017.



Figure 5-11 Demand projections for GAWB⁶⁰



Note: GAWB's allocation excludes 4 per cent for system losses. The demand estimates include all allocations required by GAWB to supply water to its customers. This is larger than the volume of water that is actually supplied to users.

As identified above, due to GAWB's customer profile, the long-run average rate of demand growth may not be appropriate for long-term supply planning and the potential impact of step-changes in industrial water demand must be considered when assessing the future water supply-demand balance for Gladstone.

In 2013, GAWB undertook stochastic modelling of its future demand, based on its understanding of the requirements of both existing and future customers at that time, as part of the development of its 2013 Strategic Water Plan. The modelling suggested a 10 per cent probability of additional capacity being required by 2020 and a 50 per cent probability by 2030.⁶¹

An assessment conducted by GAWB produced an estimate for the median year in which a supply augmentation would be required (under the median forecast) of 2028 (noting that while the modelling indicated this to be the most likely outcome, there was considerable variance in the year at which the augmentation trigger would be reached).⁶²

⁶⁰ Department of Energy and Water Supply (2016). Gladstone Regional Water Supply Security Assessment, page 10

⁶¹ Gladstone Areas Water Board (2013). Strategic Water Plan

⁶² Gladstone Areas Water Board (2013). Strategic Water Plan.



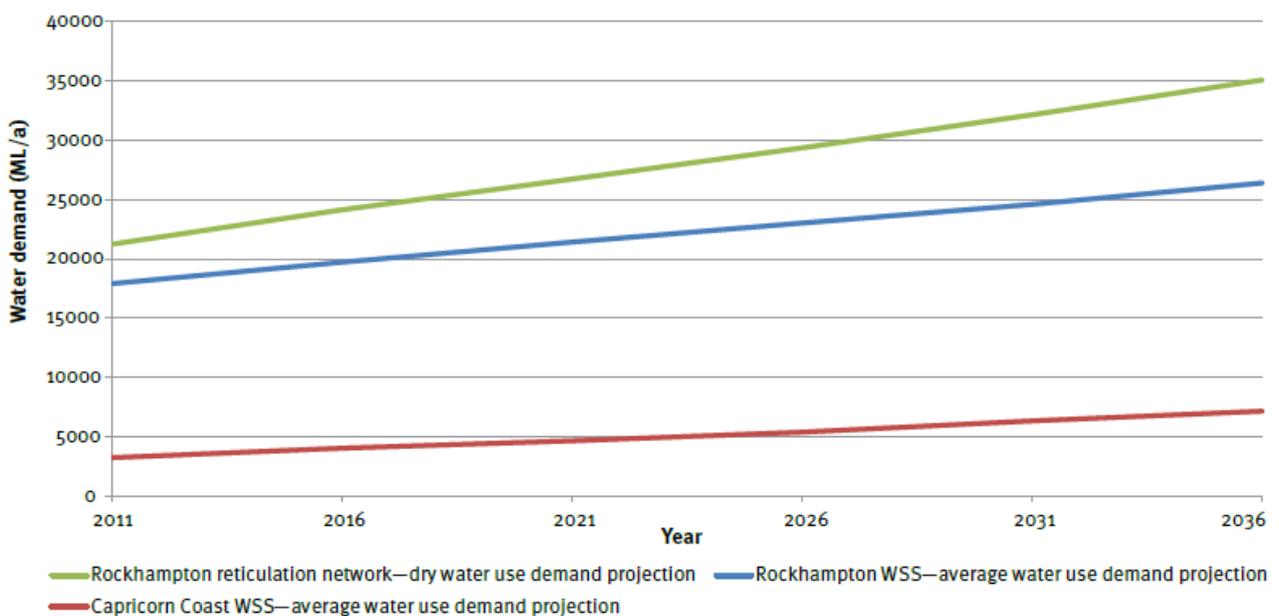
For the purposes of this DBC, GAWB’s upper bound in addition to Gladstone RWSSA’s projection has been adopted as the ‘most likely’, based on known activities and growth projections. The ‘most likely’ year of augmentation under this water demand projection is 2034. The 2034 trigger has been adopted as it is based on the most recent water demand projections available (further discussed in Chapter 8).

5.4.1.2 Rockhampton

Under the recent Rockhampton RWSSA, it was assumed that the population serviced by the Rockhampton reticulation network within the Rockhampton WSS is projected to grow from 84,000 to 116,000 by 2036.⁶³

Based on this population growth and other assumptions in relation to water use levels, DEWS forecast future water demand under dry conditions for the region serviced by the reticulation network.⁶⁴ The dry condition water demand projections were developed taking into consideration the population projection for each centre, assumptions regarding per capita water consumption (based on recent levels of annual water use), and the supplies available to the Livingstone/Capricorn Coast region from Water Park Creek⁶⁵. The consumption rates applied in a dry condition assessment are adjusted to account for higher water demand during drier years.⁶⁶ The analysis indicated that total dry condition water demand for urban and industrial users supplied by the Rockhampton reticulation network is likely to exceed 30,000 ML per annum by 2027 and 35,000 ML by 2036 (Figure 5-12).

Figure 5-12 Dry water use demand projections for Rockhampton WSS and Capricorn Coast WSS⁶⁷



⁶³ Including water users in the Livingstone Shire/Capricorn Coast, the total population serviced by the Rockhampton reticulation network is projected to grow from 108,000 to 164,000 by 2036.

⁶⁴ The analysis assumed that growth in demand for industrial development and commercial business throughout the Rockhampton and Capricorn Coast regions will remain proportional to respective residential population growths.

⁶⁵ ‘Previous analysis undertaken for LSC suggests that Water Park Creek may have been able to yield at least 2,400 ML per annum in all years over the period of the historical record’ RWSSA, page 11

⁶⁶ It is noted that water demand may be higher in drier years (e.g. for outdoor residential use) and that this can coincide with occurrences of low inflow to the Fitzroy Barrage and Eden Bann Weir storages. The scope of this assessment included The Caves and Gracemere and the Capricorn Coast region.

⁶⁷ Department of Energy and Water Supply (2016). Rockhampton Regional Water Supply Security Assessment, page 11



The demand projections in Figure 5-12 were developed based on population forecasts derived from QGSO's 2013 medium data series. More recent projections (i.e. 2015 compared to 2013) indicate a materially lower medium population growth rate for Rockhampton, with the population projected to reach 104,100 by 2036 (refer Section 5.3.1).⁶⁸ In the event that future population projections are consistent with this trend, future water demand would be below that estimated by DEWS in the Rockhampton RWSSA.

5.4.1.3 Livingstone

Population is the primary driver of projected growth in water demand for the Livingstone/Capricorn Coast region. In the Rockhampton RWSSA, the population in this region that is supplied by the Fitzroy Barrage was projected to increase from 24,000 to around 48,000 people by 2036. This represents a higher population growth rate than has been estimated in more recent population projections released by QGSO, with the latter indicating a 50.3 per cent increase in the population of the LSC between 2016 and 2036.⁶⁹ Applying the updated population projections results in total water demand for the Livingstone/Capricorn Coast region increasing to around 4,950 ML per annum by 2026 and 9,860 ML per annum by 2046. As the reliable yield of Water Park Creek is estimated at 2,400 ML per annum, the Livingstone/Capricorn Coast region will become increasingly dependent on supply from the Rockhampton reticulation network over the duration of the study period.

5.4.2 Industrial Water Demand

Apart from industrial users accessing water via the Rockhampton reticulation network, Stanwell Power Station is the only industrial water user currently accessing water from the Lower Fitzroy or Fitzroy Barrage WSS⁷⁰. The power station is the primary water user in the Lower Fitzroy WSS, which is managed by SunWater. The Eden Bann Weir is the sole bulk water supply source within the scheme, which extends from the Fitzroy Barrage to the upstream limit of the Eden Bann Weir pond. As discussed in Section 5.2.1.2, the weir has a total storage capacity of 35,900 ML and total usable storage of 26,250 ML.⁷¹ Stanwell Power Station is supplied with water from the Lower Fitzroy WSS via a 28-km pipeline from the ponded area of the Fitzroy Barrage linking the power station to the Stanwell Pump Station.

Stanwell Corporation holds 24,000 ML per annum of high priority allocations within the Lower Fitzroy WSS for the supply of cooling water to the Stanwell Power Station. SunWater holds the remaining water allocations within the WSS (1,503 ML per annum), primarily to cater for losses associated with the Stanwell Pipeline.⁷²

Stanwell Corporation's water consumption from the Lower Fitzroy WSS has averaged between 18,000 ML and 20,000 ML in recent years, approximately 80 per cent of its total allocation.⁷³

For the foreseeable future, it is 'expected that Stanwell Corporation will continue to operate Stanwell Power Station within its existing 24,000 ML per annum water allocation'⁷⁴. It is noted that in periods of low inflows, the volume of cooling water required by Stanwell Corporation increases due to a reduction in water quality levels. Should its water requirements change, Stanwell Corporation would seek to trade its allocations to

⁶⁸ 'Projected population, by local government area, Queensland, 2011 to 2036'; Queensland Government Statistician's Office; DOA: 8 June 2017; See: <http://www.qgso.qld.gov.au/subjects/demography/population-projections/tables/proj-pop-lga-qld/index.php>

⁶⁹ 'Projected population, by local government area, Queensland, 2011 to 2036'; Queensland Government Statistician's Office; See: <http://www.qgso.qld.gov.au/subjects/demography/population-projections/tables/proj-pop-lga-qld/index.php>; DOA: 14 July 2017.

⁷⁰ Department of Energy and Water Supply (2016). Rockhampton Regional Water Supply Security Assessment.

⁷¹ Department of Energy and Water Supply (2016). Rockhampton Regional Water Supply Security Assessment.

⁷² Department of Energy and Water Supply (2016). Rockhampton Regional Water Supply Security Assessment.

⁷³ Department of Energy and Water Supply (2016). Rockhampton Regional Water Supply Security Assessment.

⁷⁴ Ibid. Page 12



alternative users (e.g. urban water providers, agricultural producers, other industrial users), either on the temporary or permanent water market.

5.4.3 Agricultural Water Demand

The Rockhampton RWSSA identified the potential for agricultural expansion to occur along the Fitzroy River and in adjacent areas, particularly in relation to intensive livestock and horticultural production within the Fitzroy Agricultural Corridor.⁷⁵

Currently, agricultural production accounts for:

- approximately 81 per cent of the Lower Fitzroy region's land area, with grazing accounting for a clear majority, approximately 74 per cent, and sown pastures, a subset of grazing, accounting for approximately 24.7 per cent alone⁷⁶
- 11 per cent of the total gross value of agricultural production in Queensland, equivalent to \$1.3 billion in gross value terms.

Demand analysis identified potential agricultural demand for Rookwood Weir, through a two staged RFI process. Table 5-5 provides a summary of key findings from this process.

Table 5-5 RFI process used in the demand analysis

RFI PHASE	KEY FINDINGS
Phase 1	High potential demand for additional water was identified to support the production of sandalwood, macadamia nuts, irrigated cropping and for some feedlots as part of the RFI Phase 1.
Phase 2	Under Phase 2, interested parties were provided indicative prices and terms and conditions to respondents to Phase 1 with larger potential demand (that is, expected to exceed 5,000 ML).

5.5 Service Need

In consideration of the current water supply and water security conditions (refer Section 5.2), and having regard to the potential for future opportunity for agricultural production (refer Section 5.3.3) and the ongoing need to service the current and future residents of Rockhampton, Livingstone and Gladstone (refer Section 5.2, 5.3.1 and 5.3.2), the primary problems and opportunities have been identified as the service need for the LFRIP.

⁷⁵ Department of Energy and Water Supply (2016). Rockhampton Regional Water Supply Security Assessment.

⁷⁶ Queensland Department of Agriculture and Fisheries, Queensland Agricultural Land Audit, May 2013, p 488.



Figure 5-13 Identified Service Need (Need and Opportunity)



The identified needs and opportunities for each user group across the Study Area are as follows:

- Rockhampton urban water users.

Rockhampton is reliant on annual inflows to meet its water requirements and is susceptible to supply security risk, after just one failed wet season.

- Livingstone urban water users

The development of the Reference Project allows LSC to meet its stated immediate need to manage its own water supply and security risks (i.e. not be reliant on contractual arrangements with other entities).

- GAWB

Gladstone has no immediate need for an additional volume of water from the Reference Project. However, it does form part of GAWB's CSS, supplying water to the GFP. GAWB has indicated that the development of the GFP will be initiated when supplies in Awoonga Dam reach the point at which it has 48 months of supply remaining, or sufficient demand materialises to require GAWB to augment its water supply sources to meet the identified demand.

- Industrial water users

No service need has been identified for large-scale industrial water users within the Fitzroy Basin.

- Agricultural water users

There is an opportunity to expand agricultural production adjacent to the Fitzroy River. The Reference Project would address this potential opportunity. A number of uncertainties associated with demand for agricultural water from this Project were identified in the demand analysis. The demand analysis identified fodder crops and feedlots as the most likely sources of demand, which aligns with the existing competitive advantages of the region.

Table 5-6 provides a summary of the need and opportunities against short-term (0 to 10 years) and longer term (11 to 30+ years) requirements of the primary water user groups and types.



Table 5-6 Summary of short-term and longer-term need and opportunity

SECTOR	SHORT TERM (0-10years)	LONGER TERM (11-30+ years)
Urban		
▪ Rockhampton	✓ Rockhampton is exposed to risk of one 'failed' wet season	✓ Risk exposure is ongoing
▪ Livingstone	X LSC can continue to source 4,000 ML per annum from Fitzroy Barrage	✓ LSC seek to source 4,000 ML per annum. Long-term urban growth may result in additional needs by 2036
▪ Gladstone	X Awoonga Dam has adequate supply for seven years	✓ Need to offset single source supply risk, access to 30,000 ML per annum
Agriculture		
▪ Rockhampton	X No immediate need, though some opportunity possible.	✓ Opportunities for growth in the agricultural sector have been expressed
▪ Gladstone	X No immediate need, though some opportunity possible	✓ Opportunities for growth in the agricultural sector have been expressed
Industry		
▪ Rockhampton	✓ Rockhampton is exposed to risk of one 'failed' wet season	✓ Risk exposure is ongoing with augmentation
▪ Livingstone	<i>Covered under urban</i>	
▪ Gladstone	X No immediate need, though some opportunity possible.	✓ Need to offset single source supply risk, access to 30,000 ML per annum



5.6 Benefits

It is anticipated that addressing the need and opportunities outlined in Section 5.5 may provide the benefits captured in Table 5-7.

Table 5-7 Anticipated Benefits from Addressing the Service Need

BENEFIT RELATED OUTCOME	BENEFIT DESCRIPTION	BENEFIT TYPE	UNIT OF MEASUREMENT
Additional water available for customers along the Lower Fitzroy River	New agricultural production as a result of access to high priority water	Quantitative, both: Non-Financial Financial	Measures include: ML used by agricultural users Dollars (\$), revenue
Increase in regional employment from increased agricultural production	Employment Increase in number of direct additional agricultural jobs created	Quantitative, non-financial	FTEs
	Income Increase in agricultural sector contribution to GRP	Quantitative, financial	Dollars (\$)
Reduced costs associated with a 'failed wet season' for Rockhampton	Decreased likelihood and impact from a failed wet season, reducing (or removing) associated risks costs (either trucking in water and/or shutdown costs for commercial activity)	Quantitative, financial	Dollars (\$)
The avoidance of the costs associated with the future development and operation of a weir on the Lower Fitzroy River	Forgone requirement for GAWB to develop a weir in the future in accordance with its DMP and CSS	Quantitative, financial	Dollars (\$)
Improved access and connectivity	Delivery of upgraded river crossings will facilitate movement of people, machinery and equipment and livestock in periods of flooding and maintain access to services and facilities such as schools and health facilities, social and recreational clubs and networks	Quantitative, non-financial	No. of Days (crossings open)



5.7 Stakeholders

This section sets out the stakeholder engagement approach and activities undertaken prior to and during the development of the DBC, and sets out engagement activities required following the DBC finalisation and final funding approval.

Stakeholder engagement and feedback has been critical for the development of the Service Need, the Base Case and Reference Project and in the development of the demand analysis, which underpins the economic analysis.

5.7.1 Prior to the DBC

An EIS and an AEIS were undertaken for the LFRIP under the *State Development and Public Works Organisation Act 1971*. The Coordinator-General's evaluation of the EIS was issued on 8 December 2016. In addition to providing approval for the LFRIP⁷⁷, this report contains a range of conditions and commitments by the proponents for the implementation of the LFRIP. As part of the development of the EIS an extensive stakeholder engagement process (with key stakeholders including government, industry and community) was undertaken to manage and monitor the potential impacts and opportunities.

The Coordinator-General released the draft EIS for public and agency review and comment on 18 July 2015. To provide opportunities for public and agency involvement and education and to encourage and facilitate active consultation, the following consultation activities have been undertaken with regard to the draft EIS:

- public notification (national, regional and local newspapers)
- public exhibition of the draft EIS (exhibition during a period of 30 business days at seven venues, as well as online)
- distribution of a Project update (to a range of stakeholders)
- regulatory agency briefings (to local, state and Commonwealth government agencies)
- community information sessions (four community information sessions held during the public exhibition period)
- stakeholder meetings
- monitoring and maintenance of the Project's email, 1800 free call number and website.

The following stakeholder activities were also undertaken to identify and assess potential social impacts:

- Consultation with directly affected stakeholders (survey questionnaires and thorough discussions with Project appointed dedicated land liaison officers). All landholders were invited to participate in survey questionnaires; 21 responses were obtained. An additional 14 landholders were interviewed in person or by telephone and a further 52 landholders were met by appointed land liaison officers.
- Consultation with interested community members and community groups as well as the Social Impact Assessment Unit in the former Department of Infrastructure and Planning.

Table 5-8 lists the stakeholders identified throughout the early phase of the LFRIP, as well as their interests. The full Project stakeholder list developed for this DBC is provided in Table 5-8.

⁷⁷ It is further noted that the Commonwealth Minister's approval for the LFRIP was given in February 2017.



5.7.2 During DBC development

Throughout the development of the DBC, Building Queensland in conjunction with the proponents, consulted with representatives from key stakeholders in the region, including:

- Rockhampton Regional Council
- Livingstone Shire Council
- Growing Central Queensland
- Department of State Development
- Department of Agriculture and Fisheries
- Department of Natural Resources and Mines
- Queensland Treasury
- Department of Energy and Water Supply.

Issues raised by the above stakeholders were captured in the LFRIP Issues Register and were managed at the Project Working Group level and Steering Committee where required. The issues register was managed by the Building Queensland nominated Project Director. All substantive issues have been closed.

A more extensive consultation process was required to support the assessment of agricultural and industrial customer water demand. This process is discussed below.

5.7.2.1 Consultation Activities (Demand Analysis)

For the DBC, a multi-stage consultation process to better gauge agricultural and industrial water demand in the region was undertaken.

Following preliminary meetings with key agencies, representatives of RRC and LSC. A workshop was held in Rockhampton (1 February 2017) to ensure that stakeholders (including potential customers) were informed of the nature of the proposal, to gain an understanding of the underlying demand drivers for water in the region and to outline the current supply options potentially available to address expected future demand. Around 30 stakeholder representatives attended, including representatives from industry groups, government bodies, potential customers and local stakeholders. A good discussion provided insights and local perspectives.

A second phase was aimed at identifying customers (including investors) potentially interested in securing water from Rookwood. This took the form of direct contact (phone and email) of parties identified to date by relevant agencies and organisations.

5.7.2.2 Request for Information (RFI)

In March 2017, a public process described as a RFI to further test agricultural demand for water from the proposed Rookwood Weir was carried out. The purpose of the RFI Phase 1 was to:

- provide persons with information about the proposed Rookwood Weir
- seek information from interested persons about their potential demand for water from the proposed Rookwood Weir for agricultural and industrial purposes
- inform the development of the business case, which will include an assessment of viability of the LFRIP.



SERVICE NEED

The objective of the RFI Phase 1 was to establish interest in securing water from Rookwood Weir. The RFI was not part of a competitive or selective tender process and participation in the RFI was not a guarantee of any future pricing or contracting position.

The RFI was advertised in national, state and regional publications. These include: The Australian, Australian Financial Review, Courier Mail, The Land, Queensland Country Life and regional publications from Atherton in the north to Wide Bay further south. There were two rounds of public advertisements. The first and second round of 13 advertisements (each) appeared for four weeks from mid-April to 12 May 2017.

The RFI appeared on the LFRIP website. This is an established website utilised by the proponents during the LFRIP's EIS phase. The website is managed by GHD on behalf of the GAWB and SunWater. It has been updated to contain the RFI and instructions for its completion. Advertisements also referred to this webpage.

Following the receipt of responses from the RFI Phase 1 process, an RFI Phase 2 which involved contacting selected interested persons/parties to conduct further discussions to support the identification of current and future demand, including constraints and opportunities. On receipt of a signed Confidentiality Deed, an indicative price range and contract terms were also shared with the selected respondents. These discussions sought further information on:

- current business operations
- water requirements from the proposed Rookwood Weir
- aspects associated with proposed use of water from Rookwood Weir.

5.7.2.3 Internal and external stakeholder engagement

To assist in the preparation of the detailed business case the project team engaged with a wide range of internal and external stakeholders in the development of the DBC.

5.7.3 Post Detailed Business Case

Stakeholder engagement activities undertaken after the completion of the DBC and post funding approval are the responsibility of the nominated Project Manager/Director of the proponent of the Project. This section outlines the stakeholder engagement approach to support activities following the completion of the DBC which will assist the nominated Project Manager/Director in the objectives outlined in this section.

5.7.3.1 Stakeholder Engagement Objectives

The following objectives have been developed to ensure that the engagement and communication goal is achieved.

- Continue with engagement with key stakeholders in the decision-making period for the Project and through preparatory and early works activities for the Project.
- Prior to the commencement of the delivery phase of the Reference Project, meet with key stakeholder to provide information about the study and capture their concerns and ideas about the impact of the Project in the region.
- Prior to the commencement of construction of the Reference Project, meet with key stakeholders to outline the findings of the initial stakeholder engagement and express how their input assisted to shape the findings.
- Throughout the life of the delivery phase, capture key stakeholder input and opinion in relation to the study and its potential outcomes.



SERVICE NEED

- Through all phases of the Project maintain communication pathways and actions to keep all stakeholders best informed of Project progress and future directions.
- At all times during the delivery phase, manage stakeholder expectations, by clearly communicating the scope of the Project.
- At all times during the consultation activities, capture issues, and identify relevant actions, or corrective actions were deemed necessary.

5.7.3.2 Success Factors

Success factors associated with effective stakeholder engagement and management during delivery and operation of the Reference Project include:

- Key stakeholder contacts, records and community meetings are maintained and communication documents on Project updates are prepared and released at regular intervals.
- Key stakeholder ideas, concerns, policies and plans have been recognised and acknowledged, captured, and, where possible, addressed.
- The Project Team is able to demonstrate that key stakeholders have been listened to, and key stakeholders indicate that they have listened
- Key stakeholders are able, at some level, be satisfied the outcome of the Reference Project, even if the outcome does not reflect their personal preference, as stakeholders understand how it was determined and they acknowledge that they were part of the process.
- Key stakeholders involved in the study represented a range of community, industry and government stakeholders.
- Clear and defined reporting enables the state government to respond to public enquiries regarding the Project, as process clearly documents the stakeholders involved, the issues raised and ideas shared, and how these issues and ideas contributed to the outcome of the delivery of the endorsed Reference Project.

5.7.4 Post Detailed Business Case

Stakeholder engagement activities to be undertaken after the completion of the DBC and post funding approval will be the responsibility of the nominated Project Manager/Director of the proponent of the Project.

Table 5-8 provides a summary of identified Project stakeholders and their interests in the LFRIP.

Table 5-8 Stakeholders and project interest

STAKEHOLDER CATEGORY	STAKEHOLDER	INTEREST/S
INTERNAL STAKEHOLDERS		
Project Partners	SunWater	<ul style="list-style-type: none"> ▪ Joint proponents for the development of the LFRIP (subject to Queensland Government decision)
	Gladstone Area Water Board	



STAKEHOLDER CATEGORY	STAKEHOLDER	INTEREST/S
	Building Queensland	<ul style="list-style-type: none"> DBC Lead (engaged by the proponents)
COMMONWEALTH GOVERNMENT		
Departmental Ministers	Minister for Environment	<ul style="list-style-type: none"> Alignment with federal objectives and plans Infrastructure that is properly planned and timed Investment decision / approval Environmental approvals / requirements
	Minister for Infrastructure and Regional Development	
	Minister for Agriculture	
	Minister for Industry	
	Minister for Indigenous Affairs	
Elected Representatives	Federal Member for Capricornia	<ul style="list-style-type: none"> Alignment with federal objectives and plans Infrastructure that is properly planned and timed Local economic, social and environmental impacts
	Federal Member for Flynn	
Commonwealth Government Departments and Authorities	Department of Infrastructure and Regional Development	<ul style="list-style-type: none"> Alignment with federal objectives and plans Infrastructure that is properly planned and timed Construction and operational impacts and mitigation / management activities Review of the DBC and investment justification Funding submission / application and agreement under the NWIDF
	Department of Agriculture and Water Resources	
	Department of Environment and Energy	
	Great Barrier Reef Marine Park Authority	
	Infrastructure Australia	
QUEENSLAND GOVERNMENT		
Premier and Departmental Ministers	Premier and Minister for the Arts	<ul style="list-style-type: none"> Investment decision / approval Alignment with other QLD Government department objectives and plans Infrastructure investment that is properly planned and timed
	Deputy Premier, Minister for Transport and Minister for Infrastructure and Planning	
	Treasurer and Minister for Trade and Investment	
	Minister for Environment and Heritage Protection and Minister for National Parks and the Great Barrier Reef	
	Minister for State Development and Minister for Natural Resources and Mines	



STAKEHOLDER CATEGORY	STAKEHOLDER	INTEREST/S
	Minister for Main Roads, Road Safety and Ports and Minister for Energy, Biofuels and Water Supply	
	Minister for Agriculture and Fisheries and Minister for Rural Economic Development	
	Minister for Local Government and Minister for Aboriginal and Torres Strait Islander Partnerships	
Elected Representatives	Member for Rockhampton	<ul style="list-style-type: none"> ▪ Alignment with Commonwealth and state objectives and plans ▪ Infrastructure that is properly planned and timed ▪ Local economic, social and environmental impacts
	Member for Gladstone	
	Member for Keppel	
	Member for Mirani	
	Member for Gregory	
State Departments and Authorities	Office of the Coordinator-General (Department of State Development)	<ul style="list-style-type: none"> ▪ Alignment with other QLD Government department objectives and plans ▪ Infrastructure investment that is properly planned and timed ▪ Review, input and feedback on the DBC ▪ Ongoing management and delivery activities
	Queensland Treasury	
	Department of Transport and Main Roads	
	Department of Environment and Heritage Protection	
	Department of Agriculture and Fisheries	
	Department of Natural Mines and Resources	
	Department of Energy and Water Supply	
	Department of Aboriginal and Torres Strait Islander Partnerships	
LOCAL GOVERNMENT		
Councils	Rockhampton Regional Council	<ul style="list-style-type: none"> ▪ Improved conditions and services for local residents and businesses ▪ Job creation ▪ Impact on environment ▪ Advancing the area's status as an attractive place to invest ▪ Increase in agricultural production ▪ Cost of Project
	Livingstone Shire Council	
	Central Highlands Regional Council	
	Wooranbinda Aboriginal Shire Council	
	Gladstone Regional Council	



STAKEHOLDER CATEGORY	STAKEHOLDER	INTEREST/S
COMMUNITY AND BUSINESS		
Landholders	Directly affected landholders and tenement holders at the Rookwood Weir sites, including properties impacted by associated inundation.	<ul style="list-style-type: none"> ▪ Accessibility, to and from property and local crossings ▪ Management activities (including engagement/communication, risk and delivery management activities) during construction and operations ▪ Property damage, loss and compensation
Environmental Groups	Fitzroy Basin Association	<ul style="list-style-type: none"> ▪ Minimising and/or mitigation of environmental impacts ▪ Monitoring and reporting activities
	Fitzroy River and Coastal Catchments Inc.	
	The Wilderness Society Queensland	
	Greening Australia Queensland	
	Capricorn Conservation Council	
	Wildlife Preservation Society of Queensland	
Australian Marine Conservation Society		
Business	Rockhampton Chamber of Commerce	<ul style="list-style-type: none"> ▪ Improved conditions for local residents, industry and the agriculture sector ▪ Minimal disruption to the local community and businesses during construction ▪ Advancing growth in the agricultural sector ▪ Job creation in the region
	Gladstone Chamber of Commerce	
	AgForce Queensland	
Industry Peak Bodies	Central Queensland Local Government Association	<ul style="list-style-type: none"> ▪ Improved conditions for the agricultural and industry sectors ▪ Advancing the region's status as an attractive place to invest
	Consortium for Integrated Resources Management	
	Co-operative Research Centre for Catchment Hydrology	
	Co-operative Research Centre for Coastal Zone, Estuary and Water Management	
	Central Queensland Beef Research Committee	
	Meat and Livestock Australia	
	Gladstone Area Promotion and Development Ltd	
	Rockhampton Regional Development	



STAKEHOLDER CATEGORY	STAKEHOLDER	INTEREST/S
	Regional Development Australia (Growing Central Queensland)	
Community Groups (interest groups and community service organisations)	Duaranga Road Users Group	<ul style="list-style-type: none"> ▪ Improved conditions for local residents, industry and the agriculture sector ▪ Minimal disruption to the local community and businesses during construction ▪ Effective WHS processes
	Community Services Organisations – Rotary, Lions etc.	
	Rural Fire Brigade Gogango	
	Rural Fire Brigade Morinish	
	Fitzroy Elders – The Fitzroy Basin Elders Committee	
	Country Women’s Association	
	Woorabinda Aboriginal Council/Woorabinda Pastoral Co (owns Foleyvale and Stoney Creek	
	Coorumburra Rural Enterprises (Darumbal/BBKY, leases Coorumburra Station from Marlborough Nickel)	
Utility Service Providers	Ergon Energy	<ul style="list-style-type: none"> ▪ Service supply requirements during construction ▪ Service supply requirements for operations
	Telstra	
	Optus	
	Fitzroy River Water	
Cultural Heritage	Darumbal People	<ul style="list-style-type: none"> ▪ Contributors to CHMP (nominated representatives) ▪ Effective implementation of the CHMP ▪ Any native title or cultural implications
	Gangulu People	
	Ghungalu People	
	Kangoulu People	
	Jetimarala People	
Media	The Australian	<ul style="list-style-type: none"> ▪ What is being done and by whom ▪ Project cost ▪ Why this is needed ▪ How long it will take to plan and build ▪ Value for money for taxpayers
	Capricorn Local News	
	The Courier Mail	
	Rockhampton Morning Bulletin	
	WIN News	
	ABC Radio (Capricornia / Rockhampton)	
	ABC Radio (Gladstone)	
	Gladstone Observer	
	Gladstone News	
	ABC TV (Rockhampton)	
	Sea FM/Hot FM	



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STAKEHOLDER CATEGORY	STAKEHOLDER	INTEREST/S
	CQ Extra	
	Rockhampton and Fitzroy News	



6 STRATEGIC CONSIDERATIONS

CHAPTER SUMMARY AND CONCLUSIONS:

- The service need and Reference Project are considered to align with the strategic objectives of various plans, programs and policies, including:

Queensland Government	Commonwealth Government	Proponent Policies
<ul style="list-style-type: none"> ▪ State Infrastructure Plan ▪ Regional Bulk Water Supply Infrastructure and Queensland Bulk Water Opportunity Statement ▪ Central Queensland Regional Water Supply Strategy ▪ Rockhampton Regional Water Supply Security Assessment ▪ Gladstone Regional Water Supply Security Assessment ▪ Queensland Agricultural Land Audit ▪ Central Queensland Regional Plan ▪ Advancing North Queensland Plan. 	<ul style="list-style-type: none"> ▪ Australia Infrastructure Plan ▪ Northern Australia Audit ▪ Developing Northern Australia White Paper ▪ National Water Initiative ▪ National Water Infrastructure Development Fund ▪ National Water Infrastructure Loan Facility ▪ Reef 2050 Plan. 	<ul style="list-style-type: none"> ▪ GAWB Strategic Water Plan ▪ GAWB Drought Management Plan ▪ SunWater’s Corporate Plan 2018-2022 ▪ SunWater’s Business Development Strategic Plan 2017-2022 ▪ SunWater’s Statement of Corporate Intent 2017-18

- A number of these policies and strategies have requirements and conditions that need to be met by the LFRIP. These issues are discussed throughout this chapter.

6.1 Purpose

This chapter considers how the identified service need and the Reference Project align with, or contribute to, the strategic objectives of the Queensland Government, Commonwealth Government and relevant local government and/or operator plans, programs and policies.

6.2 Queensland Government

6.2.1 Water Policy

6.2.1.1 Queensland Bulk Water Opportunity Statement

The Queensland Bulk Water Opportunity Statement (QBWOS) was released in July 2017 and provides a framework through which the Queensland Government can support and contribute to sustainable regional economic development through better use of existing bulk water infrastructure and investment in new infrastructure.

The QBWOS provides a clear statement of the Queensland Government’s objectives for bulk water supply when considering the investment and broader competition for public funds. These objectives are:

- safety and reliability of dams and urban water supplies



STRATEGIC CONSIDERATIONS

- use existing water resources more efficiently
- support infrastructure development that provides a commercial return to bulk water providers
- consider projects that will provide regional economic benefits.

The QBWOS identifies opportunities for regional communities and the state as a whole. The focus is on maximising the use of, and benefits from existing investments and carefully considering the benefits and costs of new infrastructure. The focus of the QBWOS is therefore on reducing the barriers to using available water within existing bulk water supply infrastructure and considering new projects that demonstrate economic benefits within the context of competing budget and environmental constraints.

Importantly, the QBWOS provides complementary assessment principles that need to be considered in the assessment of proposed bulk water supply infrastructure proposals, these principles have an implication for the LFRIP, as outlined in Table 6-1.

Table 6-1 Requirements under QBWOS

OBJECTIVE	IMPLICATIONS FOR THE LFRIP
Analysis of water demand is informed by direct engagement with potential customers, who have been provided with estimates of the availability and security of water to be supplied and the potential charges likely to be associated with water delivery	<ul style="list-style-type: none"> ▪ The water demand profiles used in the development of the DBC have been based on, and give regard to the public RFI process (refer Section 5.4).
Estimates for water charges that are presented to potential customers as part of demand analysis are underpinned by preliminary strategic and technical assessment of infrastructure options	<ul style="list-style-type: none"> ▪ Preliminary estimates for water charges presented to potential customers under the RFI process (refer Section 5.4), were based on the known capital costs and technical assessments.
There should be secure customer commitment (through formal arrangements between the proponent and the customers) prior to any state government funding of bulk water supply infrastructure projects	<ul style="list-style-type: none"> ▪ This has implications for the LFRIP.
If a government contribution is necessary to enable a project to proceed, the government should be presented with a business case that addresses the above matters prior to the commencement of more detailed and costly assessments (including environmental impact assessments and any potential environmental impact statement)	<ul style="list-style-type: none"> ▪ The EIS for the LFRIP was completed before this principle (or the QBWOS) was generated. It is noted that future bulk water projects that may require a subsidy, will need a business case completed prior to an EIS being undertaken.

6.2.1.2 Central Queensland Regional Water Supply Strategy

The CQRWSS was released in 2006. The CQRWSS provides a framework for managing future urban, rural and industrial water needs in Central Queensland while seeking to achieve optimal environmental, social and economic outcomes.

The CQRWSS considered existing water supply arrangements in the region and sought to identify the most effective ways of meeting the region’s future water supply needs. The CQRWSS indicated the future water supply shortfall for the region was expected to be largely through water trading and demand management practices.



However, the CQRWSS identified the urban and industrial water resource demands of the RRC, LSC and GAWB 'cannot be met by trading and demand management savings alone'⁷⁸. The CQRWSS, identified the Lower Fitzroy River as the next main source of supply for the urban and industrial water needs of the region. The Strategy canvassed raising the existing Eden Bann Weir or construction of Rookwood Weir as potential options for accessing the strategic water infrastructure reserve of 76,000 ML per annum identified in the Fitzroy ROP.

The evaluation has considered the initiatives identified in the CQRWSS as part of the identification of the service need and the options assessment. The identification of Rookwood Weir as the Reference Project to access the strategic water infrastructure reserve in the Fitzroy ROP is consistent with the next main bulk water supply source for the region as identified in the CQRWSS.

6.2.2 Agriculture

6.2.2.1 Queensland Agricultural Land Audit

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

Chapter 10 of the 2013 Audit covers Central Queensland, including Rockhampton and Gladstone and the surrounding areas. The Audit found there to be potential for the expansion of agricultural production in the region, including in horticultural crop and intensive livestock production. Key findings from the Audit relevant to the potential expansion of agricultural production in the Lower Fitzroy were as follows:

- The availability of suitable soil and water resources in the region provides an opportunity for the expansion of irrigated agricultural production, subject to other constraints, primarily the construction of additional water storage infrastructure, water pricing and future market demand, being addressed.
- The Lower Fitzroy was identified as a key area within the region, particularly in relation to the establishment of horticulture crops and the expansion of cattle feedlots adjacent to and below the proposed Rookwood Weir.
- The Audit noted that a previous study conducted in 2007 (the Fitzroy Industry and Infrastructure Study) has identified areas of land suitable for a range of crops including citrus, grapes and vegetables, in addition to the potential development of cattle feedlots in the Stanwell and Fitzroy area.

Based on the above, the Reference Project is closely aligned with the findings of the Queensland Agricultural Land Audit with respect to the Central Queensland region, having identified areas within the Lower Fitzroy region, including adjacent to and below the location of the Reference Project, suitable for irrigated agricultural production, including high-value horticultural and intensive livestock production.

6.2.3 Planning

6.2.3.1 Central Queensland Regional Plan

The Central Queensland Regional Plan, which was published in 2013, covers several local government areas, including RRC, LSC and GRC. The Plan aims to boost economic growth throughout Central Queensland in addition to addressing land use competition between the agricultural and resource sectors. The Plan

⁷⁸ CQRWSS page 50



highlighted four priority areas for infrastructure to drive economic development throughout the region – transport networks, electricity, water, and community infrastructure.

The Plan identifies increasing demand for water across Central Queensland due to⁷⁹:

- ongoing population growth, in particular the key regional centres of Gladstone and Rockhampton
- small towns or work camps with an influx of workers associated with the resource industry
- mining activities such as dust suppression and coal washing
- increases in agricultural production to support the government’s target of doubling of food production by 2040.

The Plan recognises the Fitzroy River catchment as a ‘significant asset for the Central Queensland region’ and that there is ‘scope under the current Fitzroy Basin Water Resource Plan for provision of additional water supplies to support further development in parts of the region’⁸⁰.

The Reference Project responds to the noted demand drivers and aligns with the priority outcome for water infrastructure under the Plan, which is to ‘to improve water access by addressing increasing demands from industry, agriculture and population growth and to achieve appropriate security and reliability of water supplies’⁸¹.

6.2.3.2 Advancing North Queensland Policy

The Advancing North Queensland Policy was released in June 2016, and highlights a number of priorities that support the ‘immense economic potential of the region and have a keen focus on delivering on the tremendous opportunities and competitive natural advantages the region presents’⁸².

Water security is one of the priorities under this policy, with the Advancing North Queensland Policy acknowledged that water security and water infrastructure are critical to sustain agricultural industries and boost regional development throughout the region. The Queensland Government committed to producing RWSSAs (refer below); working with councils at risk of running out of water due to drought; progressing feasibility studies funded by the Commonwealth Government under the National Water Infrastructure Development Fund (NWIDF), including this DBC; and securing capital funding from the Commonwealth Government under the NWIDF.

DEWS, in partnership with RRC and subsequently GAWB, released the:

- Rockhampton RWSSA in February 2016.
- Gladstone RWSSA in February 2017.

The RWSSAs consider a number of growth scenarios to identify the timing and magnitude of potential water supply risks across the Study Area. This DBC takes into consideration the different growth scenarios and utilises these reports as supporting material for the service need (refer Chapter 5).

The Reference Project will support water security requirements for the Fitzroy Basin and Gladstone Region, providing agricultural and industrial water users with the necessary assurance of supply needed to make investment decisions and contribute further to the economic activity of Queensland.

⁷⁹ Central Queensland Regional Plan. Page 22

⁸⁰ Ibid.

⁸¹ Ibid.

⁸² Advancing North Queensland. Page 2



6.2.4 Infrastructure

State Infrastructure Plan

The State Infrastructure Plan (SIP) outlines the strategic direction for the planning, investment and delivery of infrastructure in Queensland. The SIP identifies the government's infrastructure objectives and sets out how the objectives are to be achieved. Table 6.2 summarises the alignment for the LFRIP with several key Governments' objectives for water investment as outlined in the SIP.

Table 6-2 Alignment with key objectives of SIP

OBJECTIVE	ALIGNMENT / ISSUES
Water supply infrastructure is in place or in train where there is a sound business case and water resources are available	<ul style="list-style-type: none"> The development of this DBC responds to this stated government objective
Appropriate solutions, including demand management, are evaluated and implemented after the water needs of local government have been assessed in partnership with the state	<ul style="list-style-type: none"> Prior to the development of the DBC, both proponents have actively considered a range of solutions, including demand management activities (refer Chapter 7)
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	<ul style="list-style-type: none"> The reference design and environmental assessment includes consideration of the environmental effects (refer Chapters 9 and 15 respectively) The Coordinator-General recommended a range of environmental controls be implemented in relation to the Project, primarily related to the impact of water use for agricultural production on the quality of water flowing into the GBR Marine Park (GBRMP). The Coordinator-General concluded that the proposed measures, in addition to several other recommended controls, would effectively avoid, mitigate, minimise or offset any adverse environmental impacts from the Project

The LFRIP DBC aligns with key aspects of the SIP by assessing the effectiveness of the LFRIP in meeting the problem of water supply security and reliability for urban and industrial users and the opportunity to increase agricultural production in the Lower Fitzroy region.

6.3 Commonwealth Government

6.3.1 Infrastructure

6.3.1.1 White Paper on Developing Northern Australia

The White Paper on Developing Northern Australia (2015) outlines the Commonwealth Government's vision for the future of Northern Australia and identified actions over the next 20 years, aimed at unlocking the North's full potential.

The Reference Project supports the strategic goal in the Commonwealth Government's White Paper of providing greater access to water across northern Australia. Specifically, there are two ways in which the Reference Project is consistent with this objective:

- providing increased water supply security and reliability in the Rockhampton and Gladstone regions to underpin sustainable economic growth



- increasing availability of water in the Lower Fitzroy for regional economic development uses, primarily irrigated agriculture.

6.3.1.2 Australian Infrastructure Plan

The Australian Infrastructure Plan sets out the infrastructure challenges and opportunities over the next 15 years in addition to identifying the solutions required to drive productivity growth, maintain and enhance the nation's standard of living and ensure that Australian cities remain world-class. The Plan highlights the need for infrastructure investment in Northern Australia to enhance regional productive capacity and take advantage of growing demand for 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 LFRIP supports the Australian Infrastructure Plan as it increases water security for agricultural production and responds to the increasingly variable climate. The Reference Project has the potential to fill an identified infrastructure gap and also capture potential downstream economic opportunities identified in the Plan. The potential for the Reference Project to contribute to the growth of the regional economies of Rockhampton and Gladstone is aligned with the strategic objective of the Australian Infrastructure Plan to capitalise on opportunities to develop Northern Australia through the development of water infrastructure for irrigated agriculture.

6.3.2 Water

6.3.2.1 National Water Initiative

The Commonwealth Government and each of the states and territories are parties to the Intergovernmental Agreement on a National Water Initiative (NWI). The NWI, established in 2004, sets out a national blueprint for water reform and a shared commitment by governments to increase the efficiency of Australia's water use, provide greater certainty for investment and productivity, and to ensure improved environmental outcomes. The NWI has driven reforms resulting in improved water management and planning arrangements. Key developments have included changes to water access entitlements, water markets, water pricing, water use efficiency and the integrated management of water resources.

Pricing principles have been agreed pursuant to the NWI Council of Commonwealth Governments (COAG) agreement. The first of these principles addressed the issue of cost recovery for new capital expenditure.⁸³ This principle states that for new and replacement assets, charges are to 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 ORC).

Charges related to water supplied by the Reference Project can be set in accordance with either of the above approaches under the regulatory framework that is administered by QCA (as the entity responsible for the regulation of water pricing in Queensland).

⁸³ NWI Pricing Principles: Principle 1: Cost recovery for new capital expenditure, paragraph 13.



It is also important to note principle six of the NWI pricing principles, which states that new contributed assets are to be excluded or deducted from the RAB or offset using other mechanisms so that a return on and of the contributed capital is not recovered from customers.

The Commonwealth Government has advised that any funding contribution made to the Reference Project under the NWIDF is to be treated as a capital contribution for pricing purposes. As a result, the prices to apply to the supply of water from the water storage infrastructure will take into account this contribution (i.e. will not be recovered through water prices).

The NWI also identifies the importance of facilitating the trading of water resources to ensure that the efficiency of water use is maximised. The specification of water rights and water resource management arrangements to apply to the Project will be developed in a manner that is consistent with the NWI requirements.

6.3.2.2 Reef 2050 Plan

The Reef 2050 Plan was released by the Commonwealth and Queensland Governments in March 2015. The Plan is the overarching framework for the protection and management of the GBR until 2050. Among other priorities and initiatives, the Plan outlines management measures for the next 35 years to ensure the outstanding universal value of the GBR is preserved now and for generations to come.

Water quality is a key focus of the Reef 2050 Plan, particularly in relation to the potential impact of infrastructure projects on the quality of water that is discharged into the GBR. The potential for agricultural practices to impact on the nutrient, sediment and pesticide loads in the GBR is identified in the Plan, as is the need to have consideration for the quality of agricultural run-off.

In December 2016, the Coordinator-General released the evaluation report on the EIS for the LFRIP. The report identified water quality impacts on the Great Barrier Reef World Heritage area (GBRWHA) from agricultural activities facilitated by the development of the water supply infrastructure as a key issue, particularly the potential for elevated nutrient levels and increased sediment loads to flow into the GBR. The Coordinator-General noted that if not properly managed, water used for irrigation is likely to deposit sediment, nutrients and chemicals into shallow aquifers. However, the Coordinator-General referred to a technical analysis which found that changing land use in the Lower Fitzroy from grazing to broadacre cropping on the river flats and to tree cropping on the more arable hills would only marginally increase herbicide and pesticide loads while not necessarily increasing sediment and nutrient loads.

Based on a review of the analysis undertaken for the EIS and other technical reports and assessments, the Coordinator-General acknowledged the need to mitigate the potential impact of the Project on the GBR and recommended the Commonwealth Environment Minister set conditions requiring the proponent to:

- develop and implement a land management code of practice that is to be attached to future water licences as a condition of sale to prospective agricultural users aimed at achieving the water quality objectives of the Reef 2050 Long Term Sustainability Plan
- implement a water quality monitoring program that would inform a future water quality offsets program if required by the Minister. This would address the impacts of consequential facilitated agricultural development on water quality entering the Fitzroy River.

The Coordinator-General concluded that, with the implementation of the proponents' commitments and the above conditions, the potential impacts of the Project on water quality in the Fitzroy River and downstream impacts on the GBR would be managed.



The Coordinator-General also noted that community pressures and improved technologies (i.e. water capture and re-use), in combination with improved agricultural practices becoming easier to implement, will play an important role in mitigating the Project’s impact on the GBR.

Hydrological modelling conducted as part of the EIS indicated that the GBR wetland protection areas located adjacent to the Eden Bann Weir and proposed Rookwood Weir footprints will not be impacted by the Project.

6.4 Proponent Policies & Plans

The LFRIP aligns with and responds to a number of objectives and stated priorities under the policies and plans of GAWB and SunWater. Table 6-3 provides a summary of these.

Table 6-3 Alignment with key objectives of GAWB and SunWater

PLAN / POLICY	DESCRIPTION & ALIGNMENT OF LFRIP WITH KEY OBJECTIVE / PRIORITY
GAWB	
Strategic Water Plan 2013	<p>Description</p> <ul style="list-style-type: none"> sets out GAWB’s approach to meeting the current and future water needs of its customers, taking into account demand, security and reliability of supply, and price. <p>Objective / Alignment</p> <ul style="list-style-type: none"> the Reference Project would provide the necessary water storage infrastructure to supply GAWB its water entitlement from the Fitzroy River.
Drought Management Plan 2015	<p>Description</p> <ul style="list-style-type: none"> sets out GAWB’s framework for managing and mitigating the impacts of future droughts. <p>Objective / Alignment</p> <ul style="list-style-type: none"> the Reference Project would provide the necessary water storage infrastructure to supply GAWB its water entitlement from the Fitzroy River should the drought ‘triggers’ outlined in the Drought Management Plan (DMP) be realised.
SunWater	
Corporate Plan 2018-2022	<p>Description</p> <ul style="list-style-type: none"> the Corporate Plan has been prepared to fulfil the requirements of the Government Owned Corporations Act 1993 (GOC Act), and guides business direction for the next five years, through to 30 June 2022. It sets out SunWater’s purpose and, the values that guide the way in which SunWater will undertake its business, SunWater’s specific business strategies, and the targets against which it will measure performance at a corporate level. <p>Objective / Alignment</p> <ul style="list-style-type: none"> the Plan demonstrates our strategic goals to be commercial focused, sustainable business with supportive stakeholders and high empowered people. LFRIP DBC aligns to the objective to actively search for growth opportunities that generate a commercial return and reinforcing SunWater’s position as the principle bulk water provider in regional Queensland and the state’s preferred proponent for the development for new bulk water infrastructure.



PLAN / POLICY	DESCRIPTION & ALIGNMENT OF LFRIP WITH KEY OBJECTIVE / PRIORITY
Business Development Strategic Plan 2017-2022	<p>Description</p> <ul style="list-style-type: none"> the SunWater Strategic Plan 2017 to 2021 identifies four goals that support SunWater's purpose of delivering value through water solutions for today and tomorrow. One of the core strategic goals "A sustainable business" requires growth of the business through the identification and implementation of new business opportunities. This plan sets out the strategies that will be delivered in support of this growth objective. <p>Objective / Alignment</p> <ul style="list-style-type: none"> LFRIP aligns with the Business Development Strategic Plan as a potential asset identified for development if demand and growth suggest commercial viability. Similarly, SunWater have projects for Connors and Nathan Dam similarly developed to progress should demand be identified.
Statement of Corporate Intent 2017-18	<p>Description</p> <ul style="list-style-type: none"> SunWater's Statement of Corporate Intent (SCI) outlines the key performance indicators, targets and other corporate measures that have been agreed for implementation in 2017-18, being the first year of SunWater's five-year corporate plan. The SCI also identifies the measures of success that will be applied in evaluating achievement against identified deliverables and goals. <p>Objective / Alignment</p> <ul style="list-style-type: none"> the SCI identifies LFRIP, among other growth projects, for further development allowing SunWater to take advantage of growth opportunities.

6.5 Conclusion

The review of relevant government programs and policies has concluded that the identified service need and Reference Project align with, and contribute to, the strategic objectives of various plans and programs of the Queensland Government, Commonwealth Government, GAWB and SunWater. A summary of the alignment is outlined in Table 6-4.

Table 6-4 Service need and shortlisted options alignment with government policies and programs

DOCUMENT	ALIGNMENT
QUEENSLAND GOVERNMENT	
State Infrastructure Plan	The Reference Project provides a solution to the problem of water supply security and reliability for urban and industrial users in Rockhampton and Gladstone in addition to making water available for the largescale expansion of irrigated agricultural production in the Lower Fitzroy region.
Queensland Bulk Water Opportunity Statement	The Reference Project is aligned with the expectations in the QBWOS.
Central Queensland Regional Water Supply Strategy	Initiatives identified in the CQRWSS have been considered as part of the identification of the Service Need and the Reference Project. The Reference Project accesses the strategic water infrastructure reserve in the Fitzroy Basin, which is aligned with the CQRWSS.
Central Queensland Regional Plan	The Reference Project aims to address the identified water security and reliability risks through the development of new water supply infrastructure.



DOCUMENT	ALIGNMENT
Advancing North Queensland	The Reference Project is aligned with the objectives identified in the Advancing North Queensland Strategy, i.e. alleviating water supply security, water infrastructure as well as reliability risks and increasing economic activity through the increase in water availability for industrial and agriculture production.
COMMONWEALTH GOVERNMENT	
Australian Infrastructure Plan	The Reference Project is aligned with the strategic objective of the Australian Infrastructure Plan to capitalise on opportunities to develop northern Australia through the development of water infrastructure for irrigated agriculture.
White Paper on Developing Northern Australia	Consistent with the White Paper, the Reference Project will provide greater access to water in the region, which will both address supply security and reliability risks and make additional water available for irrigated agricultural production.
National Water Initiative	The pricing principles to apply to the Reference Project are to be consistent with NWI Pricing Principles, including in relation to the treatment of any contribution from the Commonwealth Government as a capital contribution for pricing purposes. The water management arrangements to apply to the Project will also be consistent with the objectives set out in the NWI with respect to the efficient allocation of water resources.
Reef 2050 Plan	The Coordinator-General's assessment of the EIS for the Project concluded that, with the implementation of the proponents' commitments and the conditions recommended to the Federal Minister, the potential impacts of the Project on water quality in the Fitzroy River and downstream impacts on the GBR would be managed.
PROPONENT	
GAWB Strategic Water Plan	The Reference Project is consistent with GAWB's 2013 Strategic Water Plan, as the infrastructure on the Lower Fitzroy River is required to provide a second water source supply solution for GAWB.
GAWB Government Owned Corporations Act	The Reference Project is aligned with GAWB's DMP, which identifies the GFP and development of infrastructure on the Lower Fitzroy River as GAWB's next main water supply source.
SunWater Corporate Plan 2018-2022	LFRIP DBC aligns to the objective to actively search for growth opportunities that generate a commercial return and reinforcing SunWater's position as the principle bulk water provider in regional Queensland and the state's preferred proponent for the development for new bulk water infrastructure.
SunWater Business Development Strategic Plan 2017-2022	LFRIP aligns with the Business Development Strategic Plan as a potential asset identified for development if demand and growth suggest commercial viability.
Statement of Corporate Intent 2017-18	The statement identifies LFRIP, among other growth projects, for further development allowing SunWater to take advantage of growth opportunities.



PART C – OPTIONS



7 OPTIONS CONSIDERED

CHAPTER SUMMARY AND CONCLUSIONS:

- Two primary options were identified in the CQRWSS (2006) that could augment the water storage capacity in the Lower Fitzroy area, including construction of a new weir at Rookwood or raising of the existing Eden Bann Weir. The EIS and AEIS process considered the implications for both of these solutions.
- In December 2016, Building Queensland oversaw the collation of approximately nineteen options, which were assessed based on the ability to meet the water volumes required, as well as known cost and technical implications arising from investigations over the past decade. The considered options included new asset solutions, existing asset solutions, new storage and supply initiatives, as well as combination solutions.
- The options appraisal identified five shortlisted options, including:
 - (A) Option 1: New Rookwood Weir (76,000 ML)
 - (B) Option 2: New Rookwood Weir (54,000 ML)
 - (C) Option 5: Augment Eden Bann Weir (50,000 ML)
 - (D) Option 17: Gladstone Desalination Plant (15,000 ML) + Eden Bann Weir (35,000 ML)
 - (E) Option 19: Pipeline from Fred Haigh Dam (19,000 ML) + Eden Bann Weir (35,000 ML)
- The new Rookwood Weir (76,000 ML) was identified as the preferred Reference Project, noting:
 - It was the only option assessed that has the capacity to deliver a sufficient increase to the usable storage volume for Rockhampton to increase the full-to-empty period by a sufficient magnitude to remove the risk of supply failure as a result of a single failed wet season.
 - In addition to addressing the security of supply risk for the region and alleviating GAWB's single source supply risk, this option delivers up to 42,000 ML per annum of additional water for the expansion of agriculture production in the Lower Fitzroy, consistent with the wider government objectives.
 - Delivery risks are known and manageable, with the Rookwood Weir having been subject to rigorous assessment throughout the recently completed EIS process.
- The GFP will need to be delivered to provide GAWB access to the 30,000 ML entitlement.

The Base Case and Reference Project are further defined in Chapter 8 and 9 respectively.



7.1 Purpose

This Chapter provides a summary of the option appraisal work completed prior to the development of this DBC.

7.2 Option Development Process

As discussed in Chapter 2 Proposal Background, work has been undertaken on LFRIP over the past decade, prior to the development of this DBC. Two broad options were identified in the CQRWSS (2006), the construction of a new weir at Rookwood, or the raising of the existing Eden Bann Weir. These options were further considered in the EIS and AEIS processes.

In December 2016, Building Queensland undertook an analysis of a range of solutions that have been identified over the past decade that could alleviate the security supply risk and provide water for new agricultural producers. This included identifying a long list of options, that included consideration of asset responses not identified in the CQRWSS. The options were assessed against the needs, opportunities, known cost and technical implications arising from studies and investigations undertaken by the proponents over the past decade.

7.3 Longlist of Options

The long list of options broadly included:

- new asset solutions and alternative locations (a new weir/s, dams, water sources)
- existing asset solutions (upgrades and expansions of existing water storage infrastructure)
- combination solutions (combining elements of different options).

In addition to these options, demand management strategies were also considered, including pricing, educational strategies for water users, recycling and water use efficiency initiatives. However, as recognised in the CQRWSS 'demand management alone is not sufficient to meet the medium to long term needs of the region'.

These 19 options, considered against a 'Do Nothing' scenario, are summarised in Table 7-1. A summary of the assessment of the options against the service need and/or known technical and economic implications has also been provided.



Table 7-1 Summary of longlist of options

OPTION	SUMMARY OF ASSESSMENT / RATIONALE	
New Asset Solutions		
1. Rookwood Weir – allocation of 76,000 ML	✓	Project has the capacity to meet the short-term supply reliability requirements of the Rockhampton and Gladstone regions and is technically feasible
2. Rookwood Weir – allocation of 54,000 ML	✓	Project has the capacity to meet the short-term supply reliability requirements of the Rockhampton and Gladstone regions and is technically feasible
Upgrade Existing Asset Solutions		
3. Increase capacity of Fitzroy Barrage – 8,000 ML	✗	Failed to satisfy the yield requirements necessary to provide the additional volumes required to meet the identified Project need
4. Increase capacity of Eden Bann Weir – 35,000 ML	✗	Failed to satisfy the yield requirements necessary to meet the short-term supply reliability requirements of the Rockhampton and Gladstone regions
5. Increase capacity of Eden Bann Weir – 50,000 ML	✓	Project has the capacity to meet the short-term supply reliability requirements of the Rockhampton and Gladstone regions and is technically feasible
6. Increase capacity of Awoonga Dam - 19,000 ML	✗	Fails to provide required volumes and cost per ML is higher than other upgrades.
Alternative Storage and Supply Solution		
7. Nathan Dam – 880,000 ML (66,000ML of high priority)	✗	Without inclusion of a new weir, it is unlikely this Project would provide an economically viable solution to long-term water requirements (noting the significant distance of Nathan Dam from RRC and LSC)
8. Connors River Dam – 373,662 ML (49,500 ML of high priority)	✗	Not considered economically feasible due to the significant water transmission losses in the watercourse downstream of the dam.
9. Fitzroy Gap Dam – 2 to 10 million ML	✗	Fails to meet the service need. Additionally, development of Project will interrupt existing sources of water supply, and previous studies have concluded that the dam would flood the best arable land in the region.
10. Castle Hope Dam – 377,000 ML (44,000 of high priority)	✗	The Project fails to meet the Project need of supplying the volume of water necessary to address short-term supply reliability for the Rockhampton and Gladstone regions
11. Baffle Creek Weir – 110,000 ML (55,000 of high priority)	✗	The Project fails to meet the Project need of supplying the volume of water necessary to address short-term supply reliability for the Rockhampton and Gladstone regions
12. Gladstone Desalination Plant – Upto 30,000 ML	✗	Fails to provide the additional volumes required to alleviate Rockhampton’s supply reliability issues over the short term, and the Project is prohibitive from a cost perspective
13. Groundwater supply – Unknown	✗	This option would not satisfy the Project need, as groundwater supply within the Rockhampton, Livingstone and Gladstone regions is limited to stock and domestic purposes and supplies to small towns
Combination Solutions		
14. Rookwood Weir (54,000 ML) + Eden Bann Weir (50,000 ML)	✗	Project is excluded based on the cap placed on water allocations available under the ROP. It is also noted that this option would not result in a higher volume of allocations than the construction of Rookwood Weir while involving significantly greater cost
15. Rookwood Weir (76,000 ML) + Eden Bann Weir (35,000 ML)	✗	Project is excluded based on the cap placed on water allocations available under the ROP – option would not result in a higher volume of allocations than the construction of Rookwood Weir while involving significantly greater cost



OPTION	SUMMARY OF ASSESSMENT / RATIONALE
16. Rookwood Weir (76,000 ML) + Eden Bann Weir (50,000 ML)	 Project is excluded based on the cap placed on water allocations available under the ROP – option would not result in a higher volume of allocations than the construction of Rookwood Weir (Option B) while involving significantly greater cost
17. Gladstone Desalination Plant (15,000 ML) + Eden Bann Weir (35,000 ML)	 Meets the service need, delivers the necessary volumes of water to the Rockhampton and Gladstone regions to address short-term supply reliability requirements
18. Upgrade Awoonga Dam (19,000 ML) + Eden Bann Weir (35,000 ML)	 While the Project has the potential to deliver the necessary volumes of water to the Rockhampton and Gladstone regions, GAWB assessment identified significant costs associated with this option (in addition to timing concerns)
19. Pipeline from Fred Haigh Dam (19,000 ML) + Eden Bann Weir (35,000 ML)	 While no detailed feasibility study has been conducted on the Project, it is likely the Project would be technically capable of providing the required volumes of water within the necessary timeframes to satisfy the Project need of addressing short-term supply reliability issues for the Rockhampton and Gladstone regions (noting the Project would also require the reconfiguring of the Water Resources Plan sharing rules of each of the Kolan and Burnett sub-schemes within the Bundaberg WSS)

7.4 Shortlist of Options

Following the high-level assessment, five options were shortlisted and subject to analysis against the assessment criteria developed by Building Queensland’s economic advisors. These included⁸⁴:

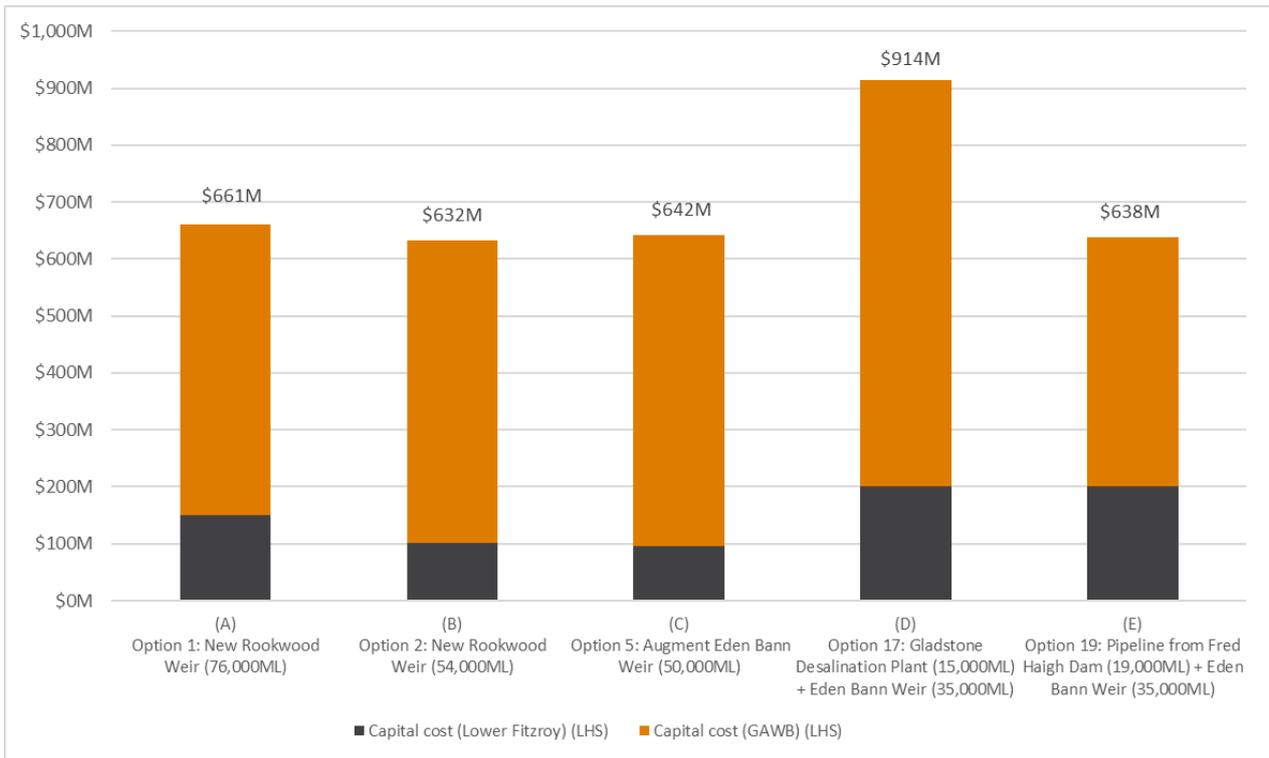
- A) Option 1: New Rookwood Weir (76,000 ML)
- B) Option 2: New Rookwood Weir (54,000 ML)
- C) Option 5: Augment Eden Bann Weir (50,000 ML)
- D) Option 17: Gladstone Desalination Plant (15,000 ML) + Eden Bann Weir (35,000 ML)
- E) Option 19: Pipeline from Fred Haigh Dam (19,000 ML) + Eden Bann Weir (35,000 ML)

Figure 7-1 provides an overview of the capital cost of each option and the outcome in terms of additional supply security for the Rockhampton Region. For Option 1,2 and 5, the capital costs include costs associated with the GFP.

⁸⁴ It should be noted that Option 1 – 3 to be capable of satisfying the project need, it would be necessary to construct the GFP



Figure 7-1 Comparison of capital costs (as of 30 September 2016)



For Option 1,2 or 5 to be capable of meeting the needs and opportunities, it is necessary to construct the GFP (included in the above analysis).

The shortlisted options were further considered in a more comprehensive multi-criteria analysis (MCA), and considered factors beyond the just the cost of water. Table 7-2 summarises the outcomes of the MCA of the shortlisted options.

Table 7-2 Summary of shortlist option analysis

CRITERIA	(A) OPTION 1 NEW ROOKWOOD WEIR (76,000 ML)	(B) OPTION 2 NEW ROOKWOOD WEIR (54,000 ML)	(C) OPTION 5 AUGMENT EDEN BANN WEIR (50,000 ML)	(D) OPTION 17 GLADSTONE DESALINATION PLANT (15,000 ML) + EDEN BANN WEIR (35,000 ML)	(E) OPTION 5 PIPELINE FROM FRED HAIGH DAM (19,000 ML) + EDEN BANN WEIR (35,000 ML)
KEY CRITERIA					
Satisfaction of Project need	High	Medium	Medium	Medium	High
Alignment with government objectives	High	Medium	Medium	Medium	Medium
Net financial impact	High	High	High	Low	Medium
Net economic impact	High	Medium	Medium	Low	Medium
Water delivery risk	High	High	High	Low	Low



CRITERIA	(A) OPTION 1 NEW ROOKWOOD WEIR (76,000 ML)	(B) OPTION 2 NEW ROOKWOOD WEIR (54,000 ML)	(C) OPTION 5 AUGMENT EDEN BANN WEIR (50,000 ML)	(D) OPTION 17 GLADSTONE DESALINATION PLANT (15,000 ML) + EDEN BANN WEIR (35,000 ML)	(E) OPTION 5 PIPELINE FROM FRED HAIGH DAM (19,000 ML) + EDEN BANN WEIR (35,000 ML)
SECONDARY CRITERIA					
Option value for future supply augmentations	Medium	Medium	Low	Low	Low
Ability to stage future augmentations	Medium	High	Low	Medium	Medium
Operational flexibility	Medium	Medium	Low	High	Medium
Social impacts	High	Medium	Medium	Medium	Medium
Environmental impacts	High	High	High	Low	Medium
Engineering cost / risk	High	High	High	Low	Low
MCA RANKING	1	2	3	5	4

These results illustrate that the options involving the construction of the Rookwood Weir (76,000 ML) performed strongest against the key assessment criteria. The key reasons underpinning the recommendation of Rookwood Weir as the Reference Project are as follows:

- It was the only option assessed that has the capacity to deliver a sufficient increase to the usable storage volume for Rockhampton to increase the full-to-empty period by a sufficient magnitude to remove the risk of supply failure as a result of a single failed wet season.
- In addition to addressing the security of supply risk for the region and alleviating GAWB’s single source supply risk, this option delivers an additional water for the expansion of industrial and agriculture production in the Lower Fitzroy, consistent with the wider government objectives. These benefits are not available to the same extent under the options involving the augmentation of the Eden Bann Weir.
- There is little risk associated with the delivery of water and the technical and economic feasibility of the Rookwood Weir Project as it has been subject to the EIS and AEIS process.

The Reference Project for the DBC is the Rookwood Weir (76,000 ML) solution. Importantly, both the Base Case and Reference Project are further defined in Chapters 8 and 9 respectively.



8 BASE CASE

CHAPTER SUMMARY AND CONCLUSIONS:

This Chapter defines the Base Case against which the Reference Project is to be assessed. The Base Case provides the benchmark against which the economic and social impacts of the Project are evaluated and quantified. A Base Case has been defined separately for each of the potential user groups likely to be impacted by the LFRIP:

- Rockhampton urban water users
 - In the absence of the LFRIP, and in the event of an extended period of low inflows into the Fitzroy Barrage, RRC will implement demand management strategies.
 - It anticipated that these measures (the subject of a yet to be complete DMP) may not be sufficient to alleviate all Rockhampton’s supply security risk. A’ failed ‘wet season would result in emergency supply measures (i.e. above and beyond those measures outlined in the DMP) such as the shutdown of industrial and agricultural users, or even the trucking of water into Rockhampton.
- Livingstone urban water users
 - Urban water users in the Livingstone/Capricorn Coast region will continue to be reliant on supply from RRC via the Rockhampton-Yeppoon Pipeline. As a consequence, water users in the Livingstone/Capricorn Coast region are likely to experience water restrictions in the event of an extended period of low inflows into the Fitzroy Barrage.
 - Emergency supply measures may also be required for the Livingstone/Capricorn Coast region at some point over the study period.
- GAWB
 - There is a possibility (i.e. in excess of 50 per cent likelihood) that low inflows could result in the level 2 water restrictions by 2034.
 - Level 2 restrictions would trigger the construction of the GFP as per the CSS, which would require an augmentation of the current water storage infrastructure of to support harvesting of flows from the Fitzroy River.
 - In the absence of the LFRIP, GAWB would be required to deliver a 54,000 ML weir at Rookwood by 2037
- Industrial water users
 - Stanwell Corporation will continue to hold and require access to its 24,000 ML per annum allocation from the Lower Fitzroy WSS (annual water use is expected to remain at around 20,000 ML).
- Agricultural water users
 - The development of water infrastructure on the Lower Fitzroy River by GAWB under the Base Case could make additional volumes of supplemented water allocations available for use in agricultural production in the Lower Fitzroy region.
 - Prior to the development of this infrastructure, irrigated agricultural production in the region, and hence demand for irrigation water, is expected to remain relatively constant.



8.1 Purpose

This Chapter defines the Base Case against which the Reference Project is to be assessed. The Base Case is defined as a ‘business-as-usual’ approach, occurring in the absence of a proposed project⁸⁵. Other important characteristics of a Base Case include:

- the Base Case provides the benchmark against which the economic and social impacts of the Reference Project (refer Chapter 9) are evaluated and quantified
- the Base Case is not a ‘zero spend’ option.
- all expected actions to be taken if none of the Project options are implemented and service levels are reasonably maintained.

For water infrastructure initiatives, as with the LFRIP, in the absence of the Project, it is recognised that service levels may not be maintainable, and that demand management strategies (i.e. water restrictions) can have deleterious effects for water users and customers. Therefore, for the LFRIP, the Base Case (or business-as-usual approach) has been defined separately for each of the potential user groups likely to be impacted by the absence of the LFRIP.

These user groups include:

- Rockhampton urban water users, who are supplied by Fitzroy River Water, a commercialised business unit within the RRC, primarily from the Fitzroy Barrage
- Livingstone Shire/Capricorn Coast urban water users, who are supplied by a combination of Water Park Creek and the RRC, via the Rockhampton-Yeppoon Pipeline
- Gladstone area water users (primarily industrial water users), who are supplied by GAWB from Awoonga Dam
- industrial water users other than those supplied by GAWB or the reticulated networks in Rockhampton or the Livingstone Shire/Capricorn Coast region
- agricultural water users located in the Lower Fitzroy region.

8.2 Base Case Defined

Under the identified Base Case, all user groups will be subject to demand management and water use efficiency measures and adopting water restriction arrangements to be implemented in the event of an extended period of low inflows (refer discussion in Section 8.3, 8.4 and 8.5). In addition to this, it is recognised that GAWB will continue to operate in accordance with the restrictions and augmentation protocols set out in its Strategic Water Plan and DMP.

For the purposes of this DBC the following assumptions have been adopted:

- a ‘Low Supply Alert’ would be issued in 2032-33, and GAWB would commence, preparatory works on construction of the GFP, subject to GAWB Board approval
- Level 2 Restrictions and the commencement of construction of the GFP would occur when Awoonga Dam reaches 48 months from its dead storage level, assumed to occur in 2034 (taking into account the potential impact of Demand Reduction Strategies and other measures)

⁸⁵ Cost Benefit Analysis Guide, Supplementary Guidance. Building Queensland (2016). Page 20



BASE CASE

- construction of the GFP would be completed by the end of 2035-36, with water being harvested from the Fitzroy River to supplement supply into Awoonga Dam
- construction of a weir on the Lower Fitzroy with an annual yield of 54,000 ML would then commence, in accordance with GAWB's CSS
- construction of the weir would be completed by 2037, with the weir then supplementing GAWB's supplies in Awoonga Dam via the GFP.

A more detailed discussion of the Base Case as defined for each user is provided below, with a further summary provided in Section 8.6.

8.3 Urban water use

The urban water users in the defined Study Area (refer Section 2.2) includes Rockhampton, Livingstone and the Gladstone.

8.3.1 Rockhampton

As identified in Section 5.2.1, Rockhampton's urban water supply requirements are currently met by two supply sources, including the Fitzroy Barrage and the Eden Bann Weir.

RRC is currently in the process of developing a comprehensive water supply strategy that includes consideration of a range of measures, including demand management and water use efficiency initiatives.⁸⁶

While RRC is still in the process of developing its WSS, it has flagged several potential options to be considered in terms of securing Rockhampton's water supply security, including:

- a water restrictions regime
- other demand management measures to reduce per capita water consumption (e.g. ongoing communication about water-wise practices)
- various water use efficiency measures, including the continuation of RRC's water mains replacement program (RRC allocated \$2.9 million to this program for 2016-17)⁸⁷

The augmentation of the Fitzroy Barrage was considered in the 2015 EIS for the LFRIP⁸⁸. While it was estimated that the augmentation could increase the annual yield from the Barrage by 8,000 ML, several environmental, social and economic issues were identified with the Project, including:

- more residential properties would need to be acquired (estimated at 370 properties), in addition to the possible resumption of recreational land
- an increased risk of flooding of nearby residential properties
- adverse impacts on the nesting habitat of the Fitzroy River turtle.

⁸⁶ In the Rockhampton RWSSA, DEWS noted that in all cases, the implementation of restrictions or other measures to reduce water demand on the Fitzroy Barrage would reduce the likelihood of the storage falling to its minimum operating level. The effect of any restriction regime will be dependent upon, among other things, the level in the Barrage at which restrictions are applied and their severity. Considerations such as determining the acceptable frequency of falling below certain levels in the Barrage, and any associated actions, are critical parts of the water supply planning currently being undertaken by the RRC.

⁸⁷ 'Projects and upgrades'; Rockhampton Regional Council; DOA: 22 May 2017; See: <http://www.rockhamptonregion.qld.gov.au/CouncilServices/Fitzroy-River-Water/Projects-upgrades>

⁸⁸ This Project included the Reference Project, being the development of Rookwood Weir.



The augmentation of the Fitzroy Barrage was subsequently discounted from the EIS on the basis that it would not provide Value for Money (VFM) and would have more substantial environmental issues compared with alternative augmentation options (including the development of Rookwood Weir)⁸⁹.

Noting that RRC is still in the process of developing its WSS, the following conclusions can be drawn regarding the water supply-demand balance for Rockhampton:

- The supply capability assessment conducted by DEWS as part of the Rockhampton RWSSA demonstrates Rockhampton is reliant on annual inflows to maintain reliable water supply and is exposed to a water supply security risk, particularly in the event of a ‘failed’ wet season (refer Section 5.2.3 for a discussion on the likelihood and impact of a ‘failed wet season’).
- The provided level of service for high reliability water allocations from the Fitzroy Barrage WSS is not considered suitable for RRC’s needs and is low compared to the reliability of supply in other regional centres.
- Even with other demand management and water use efficiency measures being implemented, it is highly likely that a water restrictions framework will need to be developed and implemented in Rockhampton in response to low inflows, based on DEWS’ assessment of the frequency at which the Fitzroy Barrage is expected to fall below specified levels. RRC is currently in the process of revising its DMP and water restrictions arrangements.
- In the event of a ‘failed’ wet season, emergency supply measures would be required to prevent a total supply failure in the Lower Fitzroy region (i.e. restrictions and other measures are unlikely to be sufficient to avoid a total water supply failure in the region). This is likely to involve the transportation of water from Awoonga Dam to Rockhampton using B Double tankers.
- If the supply security risk in the Lower Fitzroy region is to be addressed (i.e. the risk of total supply failure resulting from one ‘failed’ wet season), it will be necessary for RRC to either pursue the identified augmentations to the Fitzroy Barrage or an alternative (as yet unidentified) water supply augmentation in order to provide the necessary increase in usable storage volume for the region.

8.3.2 Livingstone/Capricorn Coast

This section assesses the Base Case with respect to water demand and supply for water users in LSC, which includes The Caves, Nerimbera and the Capricorn Coast region.

Livingstone/Capricorn Coast region will continue to be reliant on supply from the Fitzroy Barrage, primarily as a result of the constraints on the Water Park Creek resource. While water users in the region are subject to the water conservation regime administered by LSC, it is anticipated that in the event water users in the Rockhampton WSS are subject to severe water restrictions during periods of low supply in the Fitzroy Barrage (for example, in the event of a ‘failed’ wet season), water users in the Livingstone/Capricorn Coast region will also be required to comply with these restrictions (noting that RRC is yet to finalise its water restrictions arrangements and broader water supply security strategy).

Given the projected population growth in the LSC over the next 20years, there is a potential for low water reliability to constrain the region’s capacity to accommodate this growth (including the establishment of the necessary supporting services in the retail and commercial sector).

⁸⁹ SunWater and GAWB (2015). Lower Fitzroy River Infrastructure Project – Draft environmental impact statement – Alternatives to the Project.



Furthermore, LSC has identified several projects that have expressed an interest in investing in the region contingent upon there being access to a reliable water supply. Given the water supply constraints in the region, these projects will not eventuate under the Base Case.

To the extent that there are industrial or agricultural projects seeking to establish in the region subject to obtaining access to the necessary volumes of water allocations, the prevailing water supply-demand balance is likely to represent a constraint on the expansion of industrial and agricultural production in the region.

8.3.3 Gladstone

Defining the Base Case for water demand and supply requirements, and subsequently the need for, and timing of, future demand and supply-side measures, for the Gladstone region is difficult due to the inherent uncertainty regarding:

- the timing and scale of step-changes in water demand resulting from the establishment of new or expansion of existing industrial activity in the region
- year-to-year volumes of inflow into Awoonga Dam.

Based on a review of GAWB's 2013 Strategic Water Plan, DMP and CSS, the following conclusions can be made regarding GAWB's responses to changes in its supply-demand balance under the Base Case (i.e. the scenario under which the Reference Project does not proceed):

- GAWB will continue to operate in accordance with the restrictions and augmentation protocols set out in its Strategic Water Plan and DMP.
- When supplies in Awoonga Dam reach the point at which it has 60 months of supply remaining (i.e. from the dead storage level), a 'Low Supply Alert' will be triggered, which involves the implementation of Level 1 restrictions and a notice being issued to customers seeking submissions on demand reduction strategies (e.g. installation of dry cooling technologies at power stations, relinquishment of water reservations).
- Following consultation with customers, demand reduction strategies and any other measures identified through consultation with stakeholders will be implemented and the demand projections and inflow assumptions for future trigger points will be revised accordingly.
- When supplies in Awoonga Dam reach the point at which it has 48 months of supply remaining, Level 2 restrictions will be implemented (i.e. curtailment of 10 per cent of supply across all customers) and works will commence on construction of GAWB's preferred supply augmentation, currently identified under the CSS as the GFP.
- Once the GFP is completed and GAWB is able to initially harvest flows from the Fitzroy River via the GFP (noting GAWB's view is that it will be able to acquire a 5,000 ML per annum allocation to enable this), GAWB will commence the construction of water storage infrastructure on the Lower Fitzroy River, which would most likely be a 54,000 ML weir at the Rookwood Weir site (noting this would be confirmed through consultation with customers and other stakeholders at the time the augmentation trigger was reached).

Considering all available information in relation to GAWB's future water demand and the timing of future supply augmentation requirements (including the stochastic modelling undertaken by GAWB as part of the development of the 2013 Strategic Water Plan and the demand projections included in the Gladstone RWSSA), the following assumptions have been adopted regarding the most likely timing of events:



- A ‘Low Supply Alert’ would be issued in 2032-33, and GAWB would commence preparatory works on construction of the GFP.
- Level 2 Restrictions and the commencement of construction of the GFP would occur when Awoonga Dam reaches 48 months from its dead storage level, assumed to occur in 2034 (considering the potential impact of Demand Reduction Strategies and other measures).
- Construction of the GFP would be completed by the end of 2035-36, with water being harvested from the Fitzroy River to supplement supply into Awoonga Dam.
- Construction of a weir on the Lower Fitzroy with an annual yield of 54,000 ML would then commence, in accordance with GAWB’s CSS.
- Construction of the weir would be completed by 2037, with the weir then supplementing GAWB’s supplies in Awoonga Dam via the GFP.

As noted above, the timing of these stages will be subject to ongoing changes in the water supply-demand balance⁹⁰. For the CBA of the Reference Project, sensitivity analysis has been performed on the timing of GAWB’s augmentation under the Base Case.

8.4 Industrial water use

No material change is anticipated to the volume of water that will need to be supplied to Stanwell Corporation under the Base Case. It is assumed, based on the information available, that Stanwell Corporation will continue to hold and require access to its 24,000 ML per annum allocation from the Lower Fitzroy WSS (annual water use is expected to remain at around 20,000 ML per annum over the long term). This was taken into consideration in assessing the future water supply-demand balance and defining the Base Case for urban water supply in Rockhampton and the Livingstone/Capricorn Coast region.

With regards to other industrial water use in the region, the assessment of the future supply-demand balance in the Lower Fitzroy region under the Base Case (i.e. without the Reference Project) indicates there is unlikely to be additional allocations available to sustain water-intensive industrial activity in the region, either in Rockhampton or the Livingstone/Capricorn Coast region.

As such, it is not considered that there will be any additional water supplied for industrial use in the Lower Fitzroy under the Base Case, aside from growth in industrial demand serviced by the Rockhampton reticulation network.⁹¹

8.5 Agricultural water use

This section assesses the Base Case with respect to water demand and supply for agricultural production in the Lower Fitzroy and Gladstone regions.

As noted above, the construction of a weir on the Lower Fitzroy River by GAWB has the potential to make additional water available for agricultural production under the Base Case. Prior to the development of this infrastructure, it is anticipated that agricultural production and water use in the Lower Fitzroy region will

⁹⁰ For example, if demand were to remain relatively flat in accordance with GAWB’s current upper bound projections, it is unlikely that the trigger point for supply augmentation would be reached over the short to medium term (subject to inflows into Awoonga Dam). Alternatively, a step-change in demand or a material reduction in dam inflows could result in level 2 restrictions being implemented in the medium term and hence the augmentation of supply being triggered.

⁹¹ Noting DEWS’ observation in the Rockhampton RWSSA that growth in demand for water for industrial development and commercial business throughout the Rockhampton and Capricorn Coast regions is expected to remain proportional to respective residential growths.



remain at current levels under the Base Case. This is consistent with the following assumptions applied by DEWS in the Rockhampton RWSSA:

- demand for irrigation water is expected to remain relatively constant over the long term
- existing licences and local supplies will be sufficient to meet this demand, in addition to the other options available to agricultural producers to meet their future water needs (i.e. improvements in water use efficiency, permanent and temporary trading of water allocations, and increased utilisation of water allocations).⁹²

8.6 Summary of the Base Case

Table 8-1 provides a summary of the Base Case for each of the user groups, as discussed above.

Table 8-1 Base Case Summary

WATER USER	SUMMARY OF BASE CASE
Rockhampton urban water users	<ul style="list-style-type: none"> ▪ Modelling indicates that RRC is reliant on annual inflows to maintain urban water supply and is exposed to a supply security risk (storages in the region have a full-to-empty period of 16 months), particularly in the event of a ‘failed’ wet season. ▪ Supply capability modelling indicates RRC will need to implement water restrictions, in addition to other demand management and water use efficiency measures, during periods of low supply (noting that RRC has indicated that it is currently in the process of developing its WSS, which is to include details of these activities). ▪ Even with these measures, the modelling results indicate Rockhampton will remain subject to a water supply security risk, whereby one ‘failed’ wet season could result in a total supply failure. Under this scenario, emergency supply measures, for example the trucking of water into Rockhampton from Awoonga Dam, would be necessary.
Livingstone Shire/Capricorn Coast urban water users	<ul style="list-style-type: none"> ▪ Urban water users in the region will remain reliant on supply from the Fitzroy Barrage via the Rockhampton-Yeppoon Pipeline. ▪ The supply security risk to which Rockhampton is subject will also impact on urban water users in the Livingstone/Capricorn Coast region. As such, it is likely these users will also be subject to water restrictions and other demand management and/or conservation measures. ▪ While LSC administers a separate water conservation regime in the region, it is anticipated that in the event that a supply shortfall in the Fitzroy Barrage necessitates the imposition of severe water restrictions on urban water users in Rockhampton, users in the Livingstone/Capricorn Coast region will be required to comply with these severe restrictions.

⁹² Department of Energy and Water Supply (2016). Rockhampton Regional Water Supply Security Assessment.



WATER USER	SUMMARY OF BASE CASE
<p>Gladstone area water users</p>	<ul style="list-style-type: none"> ▪ GAWB’s Strategic Water Plan identifies the trigger points at which it will firstly implement restrictions and other demand management measures and secondly augment its supply. ▪ The timing of GAWB’s future augmentation requirements are highly uncertain, primarily due to the unpredictability of GAWB’s future demand. Modelling undertaken by GAWB as part of the development of its 2013 Strategic Water Plan identified 2028 as the ‘most likely’ year in which a supply augmentation would be required (noting that this is based on probabilistic modelling with a wide range of potential outcomes). ▪ However, demand projections in the Gladstone RWSSA indicate the most likely timing of an augmentation requirement could be several years later. ▪ Based on the information available, it has been assumed that GAWB will be required to commence construction of a 54,000 ML weir on the Lower Fitzroy River in 2035, with the weir to be completed by 2037. ▪ Noting that the scale of the weir would be determined closer to the date of the augmentation, it is currently anticipated that GAWB would construct a 54,000 ML Rookwood Weir.
<p>Industrial water users</p>	<ul style="list-style-type: none"> ▪ Stanwell Corporation is the only major industrial water user in the Lower Fitzroy region. Stanwell’s water requirements are not expected to change in the foreseeable future (i.e. annual water use is expected to remain at around 20,000 ML). ▪ The water supply-demand balance in the Lower Fitzroy under the Base Case is such that there is unlikely to be additional allocations available to sustain water-intensive industrial activity in the region, either in Rockhampton or the Livingstone/Capricorn Coast region.
<p>Agricultural water users</p>	<ul style="list-style-type: none"> ▪ The development of water infrastructure on the Lower Fitzroy River by GAWB under the Base Case could make additional volumes of supplemented water allocations available for agricultural production in the Lower Fitzroy Region. ▪ In the absence of this augmentation, the water available for agricultural production in the Lower Fitzroy under the Base Case will not be sufficient to facilitate the expansion of production. ▪ Water demand associated with existing agricultural production is expected to be met by existing licences and supplies, in addition to other measures taken by agricultural producers (i.e. increased use of allocations, water use efficiency measures, water trading).



9 REFERENCE PROJECT

CHAPTER SUMMARY AND CONCLUSIONS:

Queensland's state and local governments collaborate to provide secure water entitlements to urban, industrial and agricultural users while protecting the natural values and ecosystems of the region.

The LFRIP aims to maximise economic benefit from water infrastructure and its use. The LFRIP is recognised as strategic water infrastructure in alignment with Queensland's strategic priorities. The LFRIP comprises the raising of the existing Eden Bann Weir and construction and operation of a proposed weir at Rookwood.

As identified in Section 7.4, the Reference Project considered by this DBC is the Rookwood Weir (76,000ML) and associated infrastructure. The key characteristics of the Reference Project include:

CHARACTERISTIC	REFERENCE PROJECT
Weir Type	An uncontrolled gravity ogee weir constructed using roller compacted concrete and conventional concrete and earth embankment on the left abutment. Addition of 14 flap gates (3.5 metres high).
Full Supply Level	49 m AHD
Storage at FSL	117,290 ML
Yield at FSL	86,000 ML per annum
Proposed Allocation	76,000 ML high priority
Impoundment extent at FSL	Mackenzie River: 335 km AMTD; Dawson River: 15 km AMTD
Impoundment length (main channel) at FSL	84 km
Dead storage level	RL 31.0 metres
Dead storage volume	2,640 ML
Weir Length	460 metres
Height above riverbed	Approx. 17 metres
Design Life	100 years
Associated infrastructure	<ul style="list-style-type: none"> ▪ Augmentation to and construction of access roads: Thirsty Creek Road and the intersection with the Capricorn Highway at Gogango ▪ Construction of low level bridges upstream at Riverslea and Foleyvale crossings, inclusive of augmented approaches ▪ Installation of culverts at Hanrahan Crossing downstream of Rookwood Weir to facilitate access during operation releases.



9.1 Purpose

This Chapter provides an overview and the scope of the Reference Project, which would deliver a Rookwood Weir capable of providing for 76,000 ML per annum of high priority water.

9.2 Introduction and project objective

Emerging water supply risks in the Rockhampton (and Capricorn Coast) and Gladstone regions led to the development of the LFRIP. SunWater and GAWB prepared an EIS for the Project. A draft EIS was completed in 2015, with a revised draft subsequently prepared and released for public consultation in May 2016. The Queensland Coordinator-General recommended that the LFRIP proceed on 8 December 2016, subject to conditions, recommendations and implementation of commitments. The Commonwealth Minister approved the proposed action subject to conditions on 28 February 2017 (EPBC 2009/5173). The LFRIP EIS assessed a range of water supply infrastructure solutions including the raising of Eden Bann Weir and/or delivery of a new Rookwood Weir.

The LFRIP, which was initially identified in the Queensland Government's 2006 CQRWSS, will also include other upgrade works to associated infrastructure including roads and bridges.

Table 9-1 provides a summary of the key characteristics of the Reference Project.

Table 9-1 Summary of key characteristics

CHARACTERISTIC	REFERENCE PROJECT
Weir Type	An uncontrolled gravity ogee weir constructed using roller compacted concrete and conventional concrete and earth embankment on the left abutment. Addition of 14 flap gates (3.5 metres high).
Full Supply Level	49 metres AHD
Storage at FSL	117,290 ML
Yield at FSL	86,000 ML per annum
Proposed Allocation	76,000 ML high priority
Impoundment extent at FSL	Mackenzie River: 335 km AMTD; Dawson River: 15 km AMTD
Impoundment length (main channel) at FSL	84 km
Dead storage level	RL 31.0 metres
Dead storage volume	2,640 ML
Weir Length	460 metres
Height above riverbed	Approx. 17 metres
Design Life	100 years
Associated infrastructure	<ul style="list-style-type: none"> ▪ Augmentation to and construction of access roads: Thirsty Creek Road and the intersection with the Capricorn Highway at Gogango ▪ Construction of low level bridges upstream at Riverslea and Foleyvale crossings, inclusive of augmented approaches ▪ Installation of culverts at Hanrahan Crossing downstream of Rookwood Weir to facilitate access during operation releases.



The primary objective of the LFRIP is to support agricultural, industrial and urban growth. For the purposes of the DBC, it has been assumed that the LFRIP will be delivered through a JV arrangement between SunWater and GAWB. The potential governance arrangements for delivery and ownership of the assets under the LFRIP are further discussed in Chapter 19.

The Project stakeholders are identified in Section 5.7.

9.2.1 Implications of not proceeding

Limited ability to respond to short and long-term future demands for water resources will result if the LFRIP is not progressed in preparedness for future demands from existing and new customers, drought and meeting the required reliability of supply for the Rockhampton reticulation network for RRC and LSC supply:

- no additional water allocations available for agriculture use in the Project area, foregoing the potential for the growth of the regional agriculture sector in the region, both through the provision of additional and more certain water allocation
- continued reliance on the Fitzroy Barrage (and Eden Bann Weir) as the only source of supply for urban water users serviced by the Rockhampton reticulation network, leaving RRC exposed to a water supply security risk
- no additional water supply for urban and industrial water users in the Livingstone Shire or the Capricorn Coast region, foregoing potential economic growth in the region
- continuation of GAWB's exposure to supply risk as a result of its continued reliance on a single catchment-fed source of supply (i.e. the Awoonga Dam), with the GFP project postponed.

The 'no development' option will limit the growth of high value agriculture in the region and would fail to deliver on the primary objective of the LFRIP (refer Section 9.2). It also has the potential to inhibit growth locally (Rockhampton and Livingstone local government areas) and regionally (Gladstone LGA). Limiting industrial growth in particular has the potential to adversely impact on the Queensland economy with large scale industrial development potentially seeking alternative locations interstate due to this water supply constraint.

9.3 Reference Project

9.3.1 Project overview

The Reference Project will result in the construction of new weir at Rookwood, capable of supplying 76,000 ML per annum of high priority water for customers. Other infrastructure components associated with the Project include:

- augmentation to and construction of access roads: Thirsty Creek Road and the intersection with the Capricorn Highway at Gogango
- construction of low level bridges upstream at Riverslea and Foleyvale crossings, inclusive of augmented approaches
- installation of culverts at Hanrahan Crossing downstream of Rookwood Weir to facilitate access during operation releases.

Operationally, the LFRIP comprises the maintenance and management of the weir infrastructure (including access) and impoundments. Water releases are proposed to be made through 'run of river' methods and no water distribution infrastructure is included as part of the Project. Operating regimes will be developed in



compliance with the Water Plan (Fitzroy Basin) 2011 and implemented through the Fitzroy ROP (as augmented under new legislation as a water management protocol). There are a number of potential options for operating the new weir, which are further discussed in Chapter 19.

It is intended that future operation and maintenance of Riverslea Crossing and Hanrahan Crossing will be undertaken by RRC. Operation and maintenance of Thirsty Creek Road and access roads through Gogango are currently the responsibility of RRC. It is expected that this arrangement will remain. Similarly, it is intended that operation and maintenance of the state-controlled Foleyvale Crossing will be undertaken by TMR. Infrastructure agreements are proposed to be negotiated.

In addition, the following infrastructure requirements have been considered for the LFRIP. These were not assessed under the LFRIP EIS and will be required to be assessed under separate approvals processes:

- Telecommunications
- Power
- Construction material resource extraction areas.

9.3.2 Project location

The proposed Rookwood Weir site is located on the Fitzroy River at 265.3 km Adopted Middle Thread Distance (AMTD), approximately 10 km downstream from the Riverslea Road river crossing. The site is approximately 15 km north of Gogango adjacent to Thirsty Creek Road. Gogango lies approximately 66 km south west of Rockhampton along the Capricorn Highway.

Impoundment associated with Rookwood Weir extends up the Fitzroy River to the confluence and to an upstream limit on the Mackenzie River at 335 km AMTD and 16 km AMTD on the Dawson River. Saddle dams are located at approximately 268.5 km AMTD on the left bank upstream of the weir wall. Gauging stations are located on a rock bar (monitoring weir) directly downstream of the weir wall at approximately 264.7 km AMTD and upstream at Riverslea Crossing (276 km AMTD).

Views of, to and from the Rookwood Weir site are shown in Figure 9-1.

Figure 9-1 Rookwood Weir site views



Left bank slightly upstream



Left bank riverbed



Weir site looking downstream



View atop the right bank slightly downstream

The proposed Rookwood Weir site lies within the RRC LGA. The area designated for the weir infrastructure comprises Unallocated State Land (USL) within the Fitzroy River and Freehold (FH) land on the adjacent left and right banks. It is proposed that a long-term lease will be acquired over these areas.

The Rookwood Weir impoundment borders RRC LGA land, parcels of the Woorabinda Aboriginal Shire Council (WASC) LGA and sections of Central Highlands Regional Council LGA. The tenure status of land adjacent to the inundation area comprises mainly FH, some Land Lease (LL) and a few Reserves. A water storage easement is proposed for the inundation area.

Some realignment of road reserve areas will be required to accommodate proposed upgrades. Road closures will be undertaken in consultation with RRC.

9.3.3 Project status

The Queensland Coordinator-General recommended that the LFRIP proceed, subject to conditions, on 8 December 2016. The Commonwealth Minister's approval was received 28 February 2017. Chapter 10 describes legislative and planning requirements required subsequent to finalisation of the DBC and final Project approval.

9.3.4 Proposed Project programme

Weir construction is programmed to occur over at least two dry seasons. The milestones and timeframes for the Project are as follows, noting that an actual start date will be determined by several factors including seasonal factors:

- preparatory and early works (15 to 18 months prior to April Year 1)
- commencement of construction (April Year 1)
- spillway concrete complete (start-Q4 Year 2)
- commencement of impounding (mid-Q4 Year 2)
- weir construction practically complete (end-Q4 Year 2)
- impoundment is expected to occur within a single wet season during which commissioning will take place.

While the design life of the Rookwood Weir is 100 years, it is anticipated that the weir infrastructure will be maintained and operational after this period.



9.3.5 Reference design

This section provides a summary of the different design elements of the Reference Project, including:

- weir infrastructure
- roads and river crossings
- site facilities
- power supply infrastructure
- telecommunications infrastructure
- resource extraction areas.

9.3.5.1 Weir infrastructure

The assumptions underpinning the weir design included:

- the need to capture 76,000 ML per annum yield as supplemented high priority water from the strategic water infrastructure reserve under the Fitzroy WP
- the requirement to maintain environmental flows in accordance with the requirements of the Fitzroy WP
- fishways to be designed to pass a high percentage of flows; operate over high and low reservoir levels; provide upstream and downstream passage; cater for a range of fish species and sizes and minimise injury and mortality
- design in accordance with Australian National Committee on Large Dams (ANCOLD) guidelines, Queensland dam safety management guidelines and Australian Standards to safely pass large flood events.

Weir design has progressed in order to:

- support development and approval of the LFRIP EIS
- gain an understanding of the level of risk associated with the Project
- design appropriate fish and turtle passage, comprising a right bank fish lock and turtle by-pass channel
- determine that there are no fatal flaws
- determine feasibility and constructability.

Table 9-2 summarises the key elements associated with Rookwood Weir.

The following constraints influenced the weir design:

- site selection was limited to sites with rock foundations
- the width of the river and the presence of alluvial banks and their potential to erode
- requirements of the Fitzroy WP with respect to the environmental flow requirements
- the low afflux bankfull concept; design required to control flows over the weir and back up when bankfull.



Table 9-2 Key elements for the Reference Project

CRITERIA	DESCRIPTION
WEIR INFRASTRUCTURE	
Weir type	An uncontrolled gravity ogee weir with 14, 3.5 metres high flap gates
Purpose	Water supply
Catchment area	135,000 km ²
FSL	RL 49.0 metres AHD
Storage at FSL	117,290 ML
Yield at FSL	86,000 ML per annum
Proposed HP Allocation	76,000 ML per annum
Dead storage level	RL 31.0 metres
Dead storage volume	2,640 ML
Impoundment area at FSL	1,930 ha
Impoundment extent at FSL	Mackenzie River: 335 km AMTD; Dawson River: 15 km AMTD
Impoundment length (main channel) at FSL (approximate)	84 km
Total weir length	460 metres
Fauna passage	Fish locks (right bank); Turtle ramp (right bank)
SPILLWAY SECTION	
Type	3.5 m high crest gates with concrete ogee spillway (Figure 9-2)
Crest level	RL 49.0 metres
Crest length	209 m
Downstream slope	0.8 H: 1.0 V
Energy dissipation method	Type 1 stilling basin
Design headwater level (bank full level)	RL 56.7 metres
Control description	3.5 m high gates hydraulic controls
Height above riverbed	Approximately 17.5 metres
Other	A crane/pedestrian access bridge over the crest of the weir for maintenance purposes only
LEFT ABUTMENT	
Crest level	RL 52.5 metres
Crest width (non-spillway)	6 metres
Section type	Roller compacted concrete
Embankment downstream slope	0.8 H: 1.0 V
Embankment slope protection	Wrap around embankment with roller compacted concrete face protection and rock filled mattresses downstream



CRITERIA	DESCRIPTION
RIGHT ABUTMENT	
Crest level	RL 52.5 metres
Crest width (non-spillway)	6 metres
Section type	Conventional concrete
Embankment downstream slope	0.8 H : 1.0 V
Embankment slope protection	Not required
OUTLET WORKS	
Provision for selective withdrawal	Outlet control gates with selective withdrawal capability and trash screens (Figure 9-3)
Low level outlet conduit	1800 mm diameter inlet to a 1400 mm outlet
Low level outlet valve	Vertical discharge regulating valve
Low level outlet capacity	Discharge rate: 14.5 m ³ /s (or a volume of 1250 ML per day)
Siting	Adjacent to fish locks (right bank)
Environmental flow outlet size	3 bays of culverts (1.5 metres x 2 metres)
Environmental flow outlet length	Approximately 12 metres
Environmental flow outlet capacity	Discharge rate 58 m ³ /s (or a maximum volume of 5,000 ML per day)
Environmental flow outlet stilling basin type	USBR impact type basin
Saddle dam	Earth embankment/reno mattress (6 m wide by 230 mm thick)



Figure 9-2 Rookwood Weir ogee spillway section

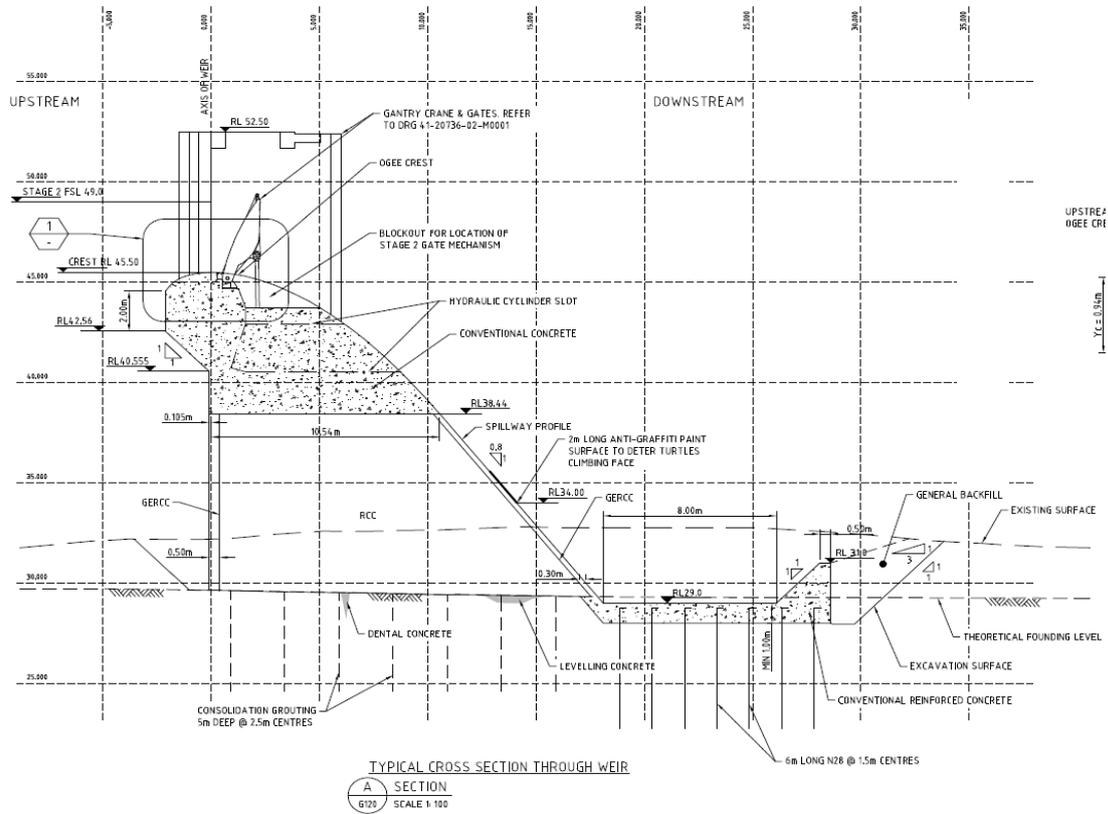
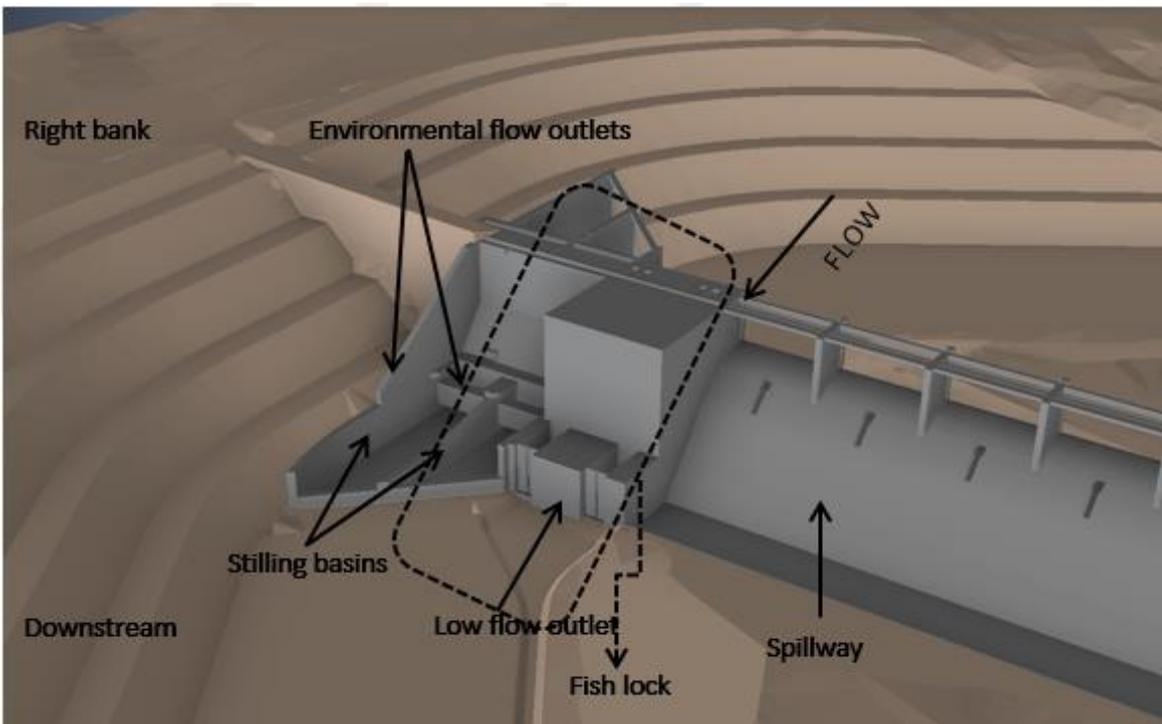


Figure 9-3 Rookwood Weir right bank proposed outlets and fish lock design





9.3.5.2 Roads and river crossings

Access to the proposed Rookwood Weir site is via the state-controlled Capricorn Highway, at Gogango, and on Thirsty Creek Road (a RRC local road). All public roads are two-wheel drive accessible and are suitable for operation vehicle access. Upgrades are required to facilitate construction access:

- The Capricorn Highway intersection at Gogango will be upgraded to a channelised right turn treatment with a short turn slot off the Capricorn Highway. The acceleration lane (heading east) from any local Council road onto the Capricorn Highway will be increased in width and length (subject to a road safety audit and agreement with DTMR and RRC)
- Thirsty Creek Road will be upgraded to accommodate heavy construction traffic including low loaders and carriers; primarily at waterway crossings to allow gentler vertical geometry, with works retained within the existing road footprint as far as is practicable
- A new private, permanent access road (500 metres long) is proposed off Thirsty Creek Road at the weir site on the right bank and is accommodated within the weir site footprint area.

Inundation will impact on public and private infrastructure, such as roads and river crossings (low level bridges and causeways). To maintain connectivity and function of the road network upgrades to accommodate raised water levels are proposed at:

- Riverslea Crossing: Existing low-level causeway on Riverslea Road will be upgraded to a single lane, low level bridge with a flood immunity of between a 1 in 2-year and 1 in 5-year annual exceedance probability (AEP) event.
- Foleyvale Crossing: Existing low-level causeway on the state-controlled Duaringa-Apis Creek Road will be up-graded to two-lane low-level bridge with of flood immunity of a 1 in 2 year AEP event.
- Hanrahan Crossing: Existing culvert crossing will be upgraded to a new bank of culverts to safely pass operational flows up to 50 metres³ per second.

Road design (local roads) accounts for a 60 km per hr speed limit, appropriate vertical geometry for construction vehicles, a 20-year design life, cross drainage provisions for a 2-year storm event, Coordinator-General recommendations for approval under the *Transport Infrastructure Act 1994*.

Bridges and culverts are designed in accordance the Australian Standard for Bridge Design (AS5100) and TMR's Road Planning and Design Manual (2004) (as applicable) and requirements of the *Fisheries Act 1994* (Qld) in terms of fish passage.

The road and bridge/culvert design as at March 2017 is at a concept level sufficient to inform the development of Project costs as included in the financial analysis.

9.3.5.3 Site facilities

During construction, temporary site facilities are likely to comprise: storage and office areas, amenities, power generation and reticulation infrastructure and water reticulation infrastructure (pumps and pipes), fuel (diesel) and chemical stores, batching plants, screening and crushing facilities (and associated stockpiles), and washdown and minor (motor vehicle) maintenance facilities/workshop.

To support operations, a new permanent control room will be established. The building provides for: a generator room; two power pack rooms; an operations control room; and a bathroom.



Permanent water supply requirements during operations are limited to ablution facilities using a rainwater harvesting system for capture and a tank for storage. An adequate number of mobile ablution facilities will be provided onsite and emptied regularly by a licenced contractor.

9.3.5.4 Power supply infrastructure

There is no current power supply to the proposed Rookwood Weir site that has been confirmed.

Power supply during construction will be through the use of diesel generators as required to meet construction requirements, notwithstanding the line supply.

The total power requirement for operations is estimated at 60 kW of total installed power with an average maximum demand of approximately 30 kW. Suitably available power would be a remote end of the Ergon 22 kV Feeder WN213 (from Ergon's Wowan Substation) which already provides power for local houses and relatively large water pumping loads. Connection of the proposed 50-60 kVA size load will require a standard Ergon pole-mounted 100kVA, 22/0.433kV power transformer and metering unit. An application will be made to Ergon for a reliable power source for construction and operation in the Early Works phase.

9.3.5.5 Telecommunications infrastructure

The site will have a control room serviced by a landline and internet communications. Mobile phone coverage is inconsistent. During construction, mobile phone coverage will be supplemented by satellite communication facilities. Separate applications will be made to service providers for temporary and permanent communications for construction and operation of the weir.

9.3.5.6 Resource extraction areas

A number of potential source locations for the supply of construction materials have been identified and are currently being investigated (quality and quantity). For the purposes of the financial analysis, conservatively, resource material is proposed to be imported from established commercial operations within the local area. Opportunities for extraction closer to the weir site are being investigated, thereby reducing haulage requirements.

Resource materials required include:

- coarse (gravel) and fine (sand) aggregates for concrete production primarily for the weir infrastructure, including outlet works and fish locks, with smaller quantities required for construction of the low-level bridges and culvert
- clay, sand, gravel or rock for weir embankments and saddle dam construction
- rock for rip rap and erosion protection
- road base material, general fill material and dump rock for new and upgraded roads.

As per statements in the EIS documentation, locally sourced personnel will be used on the Project as a preference. Exceptions will be key skill areas that may be less or not available locally to meet the Project timelines. Establishment of a camp for weir construction personnel has been recently assessed as preferable for safety and productivity for the Project. The proposed camp will accommodate up to 170 workers and will operate in line with construction requirements i.e. during the dry seasons. A variation to the Coordinator General's conditions for the EIS will be sought in due course to accommodate the inclusion of a camp.



9.3.5.7 Restoration of temporary construction areas

Rehabilitation of construction areas at the weir sites will be undertaken in accordance with the EMP. Most areas disturbed during construction will remain as part of the infrastructure works.

9.3.6 Decommissioning and Rehabilitation

While the design life of the Project is 100 years it is anticipated that the weir infrastructure will be maintained and operational after this period. As such, effective prescriptive planning for decommissioning and rehabilitation cannot be undertaken at present as best practice standards and legislative requirements are likely to change over the life of the Project. Management obligations for the infrastructure will continue in accordance with the approval requirements until such time as the infrastructure is decommissioned and the area rehabilitated. These responsibilities will remain with the owner of the infrastructure.



10 LEGAL AND REGULATORY CONSIDERATIONS

CHAPTER SUMMARY AND CONCLUSIONS

- This chapter outlines the legal and regulatory issues and risks that will need to be considered and managed for the Reference Project including legislative and ownership issues, approvals and other legal matters pertaining to procurement and delivery, including key approvals risks
- The Reference Project options considered in the DBC are subject to the water regulatory issues identified in this Chapter. No other specific legislation is deemed necessary for delivery of the LFRIP
- Under the JV arrangement, which has been assumed as the delivery vehicle for the Reference Project, it is anticipated that:
 - under an incorporated JV, a separate legal entity, distinct from SunWater or GAWB would be established.
 - under an unincorporated JV model, SunWater and GAWB would enter into a JV agreement that deals with matters including allocation of risk, decision-making processes, commercial arrangements (including how the unincorporated JV, or a JV participant as agent for the unincorporated JV, will enter into contracts) and ownership of property (including the Reference Project infrastructure).
- There are no known legal impediments that would preclude the adoption of either an incorporated or unincorporated model, recognising that there are additional establishment and administration issues attached to an unincorporated structure.
- There are requirements and obligations for the Proponent in regard to land tenure, native title and aboriginal cultural heritage, as set out in the EIS and Coordinator-General's Report and having regard to the requirements under the Land Act, Water Act, Water Supply (Safety and Reliability) Act and the ACH Act.
- Table 15-1 in Chapter 16, provides a description of key approvals likely to be required for the Reference Project.

10.1 Purpose

This chapter outlines the legal and regulatory issues and risks that will need to be considered and managed for the Reference Project including:

- legislative issues pertaining to planning approvals, environmental legislation, industrial relations, property, native title and cultural heritage
- approvals required to be considered and completed
- other legal matters relating to the procurement and delivery.

10.2 Legislative and Ownership Issues

The Reference Project options considered in the DBC are subject to the water regulatory issues identified in the DBC. No other specific legislation is deemed necessary for delivery of the LFRIP. For the purposes of the



DBC assessment, it has been assumed that the LFRIP will be delivered through a JV arrangement between SunWater and GAWB.

It is recognised that an incorporated or unincorporated structure could be adopted, noting under an:

- incorporated JV, a separate legal entity, distinct from SunWater or GAWB would be established. The new entity would own the Reference Project infrastructure and, consequently, be the Resource Operations Licence (ROL) holder responsible for managing the water and for contracting with scheme customers.
- unincorporated JV model:
 - No new entity would be established.
 - SunWater and GAWB would enter into a JV agreement that deals with matters including allocation of risk, decision-making processes, commercial arrangements (including how the unincorporated JV, or a JV participant as agent for the unincorporated JV, will enter into contracts) and ownership of property (including the Reference Project infrastructure).
 - It is anticipated that GAWB and SunWater would undertake aspects of the Reference Project individually to satisfy their JV obligations (i.e. one proponent would acquire and own the land and assets, while another would be responsible for planning and management activities).

While there are no known legal impediments that would preclude the adoption of either model, it is recognized that there are additional establishment and administration issues attached to an unincorporated structure. Taxation implications from these different structures are further discussed in the Affordability Chapter.

Other issues considered below include land tenure, native title and aboriginal cultural heritage considerations.

Table 10-1 Other legislative issues

Component	Legislative Issue
Land Tenure	<ul style="list-style-type: none"> ▪ Considered in detail by the Coordinator-General’s Report and EIS ▪ Proponent to acquire perpetual lease for weir site: <ul style="list-style-type: none"> – there are a number of requirements under the Land Act and Water Act that will need to be satisfied before entering into a perpetual lease arrangement. ▪ Inundated land. As identified in the EIS: <ul style="list-style-type: none"> – to the extent that the impoundment falls within the cadastral boundary of a watercourse, there is no specific need for the Reference Project proponent to acquire an interest in the land in the watercourse – to the extent that the inundated land is located outside the cadastral boundary of a watercourse and is upstream of the weir, it is proposed to obtain a water storage easement over the riparian land. ▪ Under a JV model, the JV entity would become a public utility provider once it is registered as a service provider under the Water Supply (Safety and Reliability) Act. However, it would be necessary to facilitate service provider registration before seeking to grant a water storage easement for the benefit of the JV entity ▪ Roads and bridges: <ul style="list-style-type: none"> – In relation to any access road for the Reference Project, the Coordinator-General's Report identifies that the proponent proposes to negotiate an easement over Lot 1 on SP136791 with the landowner. If public road needs to be created, then Lot 1 on SP136791 will need to be reconfigured so that the road can be dedicated by the landowner



Component	Legislative Issue
	<ul style="list-style-type: none"> – Any closure of a road will need to be effected under the Land Act
Native Title	<ul style="list-style-type: none"> ▪ It will be necessary to consider whether there are any "future acts" to be done in association with the carrying out of the Reference Project and, if so, what is required to be done for such future acts to validly affect native title.
Aboriginal Cultural Heritage	<ul style="list-style-type: none"> ▪ The <i>Aboriginal Cultural Heritage Act 2003</i> prescribes a cultural heritage duty of care that will require the Reference Project proponent (and its contractor) to take all reasonable and practicable measures to ensure that its activities do not harm Aboriginal cultural heritage ▪ The proponent will be taken to have complied with the cultural heritage duty of care (and will not otherwise have committed any of the above ACH Act offences) if it carries out its activities under either: <ul style="list-style-type: none"> – an approved Cultural Heritage Management Plan (CHMP) under Part 7 of the ACH Act that applies to the Aboriginal cultural heritage – a native title agreement (such as a registered Indigenous Land Use Agreement), or another agreement with an Aboriginal party (often described as a "cultural heritage management agreement" (CHMA)), unless the Aboriginal cultural heritage is expressly excluded from being subject to the agreement ▪ CHMPs have been developed with the Jetimarala People, Gangulu People, Ghungalu People and Kangoulu People (combined CHMP); and Darumbal People ▪ It is recognised that since the EIS the Aboriginal party for a large majority of the area has changed ▪ Final/updated CHMPs will need completed and approved as part of early works, noting there may be additional ongoing management responsibilities and requirements associated with these (that may not have been originally identified as part of the CHMPs developed under the EIS

10.3 Regulatory Issues

A summary of key regulatory issues is provided below.

10.3.1 Regulatory Framework and Instruments

The conduct and implementation of the Reference Project is subject to the regulatory framework established under the Water Act. It is also noted that while the Fitzroy Basin ROP is no longer in existence, the provisions of the ROP are, by certain transitional provisions in the Water Act, statutorily deemed to be included in one or more of the existing or new instruments. These instruments are further discussed in Table 10-2.



Table 10-2 Regulatory framework and instruments

Description	Implication/s for the Reference Project
Water Act	
<p>At the highest level, the Water Act provides for the sustainable management of Queensland's water resources and quarry material by establishing a system for the planning, allocation and use of water. The high-level framework established under the Water Act itself is amenable to implementation of the Reference Project</p>	<p>No aspect of the Water Act itself would impede or prevent implementation of the Reference Project</p>
Water Plan	
<p>The Water Act authorises the making of 'water plans' (formerly, 'water resource plans') that apply to a part of the state and advance the sustainable management of Queensland's water. The Water Plan (Fitzroy Basin) 2011 (Fitzroy Basin Plan) applies in relation to the area of Queensland where the Reference Project is proposed to be located. Most relevantly, the Fitzroy Basin Plan:</p> <ul style="list-style-type: none"> ▪ defines the availability of water in the plan area ▪ provides a framework for sustainably managing water and the taking of water ▪ identifies priorities and mechanisms for dealing with future water requirements ▪ provides a framework for reversing, where practicable, degradation of natural ecosystems ▪ regulates the taking of overland flow water ▪ regulates the taking of groundwater. 	<p>The Reference Project must continue to align with the sustainable management of water requirements set out in the Fitzroy Basin Plan.</p> <p>The Fitzroy Basin Plan already contemplates the grant of unallocated water held as a 'strategic water infrastructure reserve'. Specifically, s. 45 of the Fitzroy Basin Plan provides for a nominal volume of 76,000 ML for supplemented water allocations to be granted in respect of water infrastructure on the Fitzroy River.</p> <p>It is noted that:</p> <ul style="list-style-type: none"> ▪ all commercial considerations for the Project are premised on the grant of nominal water allocations to a maximum of 76,000 ML ▪ Absent amendment to the Fitzroy Basin Plan, there is no scope to grant allocations in excess of that volume.
Resource Operations License	
<p>The operator of the Reference Project will require a ROL authorising it:</p> <ul style="list-style-type: none"> ▪ to interfere with the flow of water to the extent necessary to construct or operate the water infrastructure to which the licence applies (i.e. the weir); or ▪ to take water or interfere with the flow of water to distribute water under water allocations. <p>Pursuant to s. 176(2) of the Water Act, a ROL can only be held by the owner of the water infrastructure to which the licence applies or the parent company of a subsidiary company that is the owner that holds the infrastructure.</p>	<p>The ROL will need to be held by the JV entity under an incorporated model, or by either GAWB or SunWater under an unincorporated model.</p> <p>It is likely that the infrastructure owner (under either model), will need to make an application to the chief executive of the department administering the Water Act, being the DNRM.</p>
Water Supply (Safety and Reliability) Act 2008 (Qld)	
<p>The regulatory requirements under the <i>Water Supply (Safety and Reliability) Act 2008</i> (Water Supply Act) will need to be addressed in implementing the Reference Project, particularly in relation to registration as a service provider and dam safety and flood mitigation.</p>	<ul style="list-style-type: none"> ▪ The owner (or a prescribed related entity of the infrastructure owner) will need to be registered as a service provider under the Water Supply Act. ▪ Chapter 4 of the Water Supply Act contains the regulatory framework for dam safety and flood mitigation:



Description	Implication/s for the Reference Project
	<ul style="list-style-type: none"> – Section 340 of the Water Supply Act provides that Chapter 4 does not apply to the Reference Project (either option), as neither will have a variable flow control structure on the crest of the weir – requirements for dam safety and flood mitigation do not apply for the Reference Project ▪ the EIS provides that, notwithstanding that the Rookwood Weir was not determined to be a referable dam, it will still be constructed to the required standards of a referable dam. In this regard, the following standards are relevant: <ul style="list-style-type: none"> – Guidelines for Acceptable Flood Capacity for Water Dams (DEWS 2013) – Guidelines for Failure Impact Assessment of Water Dams (DERM 2010) – Queensland Dam Safety Management Guidelines (DNRM 2002).
Water Act 2007 (Cwth)	
	No implication for the Reference Project, noting the Lower Fitzroy water scheme is not a 'water resource plan under the Murray Darling Basin Plan.

10.3.2 Other Regulatory Issues

A range of operational issues, particularly as relates to the sale and distribution of water, have potential regulatory implications and require active management by the asset owner. These issues are highlighted in Table 10-3.

Table 10-3 Regulatory requirements and implications

Description
Water Pricing and Charging Power
<p>There are a number of regulatory overlays that are likely to impact on the approach taken to water pricing and charging for the Reference Project. The regulatory issues likely to have the most significance include:</p> <ul style="list-style-type: none"> ▪ NWI and NWI Pricing Principles ▪ compliance with NWIDF Guidelines ▪ QCA price monitoring and price regulation powers ▪ regulatory constraints and requirements in relation to exercise of statutory and contractual charging powers.
Water Sharing
<p>The Reference Project area is located within the 'Fitzroy Water Management Area'. Chapter 14 of the ROP sets out the relevant water sharing rules applicable in that area, which are based on an announced allocation approach. If an alternative approach to water sharing is proposed, then the water planning instrument that contains the relevant ROP provision will require amendment.</p>
Water Rights Model
<p>There are two primary water rights models that may be adopted for the Reference Project as follows:</p> <ul style="list-style-type: none"> ▪ a de-centralised model where allocations are sold to end users (Allocation Based Model)



Description
<ul style="list-style-type: none"> a centralised, contractual model wherein a bulk water entitlement is held by a supply entity and access to a nominated volume of water is supplied to individual customers under a system of supply contracts with terms and conditions of those contracts agreed between the supply entity and its customers (Contract Based Model). <p>It is important that the model adopted is consistent with the NWI, on the basis that compliance with the NWI is required in accordance with the Intergovernmental Agreement and as a condition for securing Commonwealth funding.</p> <p>Either model could be implemented with few regulatory issues in these circumstances. It is noted that for the economic and financial assessment undertaken for the DBC, an allocation model has been assumed.</p>
Water Trading
<p>Compliance with the NWI generally requires that water access entitlements are able to be traded, given, bequeathed or amalgamated. Either an Allocation Based Model or a Contract Based Model is able to facilitate trade within a water supply scheme.</p>
Intergovernmental Agreement
<p>The Queensland Government has made certain commitments in relation to water use under the Intergovernmental Agreement on a NWI, including the NWI Pricing Principles. These commitments are relevant to any implementation of the Reference Project in a number of ways, including in respect of the following:</p> <ul style="list-style-type: none"> selection of water rights model treatment of any government contributions and pricing <p>Achieving compliance with the NWI will not prevent implementation of the Reference Project. It is noted that the commercial delivery model proposed for adoption, will need to be reviewed against the requirements under the NWI and NWI Pricing Principles by the ROL holder.</p>
Third Party access agreements and regulations
<p>There are currently no relevant third-party access requirements for the Reference Project.</p>

10.4 Approvals

Table 15-1 in Chapter 16, provides a brief description of key approvals likely to be required for the Reference Project. Further construction related approvals may be identified during the detailed design of the Reference Project. Table 10-4 provides a summary of regulatory matters relating to certain approvals.

Table 10-4 Regulatory issues for various approvals

Description
Planning Reform
<p>Planning legislation in Queensland has recently undergone reform. The Planning Act commenced on 3 July 2017. The Planning Act repealed and replaced the Sustainable Planning Act. The Sustainable Planning Regulation was also replaced by the Planning Regulation 2017 (Planning Regulation). The new planning framework includes State and Local Planning Instruments (including the Minister's Guidelines and Rules, Development Assessment Rules—DA Rules and the State Development Assessment Provisions—SDAP).</p> <p>The Planning Act does not introduce any changes that are of concern for the Reference Project.</p> <p>Project approvals which may be triggered under the new planning legislation are described in Table 15-1 in Chapter 15.</p>
Designation of premises for development infrastructure
<p>The CG Report states that "The proponents have stated their intention to seek a community infrastructure designation (CID) under SPA for the proposed area of land for each weir". A CID has not been declared for the Rookwood Weir. Under the Planning Act, instead of CIDs, there is a similar process for the designation of premises</p>



Description
<p>for development of infrastructure, including water cycle management infrastructure (a Designation). If a Designation is made, certain development which would otherwise be assessable development will be categorised as accepted development for which an approval is not required. For example, the clearing of vegetation for the construction of water cycle management infrastructure is exempt clearing work where located on designated premises.</p> <p>Development for which an exemption may apply where located on premises for designated for development infrastructure, are identified in Table 15-1 in Chapter 15.</p>
Environmental Authority for ERA
<p>An Environmental Authority (EA) under the EP Act is required to undertake a Prescribed Environmentally Relevant Activity (ERA). The holder of an EA is required to be registered as a suitable operator. The Reference Project may trigger the requirement for an EA for ERA 16 for extractive and screening activities in relation to potential dredging and/or extraction of material resources. ERA 16 is a concurrence ERA which may also require a development approval under the Planning Act, depending on the aggregate environmental score of the activity being undertaken. Consideration should be given to other ERAs which may be triggered during the detailed design of the Reference Project.</p>
Vegetation clearing
<p>Vegetation clearing will be required for the Reference Project. Clearing of native vegetation on prescribed land is assessable development requiring code assessment, unless it is exempt clearing work or accepted development under schedule 7, part 3, section 12 of the Planning Act.</p> <p>Searches indicate that the Reference Project is not located within EHP Protected Plants Flora Survey Trigger Mapping area.</p>
Works on a state-controlled road and local government roads
<p>The Reference Project involves work on state-controlled roads, including intersection works proposed on the Capricorn Highway at Gogango. A road corridor permit is required to construct, maintain, operate or conduct ancillary works and encroachments on a state-controlled road, unless the works are undertaken by TMR. Approval is also required from the chief executive administering the TI Act for works on or interfering with a state government-controlled road.</p> <p>A road reserve works permit will be required under local laws for the proposed upgrades to local roads at Gogango, along Thirsty Creek Road at river crossing approaches (Riverslea Crossing and Hanrahan Crossing), unless the works are undertaken by a local government.</p>
Other approvals
<p>A permit is required to excavate or place fill in a watercourse, unless such works are otherwise authorised or exempt. GAWB and SunWater are water service providers under the Water Supply Act and are exempt under the Riverine Protection Permit Exemption Requirements as approved by the chief executive (WSS/2013/726, Version 1.02, provided the entities comply with the minimum requirements set out in the Riverine Protection Permit Exemption Requirements. If the minimum requirements in the exemption cannot be met, this permit will be required.</p> <p>Such minimum requirements include:</p> <ul style="list-style-type: none"> ▪ sediment and erosion controls must be used ▪ all culverts placed within the watercourse must be aligned with the stream channel and placed as close to the centre of the watercourse channel as practical ▪ all culverts placed within the watercourse must be of a sufficient size to ensure uninterrupted low flows and minimise the occurrence of blockage of culverts caused by flood-borne debris ▪ constructed access tracks (e.g. culverts) must be provided with a scour apron and cut off wall on the downstream side sufficient to prevent bed erosion.



Description
A range of other planning and environment approvals are identified in Chapter 16.

10.4.1 Approvals Risk

This section summarises some of the key approvals risks identified in the development of the DBC. Each of these issues and responses may have a timing and/or cost implication for LFRIP. Where deemed appropriate, these risks have been further identified in the risk register and have been provisioned for in the risk adjusted cost estimates.

The key approvals risks include:

- The EPBC Approval for the LFRIP does not differentiate between conditions of the approval that apply to the Eden Bann Weir and the conditions that apply to the Rookwood Weir. As such, it is anticipated that the proponent must either:
 - seek a clarification from the Minister that separate plans and strategies are to be undertaken for Eden Bann Weir and Rookwood Weir
 - or seek a change to the EPBC Approval to make this distinction clear.
- Under Condition 17 of the EPBC Approval, if the holder of the EPBC Approval has not substantially commenced the action after five years of the date of the approval, the written agreement of the Minister is required prior to the approval holder commencing the action.
- The EPBC Approval has effect until 25 February 2046. As the EPBC Approval relates to both the construction and operation of the Rookwood Weir, an extension to the currency period of the EPBC Approval will be required to approve the operation of the Rookwood Weir beyond 2046 (anticipated to be undertaken after operations commence).
- The EPBC Approval is personal to SunWater and GAWB as the holders of the EPBC Approval. The consent of the Minister will be required if the EPBC Approval is proposed to be transferred to another entity, other than, such as an incorporated JV. As it currently stands, both SunWater and GAWB are bound by the conditions of the EPBC Approval and have the legal risk of compliance with the conditions of the EPBC Approval.
- The 'Project proponent' (including its agents, contractors, subcontractors or licensees of the proponent who are undertaking the Project) has responsibility for compliance with imposed conditions of the CG Report. If an incorporated JV model is proposed, whereby the new JV entity will take on the role of Reference Project proponent, change in control processes will need to be considered.
- The CG Report will lapse 3 years after the day the report was publicly notified (i.e. 8 December 2019) unless the undertaking of the Reference Project substantially starts before the lapse date, or, before the report would otherwise lapse, the Coordinator-General gives the proponent written notice stating a later time for the report to lapse.
- Offsets which are required to be provided under the EPBC Approval and the Imposed and Stated Conditions for Rookwood Weir include offsets for the powerful owl, waterway barrier works and vegetation impacts.



11 PUBLIC INTEREST CONSIDERATIONS

CHAPTER SUMMARY AND CONCLUSIONS:

All public interest matters and associated mitigation measures identified in this Chapter have previously been identified by GAWB and/or SunWater. The key impacts relate to property and water quality.

The Reference Project is expected to directly impact 1,163 ha, impacting 33 landholders across 50 allotments through inundation. The Proponent/s have and will continue to consult with those impacted and have committed to negotiations on a range of matters including compensation.

The Reference Project is expected to impact an estimated 20.1 ha due to clearing (1.6 ha) and inundation (17.8 ha).

Public interest issues identified include:

- water quality impacts that could result from land use changes (i.e. increased agricultural production), potential downstream impacts, such as the GBRWHA, and the implementation of mitigation measures to ensure ongoing protection of the GBRWHA
- light pollution during construction potentially disrupting nocturnal fauna behaviour
- soil erosion resulting from construction and vegetation clearing, and from water releases during operations
- potential land contamination
- local surface water and groundwater resources would be impacted from construction and operational activities
- water quality impacts, in addition to those resulting from the change in land use, including ground disturbance, vegetation removal, in-stream works and contaminant spillage resulting from construction works as well as impacts from the decomposition of plant and organic material within the watercourse during operations
- the clearing and inundation of regulated vegetation and disruption to vegetation connectivity between and surrounding the project footprint
- development of the Reference Project could impact 100 black ironbox trees which are protected plants
- impacts to habitat of several wildlife species, including the Powerful owl, Red goshawk, Fitzroy River turtle and White-throated snapping turtle
- impacts to fish habitat and fish and turtle passage
- mitigation measures have been proposed and committed to by both GAWB and SunWater.

The Reference Project is expected to deliver increased regional employment, expenditure and provision of a secure water supply for industrial, urban and agricultural uses. New bridges and roads will also be constructed which will improve connectivity in the region and flood immunity will be improved.



11.1 Purpose

An assessment of public interest provides:

- information about whether the Reference Project will provide (perceived or real) equitable outcomes for all stakeholders
- an opportunity for any potential negative impacts of the Reference Project to be identified, and where possible, managed and/or identified mitigation activities to avoid risk or realise opportunities.

11.2 Community Consultation/Stakeholder Engagement and Impacts

Stakeholder engagement allows potential impacts and opportunities to be identified, including public interest issues. Stakeholder engagement, encompassing community consultation, has primarily been undertaken by GAWB and SunWater as part of the process to develop the EIS. An overview of the potential property impacts is provided below.

11.2.1 Property impacts

It is expected that the Reference Project would inundate a total of up to 1,163 ha of land equating to one per cent loss of total landholdings. This would directly impact 33 landholders across 50 allotments. GAWB and SunWater have undertaken community and stakeholder engagement, including contacting directly impacted landholders about the Reference Project and the potential impacts.

GAWB and SunWater have committed to negotiate individually on issues relating to:

- loss of land
- loss of access to land
- weed spread due to Project activities
- impacts on productivity.

In terms of compensation, GAWB and SunWater have committed to take into account the following factors when calculating appropriate landholder compensation:

- area of riparian land inundated and determined to be non-river
- loss of stock watering points
- increased need for fencing to prevent stock losses
- increased risk of stock losses due to the provision of more potential nesting places for crocodiles
- cost of relocating irrigation pumps to higher ground
- changed weed and pest control management requirements.

A stakeholder engagement plan will be developed by the proponent to guide adequate, timely and regular communication throughout design and construction activities. A Project land access and acquisition strategy will be put in place to manage land access, loss of land, compensation and potential impacts on existing and future water allocations. The emphasis of the strategy will be on securing land by agreement.

The Coordinator-General⁹³ was satisfied that these measures and commitments would reduce impacts to landholders as much as practicable.

⁹³ Coordinator-General's Report released on 8 December 2016.



11.3 Environmental impacts

11.3.1 Land impacts

Changes in the physical landscape can give rise to changes in the landscape's visual character and the way that this is experienced by the community. As already noted, the Project site is located in a rural area predominantly used for beef cattle grazing.

11.3.1.1 Scenic amenity and lighting impacts

No homesteads will be impacted by light pollution at the Project site, however lighting pollution during construction has been identified as potentially disruptive for nocturnal fauna behaviour. GAWB and SunWater have proposed a number of mitigation measures, including:

- avoiding night works during turtle nesting periods, wherever possible, in the context of engineering integrity during construction
- using directional sensor-activated lighting during construction and operations to reduce sky glow
- avoiding installing lighting within the impoundment or at river crossing.

Furthermore, GAWB and SunWater have committed to further refine the EMP to ensure the proposed light pollution mitigation measures are effectively implemented.

11.3.1.2 Topography, geology and soils impacts

Soil erosion can occur through wind and water and result in loss of soil, affecting rehabilitation of impacted land. Construction activities and vegetation clearing have been identified to potentially result in erosion and land instability within the development footprint. In addition, water releases during the operational phase have limited potential to cause erosion downstream, noting the designs of the weir have incorporated measures to minimise the impact from water releases. Operational water release volumes are relatively small when compared to normal seasonal flow variations.

GAWB and SunWater have committed to developing an Erosion and Sediment Control Plan (ESCP) prior to construction. The Reference Project is not expected to result in erosion within the impoundment areas upstream of the weir.

In addition, a geomorphological assessment prior to inundation will be undertaken to refine predictions in relation to potential impacts such as sedimentation, erosion-prone soils and bank slump. Mitigation, rehabilitation and remediation works will be identified and undertaken as required by the proponent.

11.3.1.3 Land contamination impacts

Land contamination impacts may occur from land disturbance and inundation of existing contaminated land. There is also a risk of unintended spillages or accidents that could result in land contamination.

The EIS identified two potential contamination sites based on historical and desktop information. GAWB and SunWater have also proposed to undertake site investigations prior to construction. If these investigations identify potential or actual contamination, a site management plan, remediation action plan and a contaminated sites construction management plan would be prepared and implemented.



GAWB and SunWater are also required to obtain a disposal permit to remove and treat or dispose of contaminated soil from land on the Emergency Management Register and Contaminated Land Register⁹⁴.

The Coordinator-General also notes that it expects GAWB and SunWater to fulfil their commitment to implement the contaminated land management program described in the draft EMP.

11.3.2 Water impacts

11.3.2.1 Water resources impacts

There is the potential for local surface water and groundwater resources to be impacted from construction and operational activities:

- river flows are planned to continue uninterrupted for all most the entire duration of the construction program, with the use of a cofferdam to isolate construction work impacts on the river. Some minor river flow interruptions may occur where essential work is required to be undertaken on low-flow sections
- one existing bore would be inundated by the operation of the Reference Project.

Supply may be altered to existing entitlement holders upstream and downstream from the weir, though it is noted that the proponents have committed to honour the existing entitlements/allocations so that existing water users are unaffected by the changes to their current water uses.

The proponents have proposed strategies including using cofferdams to divert and maintain flows within the river channel. The proponents are committed to meeting existing supply reliability levels, including for low flow or no flow waterholes, that are likely to be impacted. In this instance, the proponents anticipate that individual negotiations will be undertaken with the entitlement holder and be based on the voluntary purchase/sale of entitlements as well as options for the provision of an alternative water supply.

While comfortable with the measures proposed by GAWB and SunWater, the Coordinator-General has also required the joint proponents to develop and implement a ROL Holder's Operation Manual for the weir, designed to meet the environmental flow and water supply objectives of the relevant Water Plan.

11.3.2.2 Water quality impacts

During construction, there is the potential that the quality of water entering the Fitzroy River will be further reduced, which has the potential to impact wildlife habitat. Three possible impacts from construction activity were identified in the EIS – ground disturbance and vegetation removal, in-stream works and contaminant spillage. The EIS concluded that these impacts would be temporary, localised and unlikely to have 'significant' impact on water quality in the Fitzroy River. The proponents have proposed a number of measures to avoid or limit erosion, turbidity and the risk of contaminant release into the waterway. The Coordinator-General was satisfied that these risks have been adequately evaluated and adequate measures proposed to avoid or sufficiently mitigate potential impacts.

During operations, plant and other organic material within the watercourse, prior to the filling of the impoundment area, will slowly decompose with subsequent release of nutrients within the impoundment area. If not adequately mitigated, downstream impacts could include:

- decreased dissolved oxygen and increased algal development

⁹⁴ These are public registers which list contaminated, or potentially contaminated land in Queensland. These registers are maintained by the Queensland Department of Environment and Heritage Protection.



PUBLIC INTEREST CONSIDERATIONS

- water turbidity
- damage to corals
- seagrass growth
- freshwater conditions unfavourable to some species of flora and fauna
- increased water treatment costs.

A precise prediction of pollutant outcomes resulting from the change in land use (e.g. from grazing to intensive and broad acre cropping on the river flats) cannot be made at this stage. However, it is acknowledged that overall, the increased intensity of cropping associated with irrigated crop production compared to less intensive grazing systems results in greater runoff, increased deep drainage, increased sediment entering the waterways, and increased herbicide losses.

The potential impact on water quality outcomes in the GBRWHA is an issue of concern related to the Project's impact on water quality levels. Mitigating this impact and ensuring the ongoing protection of the GBRWHA is a key area of focus for the proposed mitigation measures. In this regard, the Commonwealth Minister has conditioned the Reference Project to:

- develop and implement a water quality monitoring programme capable of predicting potential and detecting actual impacts on the GBRWHA because of changes in nutrient concentrations and oxygen levels due to decaying vegetation
- develop a land management code of practice in collaboration with Commonwealth and state government departments
- develop and implement an offset strategy and offset management plan as necessary and applicable to detected impacts on water quality from facilitated agricultural development.

More detailed information on the impacts on water quality and proposed mitigation measures are set out in Chapter 16.

11.3.3 Matters of state environmental significance

11.3.3.1 Regulated vegetation

Impacted regional ecosystems are considered to provide potential foraging and nesting habitat for the Red goshawk and the Powerful owl in addition to forming part of a corridor that provides ecological connectivity along the Fitzroy River. Watercourse vegetation is expected to be inundated as a result of the Project.

The Brigalow ecological community (a species of endemic tree) in Queensland has been extensively cleared for cropping and grazing and is now highly fragmented. It is listed as 'endangered' under the EPBC Act. The Reference Project is expected to impact an estimated 20.1 ha due to clearing (1.6 ha) and inundation (17.8 ha).

The Coordinator-General recommended that the joint proponents limit disturbance to regulated vegetation and provide offsets to compensate for the loss of this ecological community. In addition, the proponents have committed to undertaking pre-clearance surveys for all threatened species of flora and implementing measures to protect any identified individuals.



11.3.3.2 Vegetation connectivity

The Reference Project would result in the loss of riparian vegetation along the main Fitzroy River channel and in the lower reaches of tributaries and adjoining creeks, which has the potential to disrupt connectivity between and surrounding the Project footprint.

GAWB and SunWater have proposed avoidance and mitigation measures that are considered by the Coordinator-General to sufficiently mitigate any adverse impact on connectivity areas.

11.3.3.3 Protected wildlife habitat – protected plants

Approximately 100 black ironbox trees could be impacted by the Reference Project. The Coordinator-General has recommended conditions requiring GAWB and SunWater to undertake a pre-clearance survey to determine the actual number of trees that would be impacted and use the results of the survey to inform the offset requirements for the species.

11.3.3.4 Protected wildlife habitat – protected animals

- Powerful Owl

The Reference Project will result in the loss of vegetation including the loss of an estimated 139 ha of suitable nesting habitat for the Powerful Owl. While this is not considered to be a significant impact on the Powerful Owl, offsets are proposed for regulated vegetation and connectivity areas including habitat features which support Powerful Owl nesting habitat.

- Red Goshawk

The Reference Project will impact 588 ha of foraging and nesting habitat of the Red Goshawk. GAWB and SunWater have committed to avoiding and limiting disturbance to habitat as well as providing offsets for significant residual impacts. The Coordinator-General imposed a condition requiring offsets and for those offsets to be co-located with offsets for a number of state matters including regulated vegetation, connectivity areas and the Powerful Owl.

- Fitzroy River turtle

The Reference Project is expected to result in inundation of up to 80 percent of nests within the impoundment area. GAWB and SunWater have committed to a nest protection program as part of their offset obligations as well as a financial settlement offset to compensate for the residual impact on aquatic habitat.

GAWB and SunWater have also committed to the construction of turtle pass infrastructure to mitigate the potential impacts of the Reference Project on turtle movement. In addition, a turtle movement study will be conducted to determine baseline data on turtle movement patterns, home range and seasonal variations to assist with the design of passage infrastructure.

The Commonwealth Minister has required additional measures including the development of a Species Management Plan and an offset strategy and offset management plan. More detail on the potential impacts and mitigation measures are set out in Section 16.3.8.2.

- White-throated snapping turtle

Similar impacts are expected as for the Fitzroy River turtle with the measures proposed to mitigate the impacts on the Fitzroy River turtle also relevant to mitigating the impacts on the White-throated snapping turtle. No further mitigation measures are proposed.



11.3.3.5 Waterway providing for fish passage

Construction of Rookwood Weir would create a barrier to fish passage in the Fitzroy River and impact fish habitat. Fish passage infrastructure has been incorporated into the design of the Reference Project. The Coordinator-General also recommended that GAWB and SunWater provide financial or direct offsets for the residual impact on fish habitat

11.4 Social and economic impacts

11.4.1 Economic activity and regional employment

The Reference Project is expected to deliver increased local employment, expenditure and the provision of a secure water supply for industrial, urban and agricultural uses. GAWB and SunWater have committed to sourcing the majority of employees from within the regional area, with a small proportion of highly specialised workers being sourced from elsewhere in Queensland. The proponents have also committed to develop and implement a recruitment plan as a mitigation and management strategy prior to construction.

The Coordinator-General has imposed a condition requiring the proponent to provide an annual social impact management report for a period of five years from the commencement of construction. That report will require the joint proponents to demonstrate how they have addressed any stakeholder and community issues. A condition has also been imposed requiring the proponents to review the social impact assessment for the Reference Project if construction does not commence within two years of the notification of the Coordinator-General's report (December 2016), to ensure it reflects the social and economic circumstances of that time.

11.4.2 Traffic and transport

The flood immunity of existing roads in the vicinity of the Reference Project are generally poor and culverts and bridges are subject to frequent flooding. Roads that will potentially be impacted by inundation during the construction period have been identified and road upgrades have been scheduled accordingly. New bridges and roads will also be constructed, which will improve regional connectivity and flood immunity (refer Section 9.3.5.2).

The Coordinator-General concluded that the impacts on Reference Project traffic and transport have been adequately evaluated and the proponent's commitments would maintain or improve the existing road network during construction and operation of the Project.

Additional commitments made by GAWB and SunWater, consistent with the Coordinator-General's recommendations, are set out in Section 16.3.

11.4.3 Air quality, noise and vibration

Construction activities will generate localised dust, noise and waste impacts. The implications for neighbouring residents is anticipated to be low, with the nearest occupied property approximately 1 km away from the construction area.

During operation, the only source of noise would be from water running over the weir crest during high flow conditions.

Both GAWB and SunWater have committed to implementing the EMP which incorporates dust and noise management measures.



11.5 Access or Use Changes

As noted in Section 12.4.2, the Reference Project will improve flood immunity of several river crossings, facilitating the movement of people, machinery, stock and goods and maintain road network connectivity. The outcome will be to either maintain or improve the existing road network in the region.

11.6 Public Access and Equity

Public access and equity is about ensuring that all groups within society can effectively realise the expected benefits of the investment. Public access is an issue primarily for agricultural users in the region but may also be relevant for stand-alone industrial users.

While commercial arrangements are yet to be established for the Reference Project, the pricing structure to apply to the water rights and charges for use of the water infrastructure will be consistent with the pricing principles established pursuant to the NWI COAG agreement. These pricing principles ensure equity across water users with prices set based on the principle of user-pays and the achievement of price transparency.

The NWI also identifies the importance of facilitating the trading of water resources to ensure that the efficiency of water use is maximised. The specification of water rights and water resource management arrangements to apply to the Reference Project will ensure that water resources are allocated in accordance with their highest value use.

11.7 Consumer Rights

No consumer rights issues (right to safety and right to be informed) associated with the Reference Project have been identified.

11.8 Safety and Security

The *Water Supply (Safety and Reliability) Act 2008* sets the legislative framework for dam safety in Queensland. The *Sustainable Planning Act 2009* (the SPA) establishes a framework for development assessment, which includes the *Water Supply (Safety and Reliability) Act 2008*, which deals with dams that must be failure impact assessed.

The results of the Failure Impact Assessment (FIA) for the Reference Project was undertaken to determine any potential risk to property and people under an extreme flood event. The FIA revealed that none of the properties identified in the EIS are potentially at risk with a present estimate of incremental population at risk being less than two people. Therefore, the EIS noted that the Reference Project is not expected to be a referable dam.

The Rookwood Weir will be assessed at five yearly intervals to determine any safety risks for the residential populace downstream from, or located near the structure. The proponents outlined preventative measures to reduce the likelihood of weir failure which includes ensuring the weir design complies with the Queensland Dam and ANCOLD guidelines, and peer review of design and construction of the weir.

11.9 Privacy

No issues have been identified in relation to privacy of individuals.



PART D – ANALYSIS



12 SUSTAINABILITY ASSESSMENT

CHAPTER SUMMARY AND CONCLUSIONS:

- The results of the sustainability assessment are as follows:

Criteria	Achievement level	Description
Context	Moderate	The Reference Project will alleviate the already identified water security and reliability constraints and underpins regional economic development
Strategic planning	Moderate	The Reference Project was identified as part of an options analysis that considered five alternative options to address the service need. It will address the key drivers of future change
Leadership, knowledge sharing and innovation	Basic	Both GAWB and SunWater operate under environmental management systems that incorporate environmental considerations into day-to-day operations
Procurement and supply chain	Moderate	The procurement policies of the project Proponents are consistent with the Queensland Government's Procurement Policy, which includes a requirement to conduct business with ethical and socially responsible suppliers
Material use	Moderate	A green procurement strategy will be developed that will include strategies such as re-use of by-products and a commitment to source materials from the closest possible location
Climate-change mitigation	Basic	The potential risks of climate change have been addressed through design construction scheduling and measures within the LFRIP EMP
Water management	Moderate	The Reference Project is not a highly intensive water use project. However, the use of water from the Reference Project for agricultural production has the potential to impact on water quality levels flowing into the GBR. The Coordinator-General has recommended controls to mitigate this impact
Resource recovery	Moderate	The EIS identifies the relevant legislative and regulatory obligations in relation to waste management and appropriate mitigation measures have been proposed
Land selection	Basic	The project site is greenfield and therefore is not located on disturbed land
Ecology	Moderate	The Environmental Assessment has adequately identified the matters of national and State environmental significance to be impacted by the Reference Project. An EMP, species management programs and offsets have been proposed by GAWB and SunWater
Green infrastructure	NA	NA
Sustainable procurement	Moderate	Procurement policies are in accordance with State procurement policy requirements including consideration of the Queensland Government's environmental and social objectives



Criteria	Achievement level	Description
Employees	Basic	A recruitment plan will be developed which will include the provision of appropriate contractual arrangements and the use of local recruiters that will facilitate local employment
Social return	Moderate	Social outcomes will be improved primarily through increased water security and reliability as well as increased access and connectivity through improved roads and bridges
Heritage	Basic	Activities associated with the Reference Project will disturb identified indigenous cultural heritage that lies within the area. CHMPs have been established, approved and registered
Equity	Basic	Existing landholders have been identified as the most significantly impacted by the Reference Project. Ongoing engagement and individual negotiations have been committed to by both GAWB and SunWater
Whole-of-life impacts	Moderate	Measures have been taken to ensure that the Reference Project will not reduce or degrade the health, diversity and productivity of the environment or adversely affect current and future generations
Valuing Externalities	Moderate	Material externalities identified include environmental impacts, the productivity improvements associated with improved communication infrastructure and improved regional connectivity and road safety attributable to road and bridge upgrades

12.1 Purpose

The Infrastructure Sustainability Council of Australia (ISCA) defines infrastructure sustainability as ‘Infrastructure that is designed, constructed and operated to optimise environmental, social and economic outcomes of the long term’.

A sustainability assessment supports an understanding of the economic, social and environmental impacts of the Reference Project, providing an overall assessment of the Project’s sustainability impact. The assessment adopted is based on ISCA’s Infrastructure Sustainability rating scheme themes and categories.

12.2 Approach

The sustainability assessment considers 19 principles across the areas of governance, environment, social and economic. Each principle is rated using the rating scale set out in Figure 12-1. An assessment guideline provides a description of the principles and guiding questions that assist with determining the rating.



Figure 12-1 Sustainability Assessment Rating

SUSTAINABILITY ASSESSMENT RATING	
Level	Criteria
Advanced	<ul style="list-style-type: none"> Generates significant additional value and new opportunities not previously evident, such as changing a liability into an asset 'Designs out' the problem up-front rather than relying on managing impacts later Solutions generate flow-on benefits outside the Project boundary
Moderate	<ul style="list-style-type: none"> Solutions to significant issues result in multiple benefits through economic, social and/or environmental outcomes Meets immediate community and user needs and will be resilient and efficient into the future Significant innovation and leading practice incorporated into the Project
Basic	<ul style="list-style-type: none"> Avoids harm and negative effects Solutions create Project efficiencies Solutions have an immediate or short-term focus
Compliant	<ul style="list-style-type: none"> Meets legislative and regulatory requirements
Poor	<ul style="list-style-type: none"> Fails to meet legislative and regulatory standards Solutions may result in dis-benefits and negative effects

Increasing Project sustainability

It is assumed that all projects will meet this level. Sustainable solutions are therefore expected to go beyond legislative and regulatory compliance.

In June 2017, key LFRIP stakeholders were identified and invited to attend a workshop to undertake the sustainability assessment. The workshop attendees included a diverse expertise to encourage alternative approaches to considering the issues. Workshop participants included representatives from:

- Building Queensland, as the leader of the development of the business case
- GAWB and SunWater, as the joint Project proponents
- GHD, which assisted Building Queensland with the environmental and social impact evaluation for the Project and was responsible for developing the LFRIP EIS.

The economic advisor for the development of the DBC, facilitated the workshop. The workshop agenda included:

- examining the wider system and the primary connections or relationships for the Reference Project
- identifying the most important drivers of change 10–20 years into the future and their implications for the Reference Project
- identifying the sustainability assessment principles not relevant to the Reference Project
- using the guiding questions to guide thinking and discussion
- using the sustainability assessment rating criteria to assign an assessment level to each principle.

In addition, the assessment also draws from information gathered and published as part of the EIS process.



12.3 Sustainability Assessment

SUSTAINABILITY ASSESSMENT	
Demonstrate how the Project fulfils the following sustainability principles	Achievement level of the principle:
GOVERNANCE	
<p>1. Context All infrastructure projects sit within a broader context, and should be planned, designed and operated to connect with the wider system (including other infrastructure, economic activity, landscapes, population hubs and movements, flows of resources, materials, goods and people). This could occur at neighbourhood, town, city, region or state scales.</p> <ul style="list-style-type: none"> ▪ The Reference Project will be delivered through a JV (unless otherwise directed by the Queensland Government), and will be subject to the governance structure outlined in the implementation plan (refer Chapter 19). ▪ The Reference Project would operate in conjunction with other Central Queensland water infrastructure including: <ul style="list-style-type: none"> – In the Lower Fitzroy, the Fitzroy Barrage and Eden Bann Weir – In Gladstone, Awoonga Dam and the proposed GFP (to be developed by GAWB to access supply from the Lower Fitzroy River) – Other bulk water supply infrastructure developed in the region in the future, such as the proposed Nathan Dam and Connors River Dam projects. 	Moderate
<p>2. Strategic planning Design infrastructure as the solution to the identified service need, taking into consideration the strategic goals and objectives. Focus on longer term use and outcomes so that the infrastructure leaves a positive legacy. Consider adaptability to respond to future changes, challenges and trends.</p> <ul style="list-style-type: none"> ▪ In the context of the strategic goals and objectives and the longer-term service need, an options analysis was conducted to determine the recommended Reference Project for the business case. ▪ Rookwood Weir was identified as the Reference Project as it could alleviate Rockhampton’s supply security while also alleviating GAWB’s single source supply risk, and it was the most cost-effective solution considered. ▪ In addition, the Reference Project had the greatest potential to facilitate economic development, primarily through largescale expansion of agricultural production, in the Lower Fitzroy region. ▪ There is little risk associated with the delivery of water and the technical and economic feasibility of the Rookwood Weir Project as it has been subject to rigorous assessment throughout the completed EIS process. ▪ A review of relevant government programs and policies has concluded that the identified service need and Reference Project align with, and contribute to, the strategic objectives of various plans and programs of the Queensland Government, Commonwealth Government and GAWB. This includes several policies and strategies at the state government level aimed at facilitating economic development in northern Queensland. ▪ In particular, there is strong alignment with past WSS relevant to the region, GAWB’s Strategic Water Plan, and the Commonwealth Government’s NWIDF. ▪ The Reference Project will mitigate the impact of climate change on reliability of inflows into water storages. 	Moderate
<p>3. Leadership, knowledge sharing and innovation The leadership team is responsible for implementing, measuring and reporting on the sustainability performance as well as creation of a culture of innovation and knowledge sharing.</p>	Basic



SUSTAINABILITY ASSESSMENT

- The JV will operate under ISO14001:2004, which specifies requirements for the business' environmental management systems. This means that environmental considerations are incorporated into day-to-day operations throughout both organisations including the promotion of continual improvement.
- A risk assessment has been completed which incorporates identification of opportunities, including innovation.
- Analysis carried out as part of the Reference Project's detailed design phase focused on identifying innovative design elements. For example, the fishway design process was a consultative design process undertaken to minimise the risk of fish and turtle injury and mortality. The key design features that typically cause high levels of fauna injury and mortality have been avoided in the design thereby substantially reducing the risk of injury and mortality to fish and turtles.
- Consultation during development of the EIS has engaged a broad range of stakeholders, including the indigenous community and is ongoing. Ongoing engagement will mitigate and manage impacts on cultural heritage.
- In 2011, four CHMP were established for the LFRIP, including the Project with relevant and endorsed Aboriginal parties (Endorsed Parties). The CHMPs are approved and registered.

4. Procurement and supply chain

Procurement activities are responsible and consider human rights, society and the environment.

Moderate

- Procurement for early works is being undertaken by SunWater and GAWB. Policies of SunWater and GAWB are in accordance with the Queensland Government's Procurement policy. Principle 4 of this policy states that procurement will be used to advance the Government's economic, environmental and social objectives and support the long-term wellbeing of the community. Principle 4.1 expands on this point and states that business will be conducted with ethical and socially responsible suppliers.
- The proponent responsible for delivery and operations, assumed to be the JV, will adopt procurement policies in accordance with the Queensland Government's Procurement policy.
- An EMP has been developed that includes a Project procurement plan which considers the engagement of local businesses to provide services to the Reference Project. Services, equipment and material required for the Reference Project are considered typical for construction projects in the region and therefore are likely to be locally available.

ENVIRONMENT

5. Material use

Materials used on the Project have a low life cycle impact and low toxicity.

Moderate

- A green procurement strategy will be developed, acknowledging that remoteness of the site and availability of supplies/suppliers, together with financial feasibility, will dictate procurement strategies, for example:
 - Identify suppliers that have greenhouse gas reduction and sustainability strategies in place for their operations.
 - The use of by-products in concrete – fly ash will be used to make concrete. Fly ash has low embodied emissions and is essentially emission 'free' for its status as a waste. Use of fly ash further contributes to reducing waste.
 - Source materials and equipment from the closest possible location. Sourcing materials such as rock, sand and gravel in-situ and/or close proximity to the site and undertaking concrete batching on site reduces the need for transportation of materials over long distances.
 - Re-use of materials such as formwork during the Project.
 - Include energy efficiency clauses in all equipment, machinery and vehicle tender specifications.



SUSTAINABILITY ASSESSMENT

- The bulk of the material used for the weir is concrete, which has a design life of 100 years and has low ongoing environmental impact where appropriately maintained.

6. Climate-change mitigation

The Project will mitigate climate change through identifying an infrastructure solution to reduce global carbon emissions.

Basic

- In undertaking the EIS for the Project it was found that the Reference Project is not expected to measurably contribute to climate change.
- It is acknowledged that a number of alternative solutions (including a desalination plant) would have resulted in higher carbon emissions than the weir structure.
- The green procurement strategy and commitment to reusing construction materials where practicable (see above) is consistent with minimising the Project's climate change impact.
- In addition, potential climate hazards have been addressed through design, construction scheduling and measures within the Project EMP.
- Provides additional resilience to the reliability of water supply for the communities of Central Queensland.

7. Water management

Managing water consumption and discharge according to local conditions now and in the future.

Basic

- The Reference Project is not a highly intensive water use project. Water use will be limited during construction (approx. 15 ML) and negligible during operations.
- The Reference Project itself is not expected to discharge water into sensitive environments, however the use of water from the Reference Project for agricultural production in the Lower Fitzroy has the potential to impact on water quality levels flowing into the GBR, as identified in the EIS.
- The Coordinator-General has proposed controls to mitigate the adverse water quality impacts on the GBR and is satisfied that these measures, in addition to other commitments made by the proponent, will sufficiently mitigate the Reference Project's impacts on water quality levels.

8. Resource recovery

Reducing waste generated and increasing re-use in construction and operation.

Moderate

- The EIS identified the relevant legislative and regulatory frameworks for waste management as well as potential impacts and mitigation measures associated with the type, quantity and nature of waste that may be generated by the Reference Project during both construction and operation. The EIS states that:
 - Prior to commencement of construction, a waste management plan (WMP) would be developed as part of the draft EMP and implemented over the life of the Project. The WMP would involve the identification of waste streams, appropriate transport, storage and disposal and review of management practices
 - A strategy for managing wastes generated during all Project phases has been developed in accordance with best practices, legislation, policies and strategies relevant to waste management. The Reference Project would incorporate waste management measures such as waste avoidance, waste reduction, waste re-use, waste recycling and waste disposal.
- The Project design has considered the use of long-life materials to reduce maintenance and replacement of parts, thereby reducing waste. In addition, reuse of waste materials on site has been incorporated wherever possible (i.e. use of fly ash in concrete production).
- The Coordinator-General was satisfied that the WMP was sufficiently detailed to demonstrate that it meets the relevant waste management and reporting requirements.

9. Land selection

Basic



SUSTAINABILITY ASSESSMENT	
The Project is located on previously disturbed land and limits impacts to local habitat.	
<ul style="list-style-type: none"> ▪ The Project site is greenfield and is not located on previously disturbed land. ▪ Potential habitat impacts both upstream and downstream have been identified and assessed in the EIS. ▪ Mitigation strategies and offsets have been committed to by SunWater and GAWB and will be similarly adopted by the JV. 	
10. Ecology The local and regional habitat and ecology will be enhanced.	Moderate
<ul style="list-style-type: none"> ▪ As detailed in Chapter 16 – Environmental Assessment, matters of national and state environmental significance predicted to be impacted by the Reference Project include: <ul style="list-style-type: none"> – Turtle species, Fitzroy River Turtle and the White throated snapping turtle are listed as threatened and endangered. – Brigalow (Acacia harpophylla dominant and co-dominant) threatened ecological community. – Black Ironbox (Eucalyptus raveretiana) trees. – Regulated vegetation and connectivity areas. – Fitzroy River turtle (Rheodytes leukops) and white-throated snapping turtle (Elseya albagula) habitat. – Powerful Owl (Ninox strenua) habitat. – Red Goshawk (Erythrorchis radiates) habitat. – Waterways providing for fish passage. ▪ In addition to the EMP and species management programs that will be implemented for the above species, offsets are proposed to satisfy state and Commonwealth requirements. ▪ Based on the findings of the impact assessment and given implementation of the EMP and offsets proposals, it is considered by the Coordinator-General that the Reference Project can be undertaken without unacceptable environmental impacts. ▪ Mitigation measures include <ul style="list-style-type: none"> – the incorporation of fish passageways as part of the design of the weir – monitoring of threatened and endangered species – nest protection activities where required as part of construction activities. 	
11. Green infrastructure Traditional infrastructure is replaced with natural processes to do the same job. The term ‘green infrastructure’ refers to an interconnected network of landscape assets that is intertwined with engineered (grey) infrastructure and buildings (all the natural, semi-natural and artificial networks of multifunctional ecological systems within, around, and between urban areas, at all spatial scales).	Not applicable
12. Sustainable procurement Creating positive social outcomes through procurement spend and processes.	Moderate
<ul style="list-style-type: none"> ▪ As noted earlier: <ul style="list-style-type: none"> – Procurement policies of SunWater and GAWB are in accordance with the Queensland Government’s Procurement policy. Principle 4 of this policy states that procurement will be used to advance the government’s economic, environmental and social objectives and support the long-term wellbeing of the 	



SUSTAINABILITY ASSESSMENT

community. Principle 4.1 expands on this point and states that business will be conducted with ethical and socially responsible suppliers.

- The Project procurement plan will consider the engagement of local businesses to provide services to the Project.
- A green procurement strategy will be developed, acknowledging that remoteness of the site and availability of supplies/suppliers, together with financial feasibility, will dictate procurement strategies.

13. Employees Supporting and improving the lives of all employees, including sub-contractors of the infrastructure Project.	Basic
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- The EMP includes a commitment to develop and implement a recruitment plan including the provision of appropriate contractual arrangements with construction contractors and the use of local recruiters, that will facilitate opportunities for local employment.
- The Construction Management Plan will include but not be limited to:
 - Workforce requirements including skills requirements (including strategies for participation by Indigenous and minority groups), sourcing, accommodation and travel to and from Project site
 - Recruitment planning giving preference to local employment by using local recruitment agencies
 - Contractor terms and conditions regarding recruitment.

SOCIAL

14. Social return The Project will have a positive social return on investment meaning that for every dollar spent, there will be over one dollar worth of social outcomes.	Moderate
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- Social outcomes will be improved through:
 - increased water security and reliability
 - access and connectivity through improved flood immunity
 - direct employment opportunities during construction and operation
 - increased demand for local businesses through Project procurement
 - increased agricultural development through increased water supply.

15. Community and stakeholders Understanding and incorporating community and stakeholder views including marginalised and affected groups, to increase the social license to operate.	Moderate
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Refer to Section 5.7 for more detail on Stakeholder engagement. It is noted that following completion of the Reference Project, its legacy in the community will include:

- improved infrastructure including upgrades roads and bridges
- increased water security and reliability to underpin the continued economic growth of the region.

16. Heritage Protecting Indigenous and non-Indigenous heritage and sites highly valued by the community.	Basic
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- Locations within and near the Reference Project that possess a range of cultural places and values that constitute Aboriginal cultural heritage as defined in the ACH Act have been identified.
- Activities associated with the Reference Project have the potential to disturb the identified Aboriginal cultural heritage that lies within the areas where infrastructure is to be constructed or will be inundated.



SUSTAINABILITY ASSESSMENT

- Four CHMPs were established for the LFRIP, including the Reference Project with relevant and endorsed Aboriginal parties (Endorsed Parties). The CHMPs are approved and registered.
- The proponents are committed to ensuring all practical measures are taken to avoid impacts on Indigenous cultural heritage. Ongoing engagement with the Aboriginal parties and implementation of the CHMPs, including transfer to the current Aboriginal parties if it is requested, will mitigate and manage impacts on Indigenous cultural heritage. Where applicable, on-ground mitigation and management measures identified are transferred to actions within the Project EMP.

ECONOMIC

17. Equity Share the benefits and costs of infrastructure development in a fair and equitable way.	Basic
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- The specification of water rights and water resource management arrangements to apply to the Reference Project will ensure that water resources are allocated in accordance with their highest value use. Both GAWB and SunWater have committed to developing a pricing structure and commercial arrangements consistent with the NWI COAG agreement.
- The NWI pricing principles ensure equity across users and identifies the importance of facilitating trading of water resources to ensure efficiency in water use is maximised.

18. Whole-of-life impacts Making decisions based on the whole-of-life impacts and benefits of a Project.	Moderate
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- The Reference Project has been designed and planned considering environmental and socio-economic protection for future generations, as shown through the management and mitigation measures provided in the EIS. These measures seek to ensure that the Reference Project will not reduce or degrade the health, diversity and productivity of the environment or adversely affect current and future generations.
- A whole-of-life financial and economic appraisal of the Reference Project as against the Base Case has been completed as part of this DBC.

19. Valuing externalities Putting a value on material externalities and incorporating them into the decision-making process.	Basic
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- As noted above, the CBA will estimate all measurable and material benefits and costs that are attributable to the Reference Project to inform the decision-making process.
- Material externalities include:
 - environmental impacts such as the impact on the quality of water being deposited into the GBRWHA resulting from the change in land use
 - improvements in regional connectivity and road safety due to road and bridge upgrades to be undertaken as part of the Reference Project.
- Productivity improvements for agricultural producers in the Lower Fitzroy region as a result of improved communication infrastructure to be developed as part of the Reference Project.



13 ECONOMIC ANALYSIS

CHAPTER SUMMARY AND CONCLUSIONS:

- The quantified economic benefits associated with the Reference Project relevant to the Base Case is provided in the table below (all Present Value (PV) estimates calculated using a real discount rate of 7 per cent). The estimated agricultural benefits are presented for the central case 'Best Estimate' high priority demand scenario.

Reference Project	Avoided GAWB's augmentation costs	Avoided severe water restrictions	Avoided approvals	Increased agricultural production, central case
Present Values of benefits (@ 7%)	\$76.15m	\$3.55m	\$7.42m	\$86.87m

- There is ongoing uncertainty associated with the level of agricultural demand. The above benefit estimates are based on a 'Best Estimate' demand projection developed as part of the demand analysis undertaken, with an additional annual growth rate of 1.5 per cent.
- An additional risk cost avoidance associated with emergency supply measures for Rockhampton, in the event of a 'failed' wet season of approximately \$40.81 million (in PV terms) has been estimated. This risk cost avoidance has been used to produce a risk-adjusted BCR, discussed further below.
- Qualitative economic benefits considered include:
 - Increased productivity and time savings attributable to the road and bridge upgrades to be undertaken as part of the Project. This benefit was limited to a qualitative assessment, due to the limited number of landholders affected
 - The removal of uncertainty for landholders to be affected by the Project. This benefit was also limited to a qualitative assessment, due to the limited number of landholders affected
- The quantified economic costs for the Reference Project relevant to the Base Case are provided in the table below (all PV estimates calculated using a real discount rate of 7 per cent). The below table presents the quantified economic costs for each option.

Component	Upfront Costs	Operating Costs
Present value of costs	\$255.81m	\$14.68m



- An indicative cost estimate of \$12.61 million (in PV terms) was derived for the abatement costs associated with adverse water quality impacts from increased irrigated cropping. However, the cost has not been included in the primary results due to uncertainty regarding the water quality impacts and associated costs.
- The BCR for the Reference Project, both Most Likely and Full Demand Scenarios, are provided below, along with the BCRs under a ‘worst case’ scenario where no agricultural producers take up the available allocation.

Scenario	No agricultural demand	Central case ‘Best Estimate’ demand	Full Take Up Demand Scenario
BCRs	0.3	0.6	1.6

- Inclusion of the avoided risks associated with Rockhampton’s exposure to a ‘failed’ wet season, estimated at approximately \$40.81 million (in PV terms) lifts the BCRs under all options and scenarios, as presented in the table below.

Reference Project	No agricultural demand Plus RRC risk avoidance	Central case ‘Best Estimate’ Plus RRC risk avoidance	Full Take Up Demand Scenario Plus RRC risk avoidance
Adjusted BCRs	0.5	0.8	1.8

The key conclusions to be drawn from the CBA are as follows:

- Under the base demand scenario (i.e. ‘best estimate’ with a 1.5 per cent annual growth rate), the Reference Project has a negative Net Present Value (NPV) and a BCR below 1 at a real discount rate of 7 per cent. The key benefit is the increased value of agricultural production (accounting for almost 50 per cent of quantified benefits), with the avoidance of GAWB’s augmentation costs under the Base Case the other key benefit.
- The results are highly sensitive to the benefits of increased agricultural production and hence the assumptions applied with respect to agricultural demand.
- In addition to the quantified benefits and costs, it is also important to consider those impacts that have not been quantified, either due to uncertainty or a lack of materiality. The most significant unquantified impact is the avoidance of the cost associated with the need to implement emergency supply measures in the event of a ‘failed’ wet season. Incorporating this benefit into the calculation of the results increases the BCR (under the central case base demand scenarios) from 0.6 to 0.8.



13.1 Purpose

The purpose of this Chapter is to describe the economic analysis undertaken on the Reference Project. The economic impact of the project has been assessed using standard CBA techniques. This approach estimates the net economic impact of a project by comparing all economic benefits that are measurable, material and attributable to the project with the identified economic costs. The results of an economic CBA demonstrate whether the Reference Project will result in a net economic benefit for the community.

13.2 Approach and assumptions

13.2.1 Approach

The approach adopted to undertake the economic CBA was as follows:

- define the Base Case (i.e. scenario in which the Reference Project is not developed) for:
 - Gladstone area water users supplied by GAWB
 - water users supplied by the Rockhampton reticulation network (including users in the Livingstone/Capricorn Coast region supplied via the Rockhampton-Yeppoon Pipeline
 - agricultural and industrial water users in the Lower Fitzroy region, including Stanwell Corporation.
- quantify cash flows (inflows and outflows) that ensue from the Base Case, including the costs to be incurred in meeting water requirements in the Lower Fitzroy and Gladstone regions over the study period
- identify the Reference Project options for which the economic impacts of the project are to be assessed
- identify all cash flows to be considered under the Reference Project options
- where economic impacts are material and quantifiable, quantify the economic benefits and costs (i.e. net cash flows) under each of the Reference Project options relative to the Base Case
- estimate the net economic impact, in terms of both the BCR and NPV of the Reference Project relative to the Base Case.

The benefits associated with the use of water for agricultural production in the Lower Fitzroy region have been estimated by developing detailed models of the value of production to be derived from the identified agricultural applications and the costs associated with production. This enables robust estimates to be derived for the net economic value (i.e. gross value of production less all costs incurred, including opportunity cost of land) that is to be derived from the use of water for agricultural production.

The modelling of economic benefits from the expansion of agricultural production has been modelled to be consistent with the water demand analysis undertaken for the LFRIP.



13.2.2 Key assumptions

The key assumptions for this economic analysis are consistent with those set out in the Building Queensland DBC Guidelines, being:

- a discount rate of 7 per cent, with sensitivity analysis to be conducted at 4 and 10 per cent
- study period of 30 years, consistent with the BCDF Framework
- 2017 has been adopted as Year 0 for the analysis.

13.3 The Base Case

This section sets out the Base Case against which the Reference Project is to be assessed with respect to each relevant group of water users.

13.3.1 Rockhampton urban water users

Water users supplied by the Rockhampton reticulation network are currently subject to ongoing water supply security risk due to the relatively low usable storage volume in the Lower Fitzroy. DEWS' Rockhampton RWSSA estimated that storages in the Lower Fitzroy, being the Fitzroy Barrage and Eden Bann Weir, could fall from full to empty in 16 months at current demand and assuming no inflows or groundwater contributions⁹⁵.

As discussed in Section 5.2.3, this represents a significantly higher supply security risk than exists either in South East Queensland or other major regional centres throughout Queensland. RRC has acknowledged the need to address this risk and has outlined the following measures that are to be pursued (excluding the scenario under which the Reference Project is developed):

- RRC will continue to implement water use efficiency and lighter handed demand management measures (i.e. community education and awareness campaigns) under its water supply strategy (currently under development)
- water restrictions will be implemented during periods of low inflows. RRC is currently in the process of revising its DMP and water restrictions arrangements. For this analysis, it has been assumed that RRC will implement restrictions in accordance with its current DMP (see Base Case chapter).

Water users supplied by the Rockhampton reticulation network will incur costs associated with the implementation of restrictions.

Based on discussions with DEWS and an assessment of the outcomes of the supply capability modelling undertaken as part of the Rockhampton RWSSA, the above measures are not considered sufficient to alleviate Rockhampton's supply security risk. As a result, there is the potential that, in the event of an extended period of low inflows (i.e. a 'failed'⁹⁶ wet season), emergency response measures, such as the trucking of water into Rockhampton, may be required at some point over the study period.

13.3.2 Livingstone/Central Coast region urban water users

As previously discussed, urban water users in the Livingstone/Capricorn Coast region will remain reliant on supply from RRC via the Rockhampton-Yeppoon Pipeline for the foreseeable future. As such, to the extent

⁹⁵ Department of Energy and Water Supply (2016). Rockhampton Regional Water Supply Security Assessment.

⁹⁶ A 'failed' wet season is defined as a wet season (i.e. December to March) that does not result in sufficient inflows to ensure that supply can be maintained until the commencement of the next wet season (i.e. from end of March through to December).



that urban water users in Rockhampton are to be subject to water use restrictions under the Base Case, users in the Livingstone/Capricorn Coast region are also expected to be subject to water use restrictions.

In conducting this analysis, it has been assumed that the nature of the restrictions, in terms of their timing and severity, would be the same for users in the Livingstone/Capricorn Coast region as would apply to water users in Rockhampton⁹⁷.

13.3.3 Gladstone area water users

The Base Case for water users in the Gladstone area is set out in detail in Chapter 8. In summary, the key features of the Base Case are as follows:

- A 'Low Supply Alert' will be issued by GAWB when supplies in Awoonga Dam reach the trigger level at which there is 60 months of supply remaining. Based on current demand projections and inflow assumptions, it is assumed for the Base Case that a 'Low Supply Alert' will be triggered in 2031.
- Demand reduction strategies and other measures identified through consultation between GAWB and its customers will be implemented in response to the 'Low Supply Alert'. In addition, GAWB will also commence preparatory works for the preferred augmentation option, being the GFP.
- When supplies in Awoonga Dam reach the trigger level at which there is 48 months of supply remaining, water restrictions will be implemented, with 10 per cent of supply being curtailed to all customers, and the construction of the augmentation will be commenced. Based on current demand projections and inflow assumptions, it is assumed for the Base Case that augmentation will be triggered in 2034.
- The construction of the GFP will be completed prior to Emergency (Level 3) Restrictions being implemented by GAWB (assumed to be 2034), with flows being harvested from the Fitzroy River to supplement supply in Awoonga Dam (GAWB has advised that it believes it will be able to secure a 5,000 ML allocation to harvest overland flows from the Fitzroy River).

⁹⁷ While it is acknowledged that LSC maintains its own water conservation framework with restrictions arrangements, given the reliance of water users in the Livingstone/Capricorn Coast region on RRC for reliable water supply, it is considered appropriate for the economic analysis to assume that the imposition of water restrictions on urban water users in Rockhampton in the event of a period of low supply would be extended to water users in the Livingstone/Capricorn Coast region.



- GAWB will then proceed with construction of water storage infrastructure (i.e. a weir) on the Lower Fitzroy River. While the scale of the augmentation would be determined based on water demand projections for the region at the time of augmentation, for this analysis it has been assumed that GAWB would construct a weir with an annual yield of 54,000 ML (i.e. Rookwood Stage 1). Based on the information available and taking into account the previous analysis conducted by GAWB, it has been assumed under the Base Case that the construction of the weir would commence in 2035⁹⁸. In accordance with GAWB's CSS, it has been assumed that construction of the weir will be complete by 2037.

It is important to note that the Base Case for Gladstone water users, specifically the timing of GAWB's augmentation requirement being triggered, has implications for the Base Case for the other potential water users. This is due to the additional water to be made available by the development of a 54,000 ML Rookwood Weir by GAWB under the Base Case. As the annual yield from the weir exceeds GAWB's strategic reserve of 30,000 ML, additional water would be available for other user groups, including users supplied by the reticulation network in Rockhampton and the Livingstone/Capricorn Coast region and agricultural users in the Lower Fitzroy region (see below). As such, the water supply security risk to which both Rockhampton and Livingstone/Capricorn Coast water users are exposed would cease to apply following the construction of the 54,000 ML Rookwood Weir by GAWB.

13.3.4 Agricultural production in the Lower Fitzroy

The nature of agricultural production in the Lower Fitzroy region is as follows:

- cattle grazing is the dominant land use, accounting for 74 per cent of agricultural land use in the region
- irrigated broadacre cropping, primarily on the Isaac, Dawson and Fitzroy Rivers
- diverse horticultural production, including:
 - fruits (e.g. grapes, pawpaws and mangoes) and vegetables (e.g. sweet potatoes and zucchinis) near Rockhampton
 - fruits (i.e. pineapples, lychees and mangoes) around Yeppoon
 - vegetable crops to the south of Gladstone and mangoes to the west of Gladstone
 - aquaculture in various locations around Yeppoon
 - industrial-scale forestry estates.

Relatively small volumes of irrigation water are currently used for agricultural production in the region. As set out in Section 5.2, agricultural producers in the Lower Fitzroy region currently hold 14,711 ML of medium priority allocations, with usage averaging around 5,000 ML per annum between 2006-07 and 2013-14⁹⁹. This relatively low uptake rate was found to be attributable to a range of factors including the low reliability of the water due to the conjunctive management of Eden Bann and the Fitzroy Barrage, the limitations resulting from traditional management practices, and the ineffectiveness of the water trading market in the region.

The water supply-demand balance in the Lower Fitzroy region, combined with the constraints on the increased uptake of supplemented water allocations identified above, means that agricultural production in the Lower Fitzroy region is likely to remain at current levels under the Base Case. In accordance with the

⁹⁸ Preparatory expenditure would begin to be incurred in 2034 to enable construction to be completed over the two-year period.

⁹⁹ Department of Energy and Water Supply (2016). Rockhampton Regional Water Supply Security Assessment.



Rockhampton RWSSA conducted by DEWS, agricultural producers are expected to meet their future water requirements through:

- existing licences and local supplies
- improvements in water use efficiency
- trading of water allocations
- increased use of existing water allocations.

However, in considering the volume of water available for agricultural production under the Base Case, it is important to take into account the need for GAWB to develop a weir on the Lower Fitzroy River under the Base Case. As set out above, it has been assumed that GAWB will need to construct a 54,000 ML weir by 2037¹⁰⁰. With GAWB requiring access to 30,000 ML¹⁰¹ and LSC to 4,000 ML, this augmentation would make up to 20,000 ML of water allocations available for alternative uses, primarily agricultural production, in the Lower Fitzroy region. This is an important consideration in assessing and quantifying the economic benefits associated with increased agricultural production under the Reference Project options (see section 13.4.1.4).

13.3.5 Industrial production in the Lower Fitzroy

Stanwell Corporation is the only major industrial water user in the Lower Fitzroy region. Stanwell Corporation's water requirements, driven by its need for cooling water for the Stanwell Power Station, are not expected to change materially over the 30-year study period.

The water supply-demand balance in the Lower Fitzroy region under the Base Case means it is unlikely any additional water will be available for the expansion of industrial production (that requires material volumes of high reliability water) in the Lower Fitzroy region over the study period.

The analysis undertaken for this DBC did not reveal any potential demand for water for increased industrial activity in the Lower Fitzroy region¹⁰².

13.3.6 Quantifying cash flows under the Base Case

13.3.6.1 GAWB augmentation costs

GAWB's process for accessing a second source of reliable water supply once supplies in Awoonga Dam reach the level at which the augmentation trigger under GAWB's DMP is activated are detailed above. As GAWB will be required to construct the GFP under any of the modelled scenarios, it is not necessary to consider this cost in the economic analysis¹⁰³.

However, under the Base Case, being the scenario under which the Reference Project is not developed, GAWB will be required to develop infrastructure (i.e. a weir) on the Lower Fitzroy River to supplement

¹⁰⁰ Noting that the actual timing of this augmentation will be contingent upon GAWB's supply-demand balance.

¹⁰¹ While it is acknowledged that GAWB may not require access to its full 30,000 ML allocation at the time the weir is to be constructed, the potential availability of these volumes has not been taken into account in quantifying the cashflows related to agricultural production under the Base Case, as the uncertainty associated with the future availability of these allocations is likely to prevent agricultural producers from committing to the investments required for the uptake of these allocations.

¹⁰² However, should demand for water-intensive industrial activity emerge over the medium term, the construction of a 54,000 ML weir on the Lower Fitzroy River by GAWB under the Base Case would make up to 20,000 ML of water allocations available for industrial production.

¹⁰³ The timing of the construction of the GFP will be determined by GAWB's demand and the level of supply in Awoonga Dam. In accordance with GAWB's DMP, GAWB will commence construction of the GFP, under either the Base Case or either of the two Reference Project scenarios, when supplies in Awoonga Dam reach the level at which there are 48 months of supply remaining.



supplies in Awoonga Dam. As noted above, for this analysis, the assumption has been adopted that GAWB will require access to supplementary supply from a water storage on the Lower Fitzroy River by 2037.

Based on the assumption that GAWB would construct a weir with an annual yield of 54,000 ML (i.e. Stage 1 Rookwood Weir), the capital cost of this augmentation is estimated at \$260.77 million (2017 dollars). In accordance with GAWB's CSS, a two-year construction period has been assumed, with expenditure related to preparatory works to be incurred in 2035FY (i.e. 2036FY and 2037FY).¹⁰⁴ This equates to a total capital cost estimate, in PV terms, of \$71.41 million¹⁰⁵.

Operating and maintenance expenditure associated with this augmentation varies from year to year, with an annual average of \$1.35 million (2017 dollars). Total operating and maintenance expenditure from 2038 through to the end of the study period is estimated at \$4.74 million (in PV terms)¹⁰⁶.

Based on these assumptions and estimates, the PV of the costs associated with GAWB's requirement to develop and operate a weir on the Lower Fitzroy River under the Base Case is estimated at \$76.15 million (in PV terms). As previously stated, given the uncertainty associated with the timing of this augmentation, scenario analysis has been performed on the results of the economic analysis based on different timings for the augmentation (see section 13.5.1).

13.3.6.2 Costs of maintaining the EIS and state approvals

Under the Base Case, costs will continue to be incurred by the project proponents in order to maintain the currency of the EIS and necessary state approvals. Based on information provided by GAWB, the total cost incurred in maintaining the necessary state approvals and EIS for Rookwood Weir under the Base Case is estimated at \$7.42 million (in PV terms). It is important to note that these costs are only incurred up until the weir is constructed under the Base Case.

13.3.6.3 Water restrictions for Rockhampton and Livingstone/Capricorn Coast water users

The supply capability modelling undertaken for the Rockhampton RWSSA demonstrates that there is a strong likelihood that RRC will need to implement severe water restrictions to maintain reliable supply to water users supplied by the Rockhampton reticulation network (including users in the Livingstone/Capricorn Coast region) over the next 30 years. In particular, the modelling found that at current demand, the Fitzroy Barrage will fall below the medium priority supply cessation level (i.e. the trigger point at which supply is ceased to all medium priority allocations) on average 1 in every 32 years.

While water users in the Livingstone/Capricorn Coast region are subject to a separate water conservation framework and restrictions arrangements administered by the LSC, for the purpose of this analysis, the economic cost of water restrictions under the Base Case has been quantified in accordance with the restrictions likely to be implemented by RRC. This is considered appropriate due to the continued reliance of water users in the Livingstone/Capricorn Coast region on the Rockhampton reticulation network (via the Rockhampton-Yeppoon Pipeline). Given this reliance, it is considered that in the event of supplies in the Fitzroy Barrage reaching the level at which severe water restrictions would be required, water users in the Livingstone/Capricorn Coast region would be required to comply with similar restrictions as water users in the Rockhampton WSS.

¹⁰⁴ It has been assumed that \$52.74 million in preparatory expenditure will be incurred in 2035, with construction costs of \$113.29 million and \$94.74 million (all 2017 dollars) to be incurred in 2036 and 2037.

¹⁰⁵ Based on recent trends in the ABS Wage Price Index and the Heavy and Civil Engineering Price Index, it was not considered appropriate to apply a real cost escalator to these costs. However, the costs have been subject to sensitivity analysis.

¹⁰⁶ This includes a terminal value based on future operating and maintenance costs associated with the weir.



Requiring urban water users to comply with water restrictions during periods of low supply imposes a cost on water users. In order to estimate the economic cost of these restrictions under the Base Case, it is necessary to apply estimates for:

- the population and number of households to be supplied via the Rockhampton reticulation network over the study period
- the cost that severe water restrictions impose on households
- the incidence of severe water restrictions under the Base Case.

13.3.6.4 Population and household projections

DEWS' Rockhampton RWSSA estimated that around 108,000 people access drinking water supplies via the Rockhampton reticulation network. Based on updated population QGSO projections, it is estimated that in 2018, approximately 112,400 people will be supplied by the Rockhampton reticulation network.¹⁰⁷ Based on the QGSO's 20-year population projections, this will increase to approximately 161,000 by 2047. Based on an estimate of 2.6 people per household¹⁰⁸, this equates to around 43,228 households in 2018, increasing to 61,927 by 2047.

13.3.6.5 Cost of severe water restrictions

The costs associated with water restrictions include the cost of compliance, loss of consumer welfare and the loss of societal welfare associated with the reduced usage of water for specific purposes, predominantly outdoor use. The impact of water restrictions on the welfare of households, businesses and the community was noted by the Productivity Commission in its 2011 inquiry report into Australia's urban water sector¹⁰⁹.

Table 13-1 presents a summary of previous studies that have estimated the economic cost of water restrictions in Australia.

Table 13-1 Summary of studies estimating the economic cost of water restrictions

STUDY	LOCATION	STUDY DETAILS	FINDINGS
DBM Consultants (2007). Economic Valuation of Water Reliability in South-East Queensland Using Choice Modelling.	South East Queensland	Assessed the willingness to pay for increased reliability of supply for five separate household groups in SEQ.	The average willingness to pay for an increase in reliability from Level 4 restrictions 1 in 4 years with a duration of 24 months to 1 in 30 years with a duration of 12 months across all groups was \$134 per household per annum. For the highest set of water security outcomes (Level 4 restrictions 1 in 100 years, duration of 6 months), the average willingness to pay was \$174 per annum per household.

¹⁰⁷ Population estimates for Rockhampton water users are based on estimates contained in the latest QGSO population projections. The growth rate for 2016 to 2036 has been applied to derive a population estimate for 2047. For water users in the Livingstone/Capricorn Coast region, the growth rate implied by the latest QGSO projections was applied to the 2016 estimate of 24,000 people included within the DEWS' Rockhampton RWSSA. This resulted in a population estimate of 25,970 in 2018. Latest QGSO population projections were then applied to estimate future water users in the region that will be reliant upon the Rockhampton reticulation network (i.e. same approach as for projecting future water users in Rockhampton).

¹⁰⁸ 3236.0 – Household and Family Projections, Australia, 2011 to 2036. Australian Bureau of Statistics; DOA: 3 July 2017.

¹⁰⁹ Productivity Commission (2011). Australia's Urban Water Sector. Inquiry Report Volume 1, No 55.



STUDY	LOCATION	STUDY DETAILS	FINDINGS
Allen Consulting Group (2007). Willingness to Pay for Increased Reliability of Water Supply in South East Queensland, A contingent valuation study.	South East Queensland	The Contingent Valuation method was applied to estimate households' willingness to pay for increased water security for residential use in SEQ.	Study found that households in SEQ were willing to pay an additional \$132 per annum to reduce the frequency of Level 4 restrictions from 50% to 20% and an additional \$190 per annum to remove the need for Level 2 (or more severe) restrictions.
Australian National University (2012). Willingness to pay research project – Final Report.	Canberra, ACT	Estimated households' Willingness to Pay to reduce the likelihood of different levels of restrictions	Study found that households are opposed to higher-level restrictions. On average, households were willing to pay approx. \$200 per annum to reduce the likelihood of Stage 4 water restrictions (most severe level of restrictions) by 5%. Corresponding estimates for Stage 2 and 3 restrictions were \$20 and \$70 per year respectively.
Gordon, J., Chapman, R. and Blamey, R. (2001). Assessing the options for the Canberra water supply: an application of choice modelling.	Canberra, ACT	Choice modelling survey of 294 Canberra residents conducted in the late 1990s.	On average, residents were prepared to pay \$150 per annum to reduce water demand by 20% using voluntary measures and recycling rather than a mandatory reduction in water usage.
Hensher, D., Shore, N. and Train, K. (2006). Water supply security and willingness to pay to avoid drought restrictions, <i>Economic Record</i> , 82, pp 56-66.	Canberra, ACT	Choice modelling conducted in 2002 and 2003 to assess willingness to pay to avoid water restrictions	Study found that residents were only willing to pay to avoid Level 3 restrictions (complete sprinkler bans) if they lasted all year. Willingness to pay to avoid this level of restrictions was estimated at \$239 per household/business. Households were not willing to pay to avoid Level 1 or Level 2 restrictions.
Cooper, B., Crase, L. and Burton, M. (2011). Urban Water Restrictions: Attitudes and Avoidance. Submission to Productivity Commission.	NSW and VIC	Research was undertaken to inform a contingent valuation study of the welfare estimates associated with avoiding water restrictions.	Respondents with a lawn were willing to pay \$152 to avoid restrictions while respondents without a lawn were willing to pay \$98. Willingness to pay for respondents with high incomes ranged from \$181 to \$291 per annum.
Grafton and Ward (2007). Price versus Rationing: Marshallian Surplus and Mandatory Water Restrictions.	Sydney, NSW	Study estimated the loss in Marshallian surplus from mandatory water restrictions in Sydney.	The study estimated the loss of surplus at approximately \$150 per household.



STUDY	LOCATION	STUDY DETAILS	FINDINGS
Brennan, D., Tapsuwan, S. and Ingram, G. (2007). The welfare costs of urban water restrictions.	Perth, WA	A household production function was developed and experimental studies conducted to assess the cost of restrictions on the use of water on lawns in Perth over three consecutive summers. Estimates were derived based on the opportunity cost of time lost due to the restrictions.	The study found that the cost of a twice-per-week limit on the use of sprinklers was \$100 per household per summer; while the cost of a complete ban on sprinkler usage was estimated at between \$347 and \$870 per household per summer.

While the cost estimates derived from the studies in the above table vary considerably, due to differences in methodologies, locations and the nature of the water restrictions being subject to assessment, there are several key conclusions that can be drawn, including households:

- place a material value on being able to avoid the implementation of severe water restrictions, particularly where the restrictions preclude or significantly restrict outdoor water use
- are either not willing to pay, or are only willing to pay a small amount, to avoid less severe restrictions (i.e. restrictions that constrain the times at which water can be used for outdoor purposes)
- are willing to pay to reduce the likelihood of the implementation of severe water restrictions (i.e. it is not necessary for the possibility of severe water restrictions to be totally removed).

The table also shows that studies that have estimated the cost of urban water restrictions have produced a wide range of cost estimates. For this analysis, it is important to note that while Rockhampton is exposed to ongoing supply security risk, based on the modelling conducted by DEWS, the expected incidence of severe water restrictions is likely to be relatively low (see below).

Due to the low incidence rate, the estimates derived in the two Queensland-based studies were not considered appropriate, as they were derived based on a significantly higher incidence rate for severe restrictions (i.e. one in four years and one in two years). Studies that derived cost estimates based on households' willingness to pay to avoid severe restrictions in a single year were considered to be more appropriate.¹¹⁰ Inflating the cost estimates derived from these estimates and applying the appropriate inflation factors to convert into 2017 dollars results in an average willingness to pay to avoid severe water restrictions of \$273 per household per annum¹¹¹.

13.3.6.6 Incidence of severe water restrictions

As noted in Section 13.3.1, supply capability modelling conducted by DEWS indicates that at current demand, the Fitzroy Barrage is expected to reach the medium priority supply cessation level one in 32 years (i.e. annual incidence of 3.125 per cent)¹¹². This modelling also takes into account demand from Stanwell Corporation, which is supplied from Eden Bann Weir.

¹¹⁰ Cost estimates from the following studies were used to derive an estimate for households' willingness to pay to avoid severe restrictions in a single year – Hensher, Shore and Train (2006) - \$239 per household; Cooper, Crase and Burton (2011) - \$152 per household; Grafton and Ward (2007) - \$150 per household; and Brennan, Tapsuwan and Ingram (2007) - \$347 per household.

¹¹¹ Inflation rates based on 6401.0 Consumer Price Index, Australia, Mar 2017. See:

<http://www.abs.gov.au/ausstats/abs@.nsf/mf/6401.0>

¹¹² Noting that RRC is still yet to finalise its water restrictions arrangements, it has been assumed for this analysis that severe water restrictions would commence when the Fitzroy Barrage falls below the medium priority supply cessation level.



As demand from users supplied by the Rockhampton reticulation network increases over the study period, the annual incidence of severe water restrictions increases. Based on the most recent QGSO population projections for the region (see 13.3.1), combined demand from users serviced by the Rockhampton reticulation network and Stanwell Corporation is expected to reach around 50,380 ML per annum by the end of the study period (i.e. 2048). At this level of demand, the supply capability modelling indicates that the probability of the Fitzroy Barrage falling below the medium priority cessation level will increase to around 1 in 20 years (i.e. annual incidence rate of 5.0 per cent)¹¹³.

Hence, the cost of severe water restrictions to be imposed on users supplied by the Rockhampton reticulation network have been modelled based on annual incidence rates starting at 3.125 per cent in 2018, rising to 5.0 per cent in 2047 (linear growth in the incidence rate has been applied over the study period).

13.3.6.7 Estimating the cost of severe water restrictions under the Base Case

The economic cost of the imposition of severe water restrictions on users supplied via the Rockhampton reticulation network under the Base Case in any given year of the study period are estimated by applying the estimate for the per household cost of severe water restrictions to the number of households supplied by the reticulation network in that year. The subsequent cost estimate is then multiplied by the incidence rate of severe water restrictions in that year to estimate the expected value of the economic cost of severe water restrictions.

For example, in 2018, it is estimated that 43,228 households will be supplied via the Rockhampton reticulation network. At a cost of \$273 per household, the economic cost associated with the imposition of severe water restrictions in 2018 is estimated at around \$11.8 million (2017 dollars).

Based on an annual probability of 3.125 per cent, the expected economic cost of severe water restrictions in 2018 under the Base Case is approximately \$366,000 (2017 dollars). Increases in the number of households and the annual probability of severe water restrictions results in this annual cost estimate increasing to approximately \$632,000 (in 2017 dollars) by 2037.

It is only appropriate for the cost of severe water restrictions to be included in the Base Case up to the point at which the supply-demand balance in Awoonga Dam results in GAWB's augmentation trigger being reached and a weir is developed on the Lower Fitzroy River. This augmentation, which under the Base Case is expected to be in operation by 2037, will alleviate Rockhampton's water supply security risk and hence remove the need for severe restrictions.

Based on the inputs set out in the preceding sections, the total economic cost of water restrictions to be imposed on water users supplied by the Rockhampton reticulation network under the Base Case is estimated at \$4.84 million (in PV terms).

Due to the uncertainty and variability associated with the parameter estimate for the economic cost of water restrictions, sensitivity analysis has been performed on this variable (see Section 13.5.1).

¹¹³ In the event of a severe water shortage in the Lower Fitzroy region, there may exist scope for Stanwell Corporation to reduce its water requirements to make additional volumes available for urban use. However, this has not been factored into the assessment of options for meeting a water supply shortage in the Lower Fitzroy region due to the uncertainty over Stanwell Corporation's ability to reduce its water use and the potential impact on the electricity generation sector. In addition, Stanwell Corporation has informed that during periods of low water supply, the volume of cooling water required by the power station actually increases due to the increased salinity content of the water.



13.3.6.8 Emergency water supply measures

As discussed in Section 13.3.1, water users supplied by the Rockhampton reticulation network, including in the Livingstone/Capricorn Coast region, will remain subject to ongoing water supply security risk.

The source of this security risk is the low usable storage volume in the Lower Fitzroy region relative to annual demand (the two storages have total usable storage volume of 76,100 ML while annual demand is currently at around 42,000 ML per annum). This means that water users in the region (both urban users supplied by the Rockhampton reticulation network and Stanwell Corporation) are reliant on annual inflows into the Fitzroy Barrage and Eden Bann Weir to maintain reliable supply. The magnitude of this risk was demonstrated by supply capability modelling conducted by DEWS for the Rockhampton RWSSA, which found that the storages in the Lower Fitzroy region have a full-to-empty period of 16 months (at current demand). This means that one 'failed' wet season could result in RRC not having access to sufficient water supplies to maintain a reliable water supply to urban water users and Stanwell Corporation not having access to sufficient cooling water for its power station.

While Rockhampton has never experienced a water supply failure, historical modelling conducted by DEWS showed that, based on current water use, storage characteristics, and operating arrangements, a shortfall would have occurred once in the last 100 years (in 1902). Furthermore, stochastic modelling estimated the probability of the Fitzroy Barrage falling below the minimum operating level (i.e. a supply failure) at 1 in 108 years at current demand. At total demand of 55,000 ML per annum (which is not projected to be reached by the end of the study period), this probability increases to 1 in 53 years.¹¹⁴

This information demonstrates the potential for the Lower Fitzroy region to experience a water supply shortfall requiring an emergency response. It is important to note that due to the region's low level of usable storage volume and subsequent reliance on annual inflows, the need for an emergency response would arise rapidly, preventing an infrastructure solution (e.g. bringing forward the construction of a two-way pipeline between Rockhampton and Awoonga Dam) from being implemented. Under the scenario in which the Lower Fitzroy region experiences a 'failed' wet season with no or little inflows into the storages, the region could have as little as four months of supply remaining in storages at the end of March (the typical wet season in the Lower Fitzroy region commences in December and concludes in March). This would not be sufficient to enable RRC to maintain supply to urban water users until the commencement of the next wet season in December.

Based on an assessment of the modelling results contained in the Rockhampton RWSSA and further consultation with DEWS, it is considered that the region could require, in the event of a 'failed' wet season, access to as much as five months' additional supply (subject to actual inflows and demand reductions achieved through restrictions and other measures).

It is difficult to quantify the cost associated with emergency measures (in response to water supply shortfalls), due primarily to uncertainty associated with the logistical arrangements that would apply, the actual volume of water that would be required, and the feasibility of transporting the required volumes on the road network for the duration of the supply shortfall.

¹¹⁴ Department of Energy and Water Supply (2016). Rockhampton Regional Water Supply Security Assessment.



13.3.6.9 Increased agricultural production

As noted in Chapter 8, water use for agricultural production in the Lower Fitzroy region is not expected to change materially over the study period under the Base Case, largely due to the limitations attributable to the water supply-demand balance in the region.

However, as per section 13.3.3, the Base Case does include the development of a weir on the Lower Fitzroy River with an annual yield of 54,000 ML. Assuming that GAWB acquires its 30,000 ML allocation from the weir and 4,000 ML is allocated to LSC in accordance with the Fitzroy Basin ROP, this will make up to 20,000 ML of high priority water allocations available for use in the region, including for irrigated agriculture.

To the extent that water made available by the Reference Project is to be used for irrigated agricultural production in the Lower Fitzroy region, water to be made available from this storage will also be used for this purpose under the Base Case. As such, the Base Case includes the benefits associated with the use of 20,000 ML of high priority water allocations for irrigated agricultural production from¹¹⁵ 2038 through to the end of the study period.

The economic value associated with this agricultural production has been derived based on the cash flows estimated under the Reference Project. Specifically, the economic value of increased agricultural production under the Base Case has therefore been estimated by applying the following assumptions:

- Water to be made available by the construction of a 54,000 ML Rookwood Weir in 2037 under the Base Case would be used for the production of the same crops as has been identified in the demand analysis (see section 13.4.1.4).
- The benefits to be realised from the use of water from Stage 1 Rookwood Weir for the production of these crops under the Base Case would be the same upon uptake of the water from 2038 as under the Reference Project options (in which uptake occurs from 2022).

The approach to estimating the economic value derived from this production involves the development of detailed crop models to estimate the net return derived from the application of water to the identified uses. Applying this approach results in an estimate for the economic value created from the use of water from a 54,000 ML Rookwood Weir, for agricultural production of \$37.92 million (in PV terms)¹¹⁶.

13.3.6.10 Summary of the Base Case

The Base Case to be applied in assessing the economic impact of the Reference Project options is as follows:

- GAWB to incur \$76.15 million (in PV terms) to develop and operate a weir with an annual yield of 54,000 ML on the Lower Fitzroy River that is capable of supplying water from 2037.
- A PV cost of \$7.42 million to be incurred in order to maintain the currency of the EIS and necessary state approvals for Rookwood Weir.
- A PV cost of \$4.84 million to be imposed on water users supplied by the Rockhampton reticulation network as a result of the need to apply severe water restrictions during periods of low supply.

¹¹⁵ Noting that the quantification of cashflows under the Base Case has not taken into account the potential for a proportion of GAWB's 30,000 ML allocation to be used for alternative purposes (i.e. irrigated agricultural production), on the basis that there would not be sufficient certainty associated with these allocations to enable producers to undertake the capital investments necessary to facilitate the take-up of these allocations.

¹¹⁶ Of this total, \$65.82 million is attributable to irrigated fodder cropping; \$20.62 million to macadamia nut production; and \$3.8 million to the production of crops for a feedlot operation. This estimate includes terminal values based on expected future economic benefits to be derived from the ongoing use of water for agricultural production.



- The risk associated with the need to implement emergency supply measures in the Lower Fitzroy region in the event of a ‘failed’ wet season. While not included in the quantification of the Base Case, an indicative PV cost estimate of \$56.2 million has been derived for these emergency supply measures.
- An increase in the economic value of agricultural production in the Lower Fitzroy region attributable to the use of 20,000 ML of water from Stage 1 Rookwood Weir. The total PV of this additional production is estimated at \$37.92 million.

13.4 Reference Project

The Reference Project involves the construction of a weir on the Lower Fitzroy River with an annual yield of 76,000 ML (as allowed for under the Fitzroy Basin ROP) (i.e. Stage 2 Rookwood Weir). Under this option, water would be allocated from the weir based on the following:

- 30,000 ML to GAWB, in accordance with the strategic reserve allocated under the ROP.
- 4,000 ML to LSC, in accordance with the strategic reserve allocation under the ROP and based on advice provided by LSC.
- the remaining 42,000 ML to be made available for other uses within the Lower Fitzroy region, including agricultural use or to supplement supply to the Rockhampton reticulation network.

The following sections assess and quantify, where practicable, the economic benefits and costs under this option.

13.4.1 Economic benefits

The economic benefits associated with the development of Rookwood Weir (76,000 ML) relative to the Base Case are as follows:

- The avoidance of the costs associated with the development and operation of a weir on the Lower Fitzroy River by GAWB in accordance with its DMP and CSS.
- The avoidance of the costs of severe water restrictions that would need to be imposed on water users supplied by the Rockhampton reticulation network in the absence of the Reference Project.
- The avoidance of the costs associated with emergency supply measures in the event of a ‘failed’ wet season.
- The additional economic value to be generated from the use of water for irrigated agricultural production in the Lower Fitzroy region.
- Increased productivity and time savings attributable to the road and bridge upgrades to be undertaken as part of the Reference Project.
- The removal of uncertainty for landholders to be affected by the project.

13.4.1.1 Avoided GAWB augmentation costs

The Reference Project avoids future costs to be incurred by GAWB in augmenting its water supply (i.e. Stage 1 Rookwood Weir). As set out in Section 13.3.6.1, the total cost of constructing, operating and maintaining Stage 1 Rookwood Weir under the Base Case, assuming the weir is to be constructed in 2036 and 2037 (with preparatory works to be undertaken in 2035) to be in operation from 2037, is estimated at \$76.15 million (in PV terms). This cost is avoided, and is hence an economic benefit, under Reference Project.



In addition to the avoidance of future augmentation costs, GAWB will also derive a benefit in relation to the provision of certainty associated with securing a second supply source as a result of the development of the Reference Project.

13.4.1.2 Avoided cost of maintaining state approvals and EIS

As discussed in Section 13.3.6.2, under the Base Case, costs will need to be incurred in maintaining state approvals and the EIS for the project. These costs are estimated at \$7.42 million (in PV terms). The avoidance of these costs under the Reference Project options represents an economic benefit attributable to the project.

13.4.1.3 Avoided Rockhampton water restrictions

As per Section 13.3.1, severe water restrictions are likely to be necessary if RRC is to maintain sufficient buffer supply to ensure reliable water supply to urban water users supplied by the Rockhampton reticulation network (i.e. water users in the Rockhampton WSS and in the Livingstone/Capricorn Coast region)¹¹⁷.

The development of the Reference Project will increase the volume of usable storage capacity available in the Lower Fitzroy region. Hence, in the event there is a fall in inflows into the Fitzroy Barrage, RRC will be able to source additional volumes of water from holders of allocations (or alternately defined water rights) from Rookwood Weir, rather than imposing severe water restrictions on water users (recognising that this may create an opportunity cost from the loss of water to other uses at the time). On this basis, the need to impose severe water restrictions, and the associated costs, will be avoided under the Reference Project option. This constitutes an economic benefit attributable to the Reference Project.

However, this benefit can only be attributed to the Reference Project option until the development of Stage 1 Rookwood Weir by GAWB under the Base Case (assumed to be completed by 2037). As previously discussed, the construction of this weir will make an additional 20,000 ML of high priority water allocations available in the Lower Fitzroy region (in addition to the allocations to GAWB and LSC). This would be sufficient to enable RRC to access the necessary volume of allocations to avoid having to implement severe restrictions during periods of low supply. Hence, this benefit is only attributed to the Reference Project from the completion of the Reference Project from 2022-2037 (the year in which Stage 1 Rookwood Weir is operational under the Base Case).

The subsequent PV estimate for the benefit of avoiding the economic cost associated with the imposition of severe water restrictions on urban water users supplied by the Rockhampton reticulation network from 2022-2037 is \$3.55 million.

13.4.1.4 Avoidance of the cost of emergency supply measures

The water supply security risk to which the Lower Fitzroy region is exposed under the Base Case, and the potential implications in relation to the need to implement emergency supply measures in the event of a 'failed' wet season, are discussed in detail in Section 13.3.6.8. As with water restrictions, by increasing the usable storage volume in the Lower Fitzroy region, the Reference Project will remove the risk of having to implement emergency supply measures.

¹¹⁷ This benefit does not apply to water users supplied by GAWB as GAWB's arrangements in relation to water restrictions and the timing of supply augmentations are set out in its DMP and CSS. These arrangements indicate that GAWB's customers will be subject to the same water restrictions under the Base Case and the Reference Project options.



As discussed above, the cost associated with the emergency supply measures has not been included in the economic analysis due to the considerable uncertainty regarding the logistical arrangements, cost, and feasibility of the identified solution (i.e. trucking water from Awoonga Dam to Rockhampton).

13.4.1.5 Increased agricultural production

As noted above, Reference Project will make 42,000 ML of high priority water available for use in the Lower Fitzroy region (in addition to the volumes allocated to GAWB and LSC). It is anticipated that the primary use of this water would be for agricultural production.

Several past studies have identified the Lower Fitzroy region as an area of potential growth in agricultural production, particularly within the Fitzroy Agricultural Corridor. Key activities identified in these studies include:

- intensive livestock production and feedlots
- horticulture crops
- macadamia nuts
- other crops, including sandalwood plantations and broadacre crops.

In addition, a crop mapping exercise recently conducted by the DAF identified a range of additional crops suitable for production in the Lower Fitzroy region, including grapes, peanuts, wheat, sorghum, soybeans and citrus.

13.4.1.5.1 Assessment of agricultural water demand

A demand analysis was undertaken for the proposed Rookwood Weir. The demand analysis includes several observations in relation to the potential for the expansion of agricultural production in the Lower Fitzroy region:

- the region has a good soil resource base and rainfall profile, making it productive agricultural land, with crops able to be planted in any month of the year
- the Lower Fitzroy region offers suitable conditions compared to other regions with the potential to facilitate increased agricultural production
- the region is in close proximity to fast growing markets in South East Asia in addition to growing domestic markets in South East Queensland
- the region has good access to support industries and services in Rockhampton, including retail, transport, health and education, in addition to a network of regional towns and communities that supply social support and experienced and skilled labour resources necessary to facilitate an expansion in agricultural production in the region.

A two-stage process was undertaken to assess the level of demand for water allocations to be made available from the proposed Rookwood Weir:

- Phase 1 – regional workshop and direct engagement with identified parties including a public RFI process.
- Phase 2 – additional RFI process, in which identified parties were provided with indicative information on pricing and terms and conditions of supply.

The outcomes from Phase 2 of this demand analysis have been used to quantify the economic benefits from the use of water for agricultural production in the Lower Fitzroy region. The sources of demand identified in this assessment are detailed below.



Irrigated crop production

10,400 ML of high priority allocations for irrigated cropping, to be taken up within two years, with the potential for additional demand of up to 20,800 ML within another five years (subject to market conditions and other factors).

This equates to a total potential demand of 31,200 ML of high priority allocations. Crops to be produced with these allocations include lucerne, cereal, and forage grass, to be used as feed for livestock production.

Macadamia nuts

12,000 ML of medium priority allocations for macadamia nut production. Macadamia nut production is well-suited to the mosaic landscapes of the Lower Fitzroy region. Macadamia nuts are a growing industry with exports from Australia growing strongly in recent years, particularly in the Asian region. For example, since the signing of the Free Trade Agreement (FTA) with Korea, exports of macadamias to Korea have increased by 150 per cent. In 2016, the Australian macadamia crop recorded growth of 8 per cent compared to 2015.¹¹⁸

Feedlot operation

1,500 ML of medium priority allocations for feedlot operations, which could be developed within two years. The majority of water use in a feedlot operation is for the production of fodder crops. It is therefore considered that this water would primarily be used in the production of similar crops as identified in the above section on irrigated crop production.

Summary of Phase 2 agricultural demand

In summary, the demand analysis identified the following application of water from the Reference Project for agricultural production in the Lower Fitzroy region:

- 10,400 ML for the production of irrigated fodder crops from 2022¹¹⁹, including lucerne, cereal and forage grass, increasing to 31,200 ML over the subsequent five-year period.
- 12,000 ML for the production of macadamia nuts from 2022. It has been assumed that allocations would be taken up progressively over a five-year period¹²⁰.
- 1,500 ML for irrigated crop production to supply a feedlot operation from 2022.

'Best estimate' of agricultural demand

Based on the demand study a 'best estimate' for agricultural demand was developed. This 'best estimate' is the central case upon which the CBA of the Reference Project options has been conducted, including the quantification of the economic benefits to be derived from the use of water for agricultural production in the Lower Fitzroy region (with alternative demand estimates applied as sensitivities). An annual growth rate of 1.5 per cent per annum has been applied to the 'best estimate' projection over the study period.¹²¹

¹¹⁸ Australian Macadamia Society, Media Release; 7 December 2016.

¹¹⁹ For the initial 10,400 ML, a two-year take-up period has been assumed.

¹²⁰ Based on typical production practices for producers of nuts and other tree crops.

¹²¹ This growth rate was applied based on an assessment of incremental growth rates in developed irrigation areas in Queensland.



Under this 'best estimate', agricultural water demand was limited to 10,400 ML for the production of fodder crops and 3,000 ML to support a feedlot operation (i.e. crop production for livestock feed)¹²².

Economic benefits attributable to the increased value of agricultural production were also quantified for a range of scenarios ranging from 'no agricultural uptake' to 'full agricultural uptake'. The results under these scenarios are set out in Section 13.5.1.

The economic benefits from the production of irrigated fodder crops has been estimated based on the production of lucerne, a widely-grown fodder crop specifically identified in the demand analysis. The crop would be grown to supply cattle producers and feedlot operators in central Queensland. It is acknowledged that the fodder mix required by feedlot operators must include a mix of grains and that lucerne cannot be relied upon to finish cattle in isolation. For this analysis, it has been assumed that feedlot operators in the region will have access to sufficient tonnages of alternate fodder crops and that as a result, the producer of the irrigated fodder crops would be able to produce and supply lucerne to the market without needing to rotate crops. However, should the producer need to adopt a crop rotation system (i.e. alternate production with lower value fodder crops), the net return per ML and hence economic benefits from the application of water from the proposed Rookwood Weir would be lower than has been estimated in this analysis.

13.4.1.5.2 Economic value of production

The use of water from the Reference Project for agricultural production in the Lower Fitzroy region will generate additional economic value from the use of land in the region. The economic benefit from this activity is the economic value, on a per ML basis, derived from the use of the water for the production of the identified crops.

The benefits associated with the use of water for agricultural production in the Lower Fitzroy region have been estimated by developing detailed models of the value of production to be derived from the identified agricultural applications and the costs associated with production. This enables robust estimates to be derived for the net economic value (i.e. gross value of production less all costs incurred, including the opportunity cost of land) that is to be derived from the use of water for agricultural production¹²³.

The process applied to calculate the economic benefit to be derived from each identified agricultural application is as follows:

- Estimating the area of production for each crop, estimated based on the volume of water to be used for production of the crop and the irrigation application rate (i.e. ML per ha) for that crop (e.g. at an irrigation application rate of 4 ML per ha, annual demand of 1,500 ML equates to 375 ha of crop production).
- Estimate the revenue per hectare to be derived from the production of the crop, based on estimates for the crop yield (i.e. tonnes per hectare) and crop price received by producers.
- Subtract the following from the estimated revenue per hectare:
 - total growing costs, including pre-harvest, irrigation, harvest and post-harvest costs
 - annual administration costs
 - annualised cost of capital equipment

¹²² An alternative approach to estimating the economic benefits derived from agricultural production would be to estimate the change in Industry Value Added (IVA) attributable to the project. IVA is the value of goods and services produced by an industry, after deducting the cost of goods and services used in the process of production.

¹²³ Ibid



- annualised crop establishment costs
- an allowance for the opportunity cost of land (being the economic value that would have been derived from the use of the land for grazing activity).

This provides an estimate for the net return per ha from the production of the crop. Dividing this estimate by the irrigation application rate results in the net return per ML. This represents the economic benefit attributable to the use of water from the weir for this purpose.

In order to derive an estimate for the economic benefit from agricultural production in PV terms, it is necessary to take into account the period of uptake of water for different uses. The following timings have been applied for the uptake of water allocations for the different crops under the 'best estimate' demand scenario:

- For irrigated fodder crops, a two-year take up period of 10,400 ML (commencing 2022) as identified in the demand analysis, with subsequent growth of 1.5 per cent per annum.
- No take up of water for macadamia nut production (demand related to macadamia nut production has been included in the demand scenarios modelled in Section 13.5.1).

For feedlot operations, the take up of 3,000 ML over a two-year period (commencing 2022), with subsequent growth of 1.5 per cent per annum.



The key results for the crops are summarised in Table 13-2.

Table 13-2 Economic benefits from agricultural production under Reference Project

PARAMETER	IRRIGATED FODDER CROPS	MACADAMIA NUTS	CROPS FOR FEEDLOT OPERATION
Total water demand	10,400 ML (plus 1.5% p.a.)	Nil	3,000 ML (plus 1.5% p.a.)
Irrigation application rate	4 ML per ha	4 ML per hectare	4 ML per ha
Total area of production	2,600 ha	Nil	750 ha
Total economic benefits (PV terms)	\$118.35m	Nil	\$6.44m

Based on these inputs, the total economic benefit estimated in relation to the increase in agricultural production in the Lower Fitzroy region under Reference Project (applying the ‘best estimate’ projections) is \$124.79 million (in PV terms).

The construction of a 54,000 ML Rookwood Weir would provide up to 20,000 ML of water allocations available for irrigated agricultural production in the Lower Fitzroy region (with GAWB and LSC taking the other 34,000 ML). The total economic value to be derived from this increased agricultural production is estimated at \$22.11 million (PV terms). Hence, the economic benefit from increased agricultural production attributable to Reference Project is estimated at \$86.87 million in PV terms (i.e. \$124.79 million attributable to the Reference Project less \$37.92 million attributable to the Base Case).

13.4.1.6 Productivity improvements from increased road access

In addition to the construction of Rookwood Weir, the Reference Project is to involve upgrade works to several regional roads and a bridge. As identified in Chapter 9, there are three major crossings of the Fitzroy River that are used by landholders in the project study area:

- Riverslea Crossing – the primary and only gazetted river crossing in the Gogango area, providing the only public road access to several properties. Approximately 30 to 35 people use this crossing to access services in Rockhampton. When this crossing is inundated, landholders and residents are reliant on boat transport to cross the river.
- Foleyvale Crossing – the only access to Duaringa for properties located north of the Mackenzie River. At least 5 properties with several families use the crossing. The only viable alternative is boat transportation.
- Glenroy Crossing – the primary crossing used by people living west of the Fitzroy River in the Morenish area to travel to and from Rockhampton¹²⁴.

The landholder survey conducted as part of the SIE (see chapter 14) identified that all residents impacted by changes to these river crossings travel to Rockhampton to access services, with frequency of travel ranging from one trip per week to one trip per day. The crossings provide the only direct access to Rockhampton for many residents.

Current access and river crossing flood immunity in the project study area is poor, with many roads and all river crossings becoming inaccessible for some time during the wet season. This constrains landholders’

¹²⁴ As identified in the SIE chapter, there are also several private crossings and internal property crossings, however these appear to be rarely used and function mostly as ‘opportunistic’ crossings when river levels permit.



ability to access services in Rockhampton in addition to constraining the movement of people, machinery and stock throughout the region.

The Reference Project include the upgrade of several roads and a bridge in the project study area. This will improve the flood immunity of major roads and river crossings, resulting in improved connectivity and access for landholders, particularly those requiring regular access to Rockhampton.

This improved access and connectivity will result in productivity benefits for residents and businesses impacted by the road and bridge upgrades, through:

- Travel time savings for landholders having to access services in Rockhampton during periods in which roads and river crossings would have been inundated under the Base Case
- Increased productivity resulting from the removal of constraints on the movement of stock, machinery and people during the wet season.

While the road and bridge upgrade works will result in time savings and productivity improvements for landholders that are reliant on the regional roads and river crossings to both access services in Rockhampton and transport stock and machinery throughout the region, the relatively small number of landholders that will be affected by the upgrade works (i.e. the most significant upgrade works are to be undertaken on the Riverslea Crossing, which is only used by 30 to 35 people) means that this benefit is unlikely to be material. As such, the consideration of this benefit in the economic analysis of the Reference Project has been limited to a qualitative assessment, noting that these benefits should be taken into consideration in assessing the total economic benefits to be derived from the Reference Project.

13.4.1.7 Removal of uncertainty for landholders

The development of water storage infrastructure on the Lower Fitzroy River in the vicinity of the Rookwood Crossing has been under investigation for over 20 years. Investigations undertaken as part of the SIE (see Chapter 14) identified that the uncertainty associated with the project, including with regards to the timing of the project, has caused anxiety for the landholders that would be affected. In addition to adversely affecting landholders' ability to plan for the future, this uncertainty has the potential to negatively impact property values within the project study area.

Under the Reference Project options, the uncertainty associated with the timing of the project will be removed, as affected landholders will be appropriately compensated for the costs imposed as a result of the construction of Rookwood Weir. Under the Base Case, this uncertainty will persist as the timing of the construction of the weir will remain unclear (i.e. timing of construction will be subject to changes in GAWB's water supply-demand balance).

While the removal of this uncertainty will be beneficial to the affected landholders, the relatively small number of landholders to be affected by the project (estimated at 33 landholders across 50 lots under Reference Project) and the difficulty associated with quantifying the benefit associated with the removal of this uncertainty has limited the consideration of this benefit in the economic analysis to a qualitative assessment.



13.4.1.8 Summary of economic benefits

Table 13-3 summarises the economic benefits, relative to the Base Case, under Reference Project.

Table 13-3 Summary of economic benefits under the Reference Project

ECONOMIC BENEFIT	DESCRIPTION	PRESENT VALUE ESTIMATE
Avoidance of GAWB's augmentation	Avoidance of the need for GAWB to develop water storage infrastructure on the Lower Fitzroy River to access water via the Gladstone-Fitzroy Pipeline	\$76.15m
Avoidance of state approval and EIS costs	Avoidance of the need to incur costs associated with maintaining state approvals and the EIS for the project	\$7.42m
Avoidance of severe water restrictions	Avoidance of the need for RRC to impose severe water restrictions on water users supplied by the Rockhampton reticulation network to maintain sufficient supply reliability	\$3.55m
Avoidance of emergency supply measures	Avoidance of the costs incurred in emergency supply measures required in the event of a 'failed' wet season	Unquantified due to uncertainty (indicative estimate of \$40.81m)
Increased agricultural production	Economic value derived from the use of water for irrigated crop and macadamia nut production (less the economic value derived from increased production of these crops under the Base Case)	\$86.87m
Improved productivity from road and bridge upgrades	Increased productivity and time savings for landholders attributable to the removal of constraints on the movement of people, stock and machinery due to poor flood immunity of roads and river crossings in the region	Qualitative assessment (relatively small number of landholders impacted)
Removal of uncertainty for affected landholders	Removal of the anxiety to landholders attributable to the uncertainty associated with the development of water storage infrastructure on the Lower Fitzroy River	Qualitative assessment (relatively small number of landholders impacted)
Total economic benefits		\$173.99m

13.4.2 Economic costs

This section sets out the economic costs to be incurred under Reference Project, which include:

- the capital cost of constructing the weir
- the costs incurred in operating and maintaining the weir and associated infrastructure
- the costs associated with disruptions to affected landholders
- the costs associated with amenity, noise and dust impacts during the project construction phase
- the cost of mitigating adverse water quality impacts from the use of the water for agricultural production.



13.4.2.1 Capital costs

Significant capital expenditure is required to develop the Reference Project. Based on estimates provided by the joint project proponents, the capital cost of developing a weir with an annual yield of 76,000 ML is estimated at \$306.02 million (2017 dollars). This results in the capital cost under Reference Project of \$255.81 million (in PV terms).

13.4.2.2 Operating and maintenance costs

The ongoing costs associated with maintaining and operating the weir and associated infrastructure also constitute an economic cost under the Reference Project option. Based on estimates provided by the joint project proponents, the annual operating and maintenance costs associated with the weir and associated infrastructure range from \$1.29 million to \$2.03 million (2017 dollars) over the study period. The total cost of operating and maintaining the weir under Reference Project is estimated at \$14.68 million (in PV terms).¹²⁵

13.4.2.3 Disruptions to operations of affected landholders

The development of Rookwood Weir will directly impact 33 landholders across 50 lots (see chapter 9). The Reference Project is expected to impose the following disruptions on these landholders:

- Activities to be undertaken on land owned by the affected landholders during the planning and construction phases will adversely impact on productivity and take up landholders' personal time.
- Potential for expansion of noxious weeds during the planning and construction phase of the project, imposing increased pest management costs on landholders.
- Temporary or permanent loss of small parts of land holdings and disruptions to access routes, which may have a negative impact on the productivity of affected landholders.
- Risk of disturbances to cattle and grazing activities as a result of an increase in heavy vehicle traffic.
- A small number of lots are to be impacted by upgrades to river crossings during the construction phase.

In addition to the above disruptions, it is estimated that 58 landholders are to lose a portion of their properties due to impoundment (see chapter 14). The actual extent of this loss of land is to be determined through in-field survey work, with compensation for actual losses to be negotiated individually with landholders.

While it is important to acknowledge these disruptions, the SIE notes that the duration and physical impact of disturbances are likely to be low and impact a limited number of individuals (see chapter 14). In addition to this, measures to mitigate impacts on affected landholders have been included in the project protocols¹²⁶ and the costs associated with these measures, including compensation to be paid to affected landholders, has been included in the project cost estimates derived by the project proponents.

It is therefore not necessary for the economic analysis to include any additional costs to account for the disruptions to affected landholders, including loss of land due to impoundment and flooding. The project costs also allow for mitigation measures to prevent the spread of noxious weeds on properties within the project study area.

¹²⁵ As noted in Section 13.3.3, the Base Case includes the development of Stage 1 Rookwood Weir by GAWB by 2037. The operating and maintenance costs associated with this augmentation have been included in the cash flows for the Base Case. This estimate includes a terminal value calculated based on future operating and maintenance expenditure incurred in relation to the weir.

¹²⁶ For example, weed and pest management measures have been included in the land access protocols for the project.



13.4.2.4 Amenity, noise, dust and access issues during construction

The SIE also identified the potential for noise, dust and amenity impacts to negatively affect landholders within the Project study area and along major access routes during the construction phase. It is anticipated that traffic on these access routes will increase by 32 heavy and 20-30 light vehicles per day during the construction phase (see Chapter 14).

As with the disturbances to be caused to affected landholders, measures have been included in environmental and road use management plans to mitigate these impacts. Furthermore, compensation paid to affected landholders will include consideration for adverse amenity, noise, dust and access issues during the construction phase. As stated above, the cost of this compensation has been included in the Project proponents' cost estimates. As a result, it is not necessary for the economic analysis to include any additional costs to account for these impacts¹²⁷.

13.4.2.5 Cost of mitigating adverse water quality impacts

The use of water for more intensive agricultural production in the Lower Fitzroy region (see section 13.4.1.4) has the potential to impact on water quality levels flowing into the GBR. Specifically, there is the potential for the increase in intensive agricultural production to result in increased runoff, increased sediment levels and herbicide losses, which have the potential to adversely impact on water quality in the GBR. To the extent that these adverse impacts materialise, or additional measures are required to mitigate these impacts, this will represent an additional economic cost.

The Coordinator-General's report on the EIS for the Reference Project recommended several controls to mitigate the potential impact on water quality levels. The Coordinator-General was satisfied that the measures identified, in addition to other commitments made by the Project proponents, will sufficiently mitigate the impact of the use of water from the Reference Project on water quality levels in the GBR. This included sediment modelling and requiring potential customers to sign on to an industry code of practice.

However, it is important to note that sediment loads in the Fitzroy region are already above the Commonwealth and state targets. Noting this, there is the potential that the increased intensity of agricultural production in the Lower Fitzroy region under the Reference Project options may result in adverse water quality impacts that could require abatement costs to be incurred. The box below sets out an indicative estimate for these abatement costs.

While acknowledging that water quality abatement costs associated with more intensive crop production in the Lower Fitzroy region under the Reference Project could be higher than estimated above, given the uncertainty associated with the magnitude and timing of these impacts, and the Coordinator-General's satisfaction that the proposed control measures will be sufficient to alleviate potential water quality impacts, the indicative cost estimate set out in the box above have not been included in the base results for the economic analysis.

¹²⁷ There are also potential adverse road safety and maintenance cost impacts related to the increased use of access roads during the construction phase of the Project, however these impacts are not considered sufficiently material to warrant consideration in the economic analysis due to the relatively small increase in traffic levels as a result of the Project.



13.4.2.6 Summary of economic costs

Table 13-4 summarises the economic costs, relative to the Base Case, under Reference Project.

Table 13-4 Summary of economic costs under Reference Project

ECONOMIC COST	DESCRIPTION	PRESENT VALUE ESTIMATE
Capital cost	Capital costs incurred in the development of the 76,000 ML per annum Rookwood Weir and associated infrastructure	\$255.81m
Operating and maintenance costs	Costs incurred in operating and maintaining the weir and associated infrastructure	\$14.68m
Disruptions to operations of affected landholders	Disruptions to affected landholders during the planning and construction phases, including loss of a portion of landholdings or access to land	NA (costs included in Project cost estimates)
Amenity, noise, dust and access impacts	Adverse impacts on landholders within the Project study area and along major access routes as a result of amenity, noise and dust impacts during the construction phase	NA (costs included in Project cost estimates)
Cost of mitigating adverse water quality impacts	Costs incurred in mitigating adverse water quality outcomes associated with the use of water for irrigated agricultural production	Qualitative (costs uncertain and unlikely to be material)
Total economic costs		\$270.49 million



13.5 Results

This Section presents the results of the economic analysis of the Reference Project against the Base Case. Options.

The PV estimates for the economic costs and benefits, which have been derived based on the 'best estimate' for agricultural demand incorporating a 1.5 per cent annual growth rate, and the relevant economic impacts under the Base Case, are summarised in Table 13-5.

Table 13-5 Summary of results of economic analysis (P90)

ITEM	PRESENT VALUE ESTIMATES		
	4%	7%	10%
Project Benefits			
Avoidance of GAWB's augmentation costs	\$137.67m	\$76.15m	\$44.01m
Avoidance of state approval and EIS costs	\$9.73m	\$7.42m	\$5.73m
Avoidance of severe water restrictions	\$4.99m	\$3.55m	\$2.59m
Avoidance of emergency supply measures	Qual. (indic. est. \$57.19m)	Qual. (indic. est. \$40.81m)	Qual. (indic. est. \$29.87m)
Increased agricultural production	\$144.20m	\$86.87m	\$58.39m
Increased productivity from increased connectivity	Qual.	Qual.	Qual.
Removal of uncertainty for affected landholders	Qual.	Qual.	Qual.
Total benefits	\$296.60m	\$173.99m	\$110.73m
Project costs			
Capital costs	\$275.67m	\$255.81m	\$238.06m
Operating and maintenance costs	\$28.65m	\$14.68m	\$9.25m
Disruptions to operations of affected landholders	Qual.	Qual.	Qual.
Amenity, noise, dust and access impacts	Qual.	Qual.	Qual.
Costs of mitigating adverse water quality impacts	Qual. (indic. Est. \$13.9m)	Qual. (indic. est. \$12.61m)	Qual. (indic. est. \$11.19m)
Total costs	\$304.32m	\$270.49m	\$247.31m
Net Present Value	(\$47.72m)	(\$96.50m)	(\$136.58m)
Benefit Cost Ratio	1.0	0.6	0.5
Risk-adjusted results (including cost of emergency supply measures)			
Net Present Value	(\$49.47m)	(\$55.69m)	(\$106.71m)
Benefit Cost Ratio	1.2	0.8	0.6



The above table shows that the only scenario under which Reference Project results in a positive NPV is with a discount rate of 4 per cent when the benefit associated with the avoidance of the cost of emergency water supply measures for Rockhampton are considered.

At the base discount rate of 7 and 10 per cent, the Reference Project has a negative NPV (even when the benefit associated with the avoidance of emergency supply measures is considered). Approximately half of the total benefits estimated for the Reference Project is attributable to increased agricultural production, with the avoidance of augmentation costs to be incurred by GAWB under the Base Case the other key benefit. The economic cost of the Reference Project is primarily attributable to the capital cost of constructing the weir.

The P50 results for the economic appraisal are provided in Table 13-6.

Table 13-6 Summary of results of economic analysis (P50)

ITEM	PRESENT VALUE ESTIMATES		
	4%	7%	10%
Project Benefits			
Avoidance of GAWB's augmentation costs	\$137.67m	\$76.15m	\$44.01m
Avoidance of state approval and EIS costs	\$9.73m	\$7.42m	\$5.73m
Avoidance of severe water restrictions	\$4.99m	\$3.55m	\$2.59m
Avoidance of emergency supply measures	Qual. (indic. est. \$57.19m)	Qual. (indic. est. \$40.81m)	Qual. (indic. est. \$29.87m)
Increased agricultural production	\$144.20m	\$86.87m	\$58.39m
Total benefits	\$296.60m	\$173.99m	\$110.73m
Project costs			
Capital costs	\$262.46m	\$243.56m	\$226.68m
Operating and maintenance costs	\$27.36m	\$14.01m	\$8.83m
Costs of mitigating adverse water quality impacts	Qual. (indic. Est. \$13.9m)	Qual. (indic. est. \$12.61m)	Qual. (indic. est. \$11.19m)
Total costs	\$289.82m	\$257.58m	\$235.51m
Net Present Value	\$6.78m	(\$83.58m)	(\$124.78m)
Benefit Cost Ratio	1.0	0.7	0.5
Risk-adjusted results (including cost of emergency supply measures)			
Net Present Value	\$63.97	(\$42.77m)	(\$94.91m)
Benefit Cost Ratio	1.2	0.8	0.6



13.5.1 Sensitivity and scenario analysis

This section details the sensitivity analysis performed on key parameters and scenarios against which the net economic impact of the two Reference Project options was assessed.

13.5.1.1 Sensitivity analysis

Sensitivity analysis shows how the results of the analysis are affected by changes to key parameters and assumptions. This provides policy makers with an indication of the level of certainty associated with the modelled results in addition to identifying critical parameters and assumptions in terms of the impact on the net economic impact of the Reference Project.

Parameters were identified for inclusion in the sensitivity analysis based on their significance in relation to the results of the CBA (i.e. the NPV and BCR estimates for the two Reference Project options) and the level of uncertainty associated with the parameter estimates.

The following parameters have been subject to sensitivity analysis:

- discount rate (results shown in Table 13-5)
- capital cost of the Reference Project
- economic cost of severe water restrictions (i.e. economic cost per household per annum)
- economic value of irrigated agricultural production (i.e. economic value per ML).¹²⁸

Table 13-7 sets out the results from the sensitivity analysis. The sensitivity analysis was conducted based on the NPVs estimated using the 'best estimate' demand scenario (and excluding the benefits associated with the avoidance of emergency supply measures).

Table 13-7 Results of sensitivity analysis

PARAMETER	REFERENCE PROJECT NPV (% change)
Base Net Present Value	(\$96.50m)
CAPITAL COST	
High (+20%)	(\$133.38m) (-38.2%)
Low (-20%)	(\$59.62m) (+38.2%)
ECONOMIC COST OF SEVERE WATER RESTRICTIONS	
High (+50%)	(\$94.72m) (+1.8%)
Low (-50%)	(\$98.27m) (-1.8%)
ECONOMIC VALUE OF AGRICULTURAL PRODUCTION	
High (+50%)	(\$34.10m) (+64.7%)
Low (-50%)	(\$158.89m) (-64.7%)

¹²⁸ Note the results summary table presents the NPV and BCRs for both Reference Project options at discount rates of 4, 7 and 10 per cent. It is therefore not necessary to include this parameter in the sensitivity analysis.



The key outcomes from the sensitivity analysis are as follows:

- the NPV of the Reference Project is highly sensitive to the discount rate
- the results of the economic analysis are also highly sensitive to the economic value derived from agricultural production. For example, under the scenario in which the value derived from agricultural production resulting from the Project is increased by 50 per cent, the NPV estimate increases by approximately 64.7 per cent for Reference Project
- the NPV of the Reference Project remains negative under all sensitivities tested (taking into account the assumptions based on which the base NPV and BCR estimates were derived, in particular the demand scenario adopted)
- the capital cost of the Project also has a significant impact on the NPV.

13.5.1.2 Scenario analysis

Scenario analysis is used to assess the impact of changes to parameters or assumptions beyond changing single parameter estimates. This enables an assessment of the impact of changes in multiple parameters or the timing of events on the net economic impact of the Reference Project. For this analysis, two key factors were identified for scenario analysis due to their significance to the analysis and the level of uncertainty associated with the base parameters applied in the economic modelling:

- The timing of GAWB's augmentation requirement under the Base Case – the timing of GAWB's augmentation requirement (to involve construction of a 54,000 ML weir on the Lower Fitzroy River) under the Base Case is highly uncertain, largely due to the unpredictable nature of GAWB's future demand.
- The up-take of water for agricultural production in the Lower Fitzroy region – there is uncertainty in terms of the level of demand for agricultural water use related to the Project¹²⁹. To address this uncertainty, a range of scenarios for agricultural water demand have been modelled.

In relation to the timing of GAWB's augmentation requirement under the Base Case, the following scenarios were modelled:

- augmentation to be completed by 2028¹³⁰
- augmentation to be completed by 2046
- no augmentation required over the study period.

The results of the scenario analysis are presented in Table 13-8.

¹²⁹ The primary source of this uncertainty is that the uses identified in the demand analysis are typically crops that require access to medium reliability water (as opposed to high reliability), however there are lower reliability water resources currently available (albeit mostly non-supplemented) in the Lower Fitzroy region currently that are not being used for agricultural production.

¹³⁰ This is consistent with the results from GAWB's stochastic modelling undertaken as part of the development of its 2013 Strategic Water Plan.



Table 13-8 Results of scenario analysis

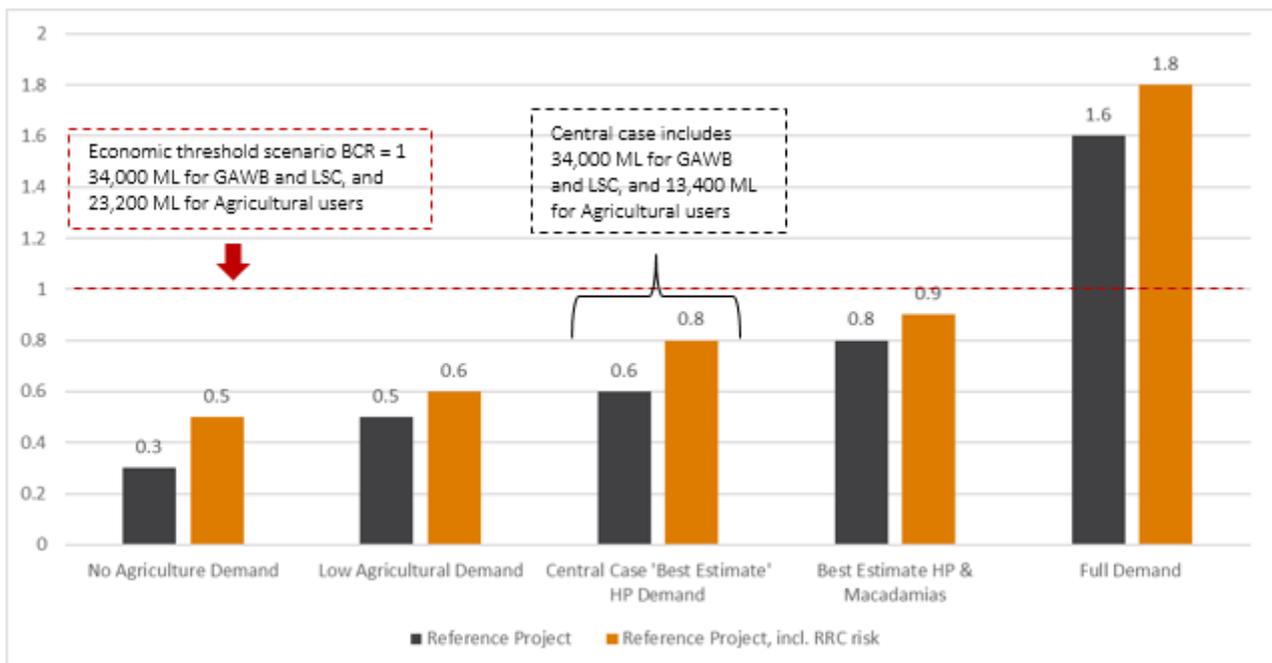
PARAMETER	REFERENCE PROJECT NPV / BCR
Central Case	(\$88.62m) / BCR of 0.66
2028 augmentation completion	(\$68.88m) / BCR of 0.74
2046 augmentation completion	(\$92.68m) / BCR of 0.65
No augmentation required	(\$120.69m) / BCR of 0.54

In relation to the take-up of water for agricultural production, the following scenarios were modelled:

- No take-up of water for agricultural production.
- Low agricultural demand, 50 per cent of the central case ‘Best Estimate’ high priority demand.
- ‘Best estimate’ demand scenario (with 1.5 per cent annual growth rate) plus demand for macadamia nut production, increasing from 2,400 ML to 12,000 ML over a five-year take-up period (with subsequent growth at 1.5 per cent per annum).
- Full take-up demand – 3,000 ML to support feedlot operations with a two-year take-up period and 39,000 ML for irrigated fodder crop production, also with a two-year take-up period.

Figure 13-1 presents the expected BCRs under each of these different agricultural demand scenarios, in addition to the central case, and presents the results with and without the inclusion of the forgone risk exposure related to Rockhampton’s water supply (refer Section 13.3.1).

Figure 13-1 BCRs under various demand scenario





The results of the scenario analysis again emphasise the importance of the take-up of water allocations for agricultural production to the economic feasibility of the Reference Project. The BCRs generated across the agricultural demand scenarios modelled range from 0.3 (no agricultural take-up) to 1.6 (full take-up), alternatively from 0.5 to 1.8 where Rockhampton's risk exposure is recognised.

As the BCR of the no agriculture demand scenario is 0.3, this suggests that the volume of water supporting productive agricultural development is the primary driver of economic benefits from the Project.

The scenario analysis also included consideration of an 'economic' threshold scenario, i.e. a demand scenario that would result in a BCR of one. To achieve this, assuming an agricultural development mix proportionally equivalent to the 'Best Estimate plus Macadamias' scenario, 23,200 ML per annum is required.

While not as significant, the NPV of the Reference Project is also materially affected by changes in the timing of GAWB's need for supply augmentation under the Base Case. Under the scenario in which the timing of the augmentation is brought forward to a completion date of 2028, the BCR of the Reference Project increases to 0.7. This is attributable to an increase in the economic benefit associated with the avoidance of capital expenditure that GAWB will be required to incur in the future under the Base Case. Conversely, if the augmentation is delayed until 2046, the BCR declines. The effect is further highlighted by the modelling of the scenario in which the augmentation is not required under the Base Case for the duration of the study period. This removes the economic benefit associated with the avoidance of future augmentation costs, which results in a reduction to the Reference Project BCRs¹³¹.

13.5.2 Summary of cost-benefit analysis

The key conclusions to be drawn from the CBA are as follows:

- Under the base demand scenario (i.e. 'best estimate' with a 1.5 per cent annual growth rate), the Reference Project has a negative NPV and a BCR below 1 at a real discount rate of 7 per cent. The key benefit is the increased value of agricultural production (accounting for almost 50 per cent of quantified benefits), with the avoidance of GAWB's augmentation costs under the Base Case the other key benefit.
- The results are highly sensitive to the benefits of increased agricultural production and hence the assumptions applied with respect to agricultural demand. The BCRs calculated for the Reference Project across several agricultural demand scenarios ranged from 0.3 to 1.6.
- In addition to the quantified benefits and costs, it is also important to consider those impacts that have not been quantified, either due to uncertainty or a lack of materiality. The most significant unquantified impact is the avoidance of the cost associated with the need to implement emergency supply measures in the event of a 'failed' wet season. Incorporating this benefit into the calculation of the results increases the BCR (under the central case base demand scenarios) from 0.6 to 0.8.

¹³¹ It is important to note that the impact of these scenarios on the NPVs and BCRs for the two Reference Project options are sensitive to the agricultural demand assumptions and scenarios on which the modelling is based. If a more optimistic agricultural demand scenario is applied, the impact of bringing forward and delaying the timing of GAWB's augmentation under the Base Case is reduced as the effect is partially offset by the increase in the economic value of agricultural production under the Base Case (noting that augmentation under the Base Case will result in 20,000 ML of water allocations being made available for agricultural production).



14 SOCIAL IMPACT EVALUATION

CHAPTER SUMMARY AND CONCLUSIONS:

A SIA report was prepared in 2014 as part of the EIS for the LFRIP, undertaken in accordance with a set of Terms of Reference issued by the Queensland Government Coordinator-General.

With mitigation in place, negative planning phase impacts associated with the uncertainty among landholders regarding the project and potential impacts on lifestyle and productivity are assessed as having a low residual risk.

Positive impacts during construction will arise from increased employment and business opportunities. Negative social impacts may arise as a result of impacts on property and productivity; lifestyle and amenity and social infrastructure. Traffic safety and management is also a key issue for stakeholders. With mitigation measures adopted, residual risks associated with the construction phase are assessed as negligible to low.

Positive operational phase impacts are associated with improved water security and road network function. Negative productivity and property impacts are predicted at low to negligible levels where mitigation measures are implemented.

Management plans and strategies developed for the Reference Project to manage negative and enhance positive social impacts include: Stakeholder Engagement Plan; Land Acquisition Strategy; Compensation Strategy; Land Access Protocol; Weed and Pest Management Plan; Traffic Management Plan and Road Use Management Plan; Construction Management Plan; and Procurement Plan.

14.1 Purpose

A SIA report was prepared in 2014 as part of the EIS for the LFRIP. The SIA was undertaken in accordance with a set of Terms of Reference issued by the Queensland Government Coordinator-General.

The SIE (this chapter) is based on the outcomes of the SIA as undertaken for the EIS for the construction and operation of Rookwood Weir only as the Reference Project for the DBC. This chapter has been prepared to inform the development of the DBC to ensure that negative and positive social impacts are appropriately considered. This Chapter includes identification and evaluation of positive and negative social impacts that can be quantified and/or monetised and those that can only be considered qualitatively.

14.2 Methodology

This chapter is informed by the:

- LFRIP EIS SIA report (2014)
- LFRIP EIS Consultation Report (2015)
- LFRIP EIS Coordinator-General's evaluation report on the environmental impact statement (December 2016).



It should be noted that:

- demographic data presented in the SIE social baseline (Section 14.4), where available, has been updated with data from Census 2016
- information included in this chapter is sourced from the SIA report (2014), but only those impacts that are considered relevant to the current time (preparation of the DBC) have been described and assessed in Sections 14.5 and 14.6.

14.3 Social study area

The social study area (Table 14-1) identifies the social area of influence of the Reference Project.

Table 14-1 Social study area

STUDY AREA	INCLUSIONS
Local study area	<ul style="list-style-type: none"> ▪ Properties affected by the Project footprint including properties subject to inundation on both sides of the development site and upstream ▪ Properties associated with construction and upgrade of river crossings upstream (namely Riverslea and Foleyvale crossings) and downstream (Hanrahan Crossing)
Regional study area	<ul style="list-style-type: none"> ▪ Communities in the immediate vicinity of the Project which would be affected by Project impacts and which would provide resources for the Project such as workforce and social infrastructure. ▪ The RRC LGA (including LSC prior to de-amalgamation¹³²) and Rockhampton City as the key regional centre ▪ Central Highlands Regional Council (CHRC) LGA ▪ Parts of the WASC LGA
Wider area of influence	<ul style="list-style-type: none"> ▪ Communities more distant from the regional study area, but which may provide a broader context for the Project such as higher order social infrastructure services and source of labour and areas to which positive impacts would be extend, including Gladstone Regional Council LGA, LSC LGA and the State of Queensland.

14.4 Social baseline

To support a detailed understanding of the Project areas, the social baseline is developed for the local and regional study areas.

14.4.1 Local study area baseline

14.4.1.1 Number of landholders impacted

The proposed Rookwood Weir site area is located within the Fitzroy River on unallocated state land. Construction of the Rookwood Weir will directly impact properties on both sides of the development site and upstream. Inundation associated with Rookwood Weir will impact 33 properties across 50 lots. Operational releases may impact on properties (water entitlements) located downstream. As far as is possible, river crossings have been aligned to be located within existing road reserves. However, some land within two lots (either side of the river) will be impacted as result of upgrades proposed at Riverslea Crossing (on local RRC Riverslea/Rookwood Road) on the Fitzroy River and Foleyvale Crossing (on the Duaringa-Appis Creek Road, a DTMR state-controlled road) on the Mackenzie River. Upgrades proposed to the river crossing

¹³² On 10 March 2013 Livingstone residents voted to de-amalgamate Livingstone Shire from the RRC LGA. The new LSC LGA came into effect on 1 January 2014.



on local RRC Hanrahan Crossing/Road will impact on land within one lot to the west of the Fitzroy River at the crossing.

14.4.1.2 Characteristic of the landholdings and landholder households

The local study area consists predominantly of large, rural agricultural (cattle grazing) land holdings. Settlement in the area is sparse and scattered.

Most of the landholdings within the local study area are owner-operated. A few are managed by an employed property manager. In addition to working the property themselves, many of the landholders employ contractors on an occasional or seasonal basis. The main activity occurring on the properties is cattle breeding and/or fattening. There is also some crop cultivation, and a small number of landholders have irrigation licences. Further detail on land use is provided in the environmental impact assessment (Chapter 16).

The most common usage of the river by landholders is for stock watering and a small number also use the water for domestic purposes. Cattle generally access the water via hard stand areas (i.e. gravel banks) or via pump/trough systems. It is assumed, based on desktop analysis, that all the properties have some kind of infrastructure for watering cattle.

Landholdings comprise a mix of owner-occupied homesteads and non-resident landholders who reside elsewhere in the region, for example Rockhampton and Yeppoon and who travel regularly to their properties. There is a mix of household types throughout the local study area, with more family households with children, followed by family households with no children and a small number of single person households. Consistent with the population of the regional study area, the local study area also has a relatively high median age.

The landholder survey has indicated that most landholders have owned and lived at their properties for 'a very long time'. When asked how long they have lived on their properties typical answers were 'decades', 'a long time', or even 'a lifetime'. In addition, some of these landholders belong to families with ties to the land dating back to the late 19th century. There are only a few landholders who have recently purchased their properties or recently moved to manage the property.

14.4.1.3 Access to services and facilities

Except for basic infrastructure and services such as utilities, roads and watercourse crossings, police and a primary school, there are no community services or facilities available in the local study area. The roads and crossings over the Fitzroy, Mackenzie and Dawson Rivers are particularly important to the community, as they provide the only direct access to Rockhampton for residents. Residents in the local study area regularly travel to Rockhampton to access services.

The landholder survey indicated that all landholders travelled to Rockhampton to access services. The frequency of their travel varied, ranging from one trip per day to one or more trips per week. The Riverslea Crossing is the most commonly used crossing, providing the only gazetted river crossing of the Fitzroy River in the Gogango area. All landholders between Foleyvale Crossing (north of Duaringa) and Weir Park (an area immediately west of the proposed Rookwood Weir site) use Riverslea Crossing (via Rookwood Road and/or Riverslea Road) to get across the Fitzroy River. When the low-level causeway at Riverslea Crossing is inundated, landholders and residents use boats to cross the river. Foleyvale Crossing on the Duaringa-Appis Creek Road over the Mackenzie River and Boolburra Crossing on the Dawson River are the other most commonly used crossings further to the west.



It is noted that these ‘crossings are regularly cut by floods, with even the highest un-trafficable for several months in most years’¹³³, i.e. during the wet season. In the wet season landowner/resident access to Rockhampton for business purposes is via Marlborough, a five to six-hour one way trip across rough four-wheel drive only roads.

14.4.2 Regional study area baseline

This Section provides an overview of the demographic profile for the regional study area focusing on overall population and unemployment rates in the region. The social infrastructure facilities and/or services that may potentially be impacted or benefited by the Project are described.

14.4.2.1 Demographic profile

RRC’s and CHRC’s estimated resident population increased through the years of 2006 and 2011, but have since experienced a slight decrease through to 2016 as shown in Table 14-2. WASC’s estimated resident population has remained relatively stable over the ten-year period. The increase in the estimated resident population over the 2006–2011 period for RRC is due to Council amalgamation subsequent to 2006. Resident population data for each of the LGAs displays that all areas recorded higher numbers of average annual growth during the earlier years featured, which indicates a changing population in current years.

Table 14-2 Demographic profile¹³⁴

LOCAL GOVERNMENT AREA	ESTIMATED RESIDENT POPULATION			AVERAGE ANNUAL GROWTH RATE	
	2006	2011	2016	2006-2011	2011-2016
	NUMBER			PERCENTAGE %	
RRC	58,749	Rockhampton (R) 109,336	Rockhampton (R) 79, 726	12.4%	-6.3%
LSC	28,870	N/A	N/A	N/A	N/A
CHRC	26,477	28,715	27,999	1.6%	-0.5%
WASC	851	945	962	2.1%	0.4%
Queensland	3,904,532	4,332,739	4,703,193	2.1%	1.6%

The average annual growth rates are relatively high for the state (Queensland) between 2011 and 2016 (1.6 per cent) compared to RRC, CHRC and WASC (-6.3 per cent, -0.5 per cent and 0.4 per cent respectively). In comparison, RRC and CHRC experienced population growth rate decreases over the 2011–2016 period (-0.5 per cent and -6.3 per cent respectively), likely associated with the 2008 Global Financial Crisis and economic downturn in the mining and resource sector.

In the September quarter of 2012 RRC LGA had an unemployment rate of 5.7 per cent, which is consistent with the Queensland rate of 5.6 per cent. The CHRC LGA recorded the lowest unemployment rate at 2.1 per cent and 405 persons.

The lower unemployment rate in the CHRC LGA is largely attributed to employment opportunities in the mining sector and associated industries. At the time of the 2011 Census, mining was the largest industry of

¹³³ EIS, Volume 3, Appendix Q. p 12

¹³⁴ Australian Bureau of Statistics, 2017; Endmemo.com 2017



employment for the region. With the downturn in the resources and mining sectors, and the development of liquefied natural gas projects largely complete, higher unemployment in RRC offers opportunities to the Project to potentially source regionally based workforce.

14.4.2.2 Social infrastructure

14.4.2.2.1 Road networks and river crossings

The state-controlled Capricorn Highway passes the southern extent of the local and regional study areas and intersects with the Bruce Highway in Rockhampton. There are also several secondary (local council) roads and smaller tracks passing through the local study area, many of which are unsealed. The Fitzroy River upstream from Rockhampton forms a natural barrier for movement of people and stock with mainly low-lying river crossings available.

The three crossings in the local study area, all with poor flood immunity, include:

- Riverslea Crossing on the Fitzroy River is the primary crossing in the Gogango area, providing the only public road access to several properties
- Foleyvale Crossing is the only access to Duaringa for properties located north of the Mackenzie River. At least five properties with several families use the crossing. The only viable alternative is to cross the river by boat
- a minor crossing at Hanrahan Road.

In addition to these crossings, it is noted that the Glenroy Crossing is also within the study area and is the primary crossing from west to east of the Fitzroy River in the Morenish area for travel to and from Rockhampton, however this crossing is unaffected by the Project.

Several private crossings and internal property crossings have been identified. However, while there is limited available information on the current function and use of some of these crossings they appear to be rarely used and function mostly as 'opportunistic' crossings when river levels allow.

14.4.2.2.2 Health and emergency services

Health and emergency services for the local and regional study area are mainly available in Rockhampton, including access to the Rockhampton Hospital which provides speciality and allied health services and emergency services such as disaster response and management, fire and rescue, ambulance and police services.

Few services are available more locally, such as smaller state medical and health facilities in Woorabinda and Blackwater, an outpatient's clinic in Duaringa, two police stations at Westwood and Duaringa, a local ambulance station at Duaringa and Rural Fire Brigades run by volunteers in Duaringa and Gogango.

14.5 Impact identification and description

14.5.1 Planning and design phase

The planning phase of the Project will extend until a decision to construct is made, and includes the development of the DBC. The uncertainty around whether a decision on the Project will be made or not and the length of time that planning and site investigations have taken contribute to social impacts arising during the planning and design phase.



14.5.1.1 Uncertainty among landholders regarding the Project

The local community has been aware of strategies (in concept and with some feasibility investigations) for additional weirs (and/or water infrastructure) on the Fitzroy River for a long time, at least 20 to 30 years. However, the timing and specific design of the Project/s has been conceptual. This has caused a feeling of uncertainty and anxiety among potentially affected landholders. The uncertainty around whether the Project will proceed (and, if so, when) may affect people's ability to plan for their future. Residents may also believe that the value of their property may be negatively affected by these uncertainties. This uncertainty may therefore potentially result in adverse impacts to the social wellbeing of local landholders as well as a belief that adverse, economic effects may arise.

Ongoing engagement and communication with stakeholders (and landholders in particular) throughout the environmental, technical and social investigations and EIS approvals processes, as well as the continued planning and design activities has, and will continue to facilitate the provision of information to inform their decision making.

14.5.1.2 Impacts on lifestyle and productivity

Project planning activities such as on-site environmental or engineering investigations and visits from land liaison officers, GAWB and SunWater (proponents) and other Project related personnel require the landholders to take time from their usual work or personal life activities to attend to Project related requirements, potentially taking up their work time and affecting productivity.

While the planning of the Project has been ongoing for some time, the frequency of site visits has been relatively low to date. It is noted that additional site investigations would be undertaken during any early or preparatory works phases leading to the construction phase. The duration and physical impact of such disturbances are however likely to be low and impact on a limited number of individuals. Land access protocols have been developed for the planning and design phase. Continued review and implementation of the land access protocols, as agreed with landholders (including compensation), and respecting landholders wishes will continue to manage and minimise this impact.

14.5.1.3 Increased risk of spread of weeds

Associated with site visits by Project personnel is the increasing number of Project vehicle visits which can potentially contribute to the spread of noxious weeds. Increasing the spread of weeds can potentially have economic consequences for the affected landholder by way of additional time required to manage weeds and affecting their productivity. Weed and pest management is included within the land access protocols agreed with landholders prior to site visits (including vehicle wash-downs prior to entry and brush downs when moving between areas on the same property). No incidences of non-compliance have been reported for the Project to date.

14.5.2 Construction phase

14.5.2.1 Increased employment and business opportunities

In total, a workforce of approximately 150 persons is anticipated across the approximate two-year construction period, with approximately 60 people on site at peak. It is expected that 50-60 per cent of the workforce would be unskilled construction labourers and 40-50 per cent would be skilled. Upgrade and construction of river crossings will each require a total workforce in the order of 40 people over a period of 12 consecutive months.



The majority of the employees are likely able to be sourced from within the regional study area, and/or from across greater Queensland, though it is noted that the constructor may utilise specialists from further afield if deemed necessary.

For the LFRIP, while construction offices will be setup on site, there will also be the establishment of a camp for weir construction personnel as it has been assessed as preferable for safety and productivity for the Project. The proposed camp will accommodate up to 170 workers and will operate in line with construction requirements (e.g. during the dry seasons). A variation to the Coordinator-Generals' conditions for the EIS will be sought in due course to accommodate the inclusion of a camp. Workforce sourced from other parts of the state are expected to be mainly housed in short-term temporary commercial accommodation in Rockhampton and surrounding areas and construction workers transported daily by bus to the construction site and back to their accommodation or to a meeting point close to their accommodation. It is not expected that the small number of specialised workers sourced from outside the regional study area would impact on housing availability given vacancy rates of residences and occupancy rates of other accommodation types in Rockhampton, with Rockhampton's vacancy rates running above 6 per cent as of 2016¹³⁵.

In the context of the size of the regional economy, labour force and unemployment rates in the regional study area, it is anticipated that the Project will impact positively on and benefit regional employment and will provide employment opportunities to local communities. The skills required for employment in the on-site work include:

- plant and equipment operation
- form work construction and reinforcement setting
- concrete batching, pouring and finishing
- welding, electrical, plumbing, dogmen, riggers, drillers and other specialist trades
- trenching, pipe laying and joining
- explosives (only if required during excavation)
- surveying
- clerical and record keeping
- construction engineering supervision (range of skills, including foremen)
- environmental supervision
- laboratory technicians.

It is acknowledged that construction activities will have a positive impact on local businesses, both from direct and indirect expenditure, including expenditure from the workforce in terms of accommodation and food and beverage consumption. With the current down turn in mining related jobs and business requirements, such employment and business opportunities will have a positive effect on the regional and local economy.

¹³⁵ https://www.reiq.com/reiq/posts/media/vacancy_rates_improve_in_most_markets_ease_in_inner_brisbane.aspx



14.5.2.2 Productivity and property impacts

During construction, landholders may experience temporary impacts to their property and productivity due to:

- Loss of land, access to land and/or disturbance to land areas

Landholders either side of the weir, at river crossings and along new or upgraded accesses would experience temporary or permanent loss of small parts of their land, limited loss of access to parts of their property, or disruptions to access routes and parts of their property due to construction activities.

- Loss of and disturbance to cattle

Increased traffic volumes may increase the risk of accidents involving stock. Further increased traffic movements and construction activities have the potential to disturb (noise and dust) cattle and access to and use of areas for grazing may be restricted at periods during the construction phase. There are consequently both health and safety impacts as well as economic implications related to the loss of, and disturbance to, cattle.

- Additional time spent by landholders on Project related activities

Landholders will be required to inform and communicate with Project staff if property damage is incurred. It is acknowledged that this may have a timing impact for the Landowners, both in terms of inspection and/or reporting. The Project staff will ensure all reporting and compensation procedures and requirements are adequately communicated to Landholders to minimise time and costs impacts.

- Spread of weeds

Similar to the planning and design phase, mobilisation and demobilisation of construction vehicles, equipment and machinery has the potential to increase the risk of spread of noxious weeds. Following established land access protocols and developing and implementing construction EMPs, including weed and pest management sub-plans will manage and minimise this impact.

14.5.2.3 Lifestyle and amenity impacts

Sensitive receptors within the Project area are limited. The closest homestead to the Rookwood Weir site is over a kilometre away. Residents along the construction access roads, including at Gogango, may experience nuisances and disruptions as a result of increased noise, dust and access constraints. Construction is planned to be intermittent, with peak activity occurring during the dry season, restricted as far as possible to daytime hours and over a relatively short term. The number of additional heavy vehicles using access roads during peak periods would be approximately 32 heavy vehicles per day. Road impact assessments and implementation of construction EMPs and road use management plans will seek to manage these nuisance impacts. Implementing the Project's Stakeholder Engagement Plan will provide timely advice and notification to residents and landholders regarding potential disturbances where avoidance is not possible.

14.5.2.4 Impacts on social infrastructure

As the construction workforce would be small, temporary and seasonal and mainly from the regional study area, no additional demand for social infrastructure services is anticipated. Perceived safety issues related to increase in construction traffic may increase demand for police, fire and rescue and ambulance services. Consultations with emergency service providers indicate that such demand would be minor and within the capacity of the services to respond.



14.5.2.5 Traffic safety

During construction, there will be some increases to traffic volumes near the weir site, at river crossings and along construction access roads, particularly during mobilisation and demobilisation. At this stage, it is expected that around 32 heavy vehicles and between 20 and 30 light vehicles will travel to the Rookwood Weir site on an average day. During construction, traffic will mainly be related to transporting the workforce to and from the site, and supplying cement and fly ash and other construction materials.

Increased traffic volumes may increase the risk of accidents involving single vehicles, other road users or livestock. Additionally, increased traffic volumes and loads may also damage local roads.

Road impact assessments and implementation of construction EMPs, traffic management plans and road use management plans will seek to manage these nuisance impacts. Implementing the Project's Stakeholder Engagement Plan will provide timely advice and notification to residents and landholders regarding potential disturbances where avoidance is not possible.

14.5.3 Operations phase

14.5.3.1 Improved water security

The Project will increase availability and reliability of water to cater to the local and regional growth in the agricultural and industrial sectors and to support urban growth in line with the Central Queensland Regional Plan (DSD, Infrastructure and Planning 2012) and strategic intents and visions of local regional councils. The regional economy is reported to have expanded by an average of 10.3 per cent per annum over the past 10 years to 2010–11 (compared with 8.8 per cent growth for the state). This strong growth is driving demand for water as well as other services and utilities such as education, health care and electricity together with housing and construction and retail trade.

Planning for future water security through the Project supports the state's interests in achieving regional outcomes through public and private sector investment to improve water access by addressing increasing demands agriculture, industry and population growth to achieve appropriate security and reliability of supply. The Project will facilitate and enable economic development, thus benefiting the local, regional, state and national economies.

14.5.3.2 Improved road networks

As a result of the operation of Rookwood Weir, river crossings are proposed to be upgraded from existing low-level causeways with poor immunity to high level bridges and culvert crossings. Improved flood immunity of Riverslea Crossing and Hanrahan Crossing (Fitzroy River) and Foleyvale Crossing (Mackenzie River) will improve access and connectivity for the residents in the local study area. It will facilitate the movement of people, machinery and equipment and livestock in certain periods and maintain access to services and facilities such as schools and health facilities, social and recreational clubs and networks, by reducing the annual average time of closure and the duration of flooding above the crossing levels generating a positive impact for the community in general and for the productivity of landholders.

Riverslea Crossing and Foleyvale Crossing serve as major connections within the regional road network. Improvements in the condition and immunity of these crossings will improve regional road network connectivity. Good road connections and networks will serve to retain existing industries and businesses and will make the region attractive to potential new investors in the agricultural and industrial sectors.



14.5.3.3 Productivity and property impacts

Potential negative impacts within the local study area may include loss of land currently used for grazing, agricultural infrastructure (such as removal of pumps and fencing), severance of and/or loss of access to land, cattle bogging and changes to water allocations.

Despite land subject to inundation being contained within the river (and creek) bed and banks, fifty-eight landholders will lose a portion of their property (across freehold and land lease tenures) (inclusive of creek areas that are not Unallocated State Land) due to impoundments. Based on cadastral data, an estimated 1,163 ha of land (Freehold and Land Lease) will be impacted by the Rookwood Weir. This equates to a negligible per cent loss of total land holdings and a one per cent loss of total land holdings for Rookwood Weir. However, due to some of the landholdings adjacent to the Rookwood Weir impoundment being small, individual losses range from negligible to 26 per cent (noting two properties are estimated to lose 25 per cent and 26 per cent of their landholdings respectively).

Properties in the local study area currently operate on the basis that flooding occurs to some degree annually. Irrigated infrastructure is generally set up above a 1:5-year annual exceedance probability event and cattle are moved around properties in response to rising flood waters. Post-development, some additional land will be flooded during smaller events. For the larger flood events, incremental changes to flooded areas will be negligible (on average the per cent change in land area flooded is 0.5). These incremental flood extents will inform the determination of the flood margin (if necessary) for the LFRIP and will be used in individual land negotiations.

The actual extent of land loss (including flooding as appropriate) will be determined through in-field survey. The adverse impacts arising with regard to land and land use are largely economic in nature. Compensation for actual loss will be negotiated individually with landholders considering:

- the area of riparian land inundated
- land value and improvements made to the land
- the loss of stock watering points
- the increased need for fencing to control stock movement and prevent stock losses, particularly from bogging
- the increased risk of stock losses due to the provision of more potential nesting places for crocodiles and bogging
- the cost of relocation of irrigation pumps and other on farm infrastructure
- changed weed and pest control management requirements.

14.6 Impact assessment and impact mitigation/management strategies

Table 14-3 assesses and categorises the social impacts identified and described in Section 1.5. The assessment is presented in accordance with the LFRIP EIS SIA report and the categorisation on whether the impacts can be quantified and monetised is presented as per Building Queensland's Business Case Development Framework Social Impact Evaluation Guide Release 2, December 2016.

A number of management strategies and plans have been developed to manage the negative social impacts and enhance the positive impacts arising from the Project. These strategies and plans are included as imposed conditions within the LFRIP EIS Coordinator-General's evaluation report and require the proponents to review and report on the outcomes of the implementation of the commitments made with regard to



SOCIAL IMPACT EVALUATION

social impacts. These mitigation and management measures are also presented in Table 14-3 along with the assessment of residual impacts. Key features of the Impact Management Plans are detailed in Table 14-4.



SOCIAL IMPACT EVALUATION

Table 14-3 Social impact risk assessment

SUMMARY OF SOCIAL BENEFITS AND IMPACTS	NATURE OF IMPACT	RECEPTORS	SIGNIFICANCE RATING	CAN THE IMPACT BE QUANTIFIED AND MONETISED	MITIGATION MEASURES/MANAGEMENT STRATEGIES	SIGNIFICANCE RATING POST MITIGATION
PLANNING PHASE						
UNCERTAINTY AMONG LANDHOLDERS REGARDING THE PROJECT						
Uncertainty about the timing and design of the Project causing anxiety about when the Project may occur, compensation associated with the loss of land, impact on property values, and impeding on the landholder's ability to plan for the future	Negative	Riparian landholders, local community	Medium	No	Stakeholder Engagement Plan/Strategy	Low
IMPACTS ON LIFESTYLE AND PRODUCTIVITY						
Disruption to daily life and productivity due to time spent by the landholders in dealing with Project related land access and consultation matters	Negative	Riparian landholders	Low	Yes	A Project Land Acquisition Strategy A Land Access Protocol.	Low
Spread of weeds from vehicles of Project staff visiting properties and potential leading to remediation costs to landholders	Negative	Riparian landholders	Low	Yes	A Weed Management Plan	Low
CONSTRUCTION PHASE						
INCREASED EMPLOYMENT AND BUSINESS OPPORTUNITIES						
The Project is expected to generate approximately 100 construction jobs for skilled and unskilled workers, which would be available for the regional workforce	Positive	Regional community	High	Yes	A Recruitment Plan	High



SOCIAL IMPACT EVALUATION

SUMMARY OF SOCIAL BENEFITS AND IMPACTS	NATURE OF IMPACT	RECEPTORS	SIGNIFICANCE RATING	CAN THE IMPACT BE QUANTIFIED AND MONETISED	MITIGATION MEASURES/MANAGEMENT STRATEGIES	SIGNIFICANCE RATING POST MITIGATION
Construction activities would increase demand for local businesses via Project procurement, as well as the needs of the temporary workforce (such as accommodation and food/catering). With the current downturn in mining related jobs and business requirement, such employment and business opportunities will have a positive effect on the regional economy.	Positive	Regional community	Medium	Yes	A Project Procurement Plan CEMP	Medium
IMPACTS ON PROPERTY AND PRODUCTIVITY						
Potential temporary or permanent loss of parts of land or access to parts of their property due to construction activities and due to inundation during operation.	Negative	Landholders on either side of weir site, at river crossings and along new accesses	Medium	Yes	Land Acquisition Strategy CEMP Weed Management Plan Traffic Management Plan	Low
Potential, temporary impact on productivity due to risk of loss of cattle due to increased traffic, impacts on cattle sure to increased noise, time spent by landholders in dealing with Project staff and weed spread due Project related traffic.	Negative	Landholders on either side of weir site and along access route	Medium	Yes	Land Access Protocol. Stakeholder Engagement Plan (including a grievance management process)	Low
Potential to increase the risk of the spread of noxious weeds, potentially leading to remediation costs to landholders due to mobilisation and demobilisation of construction vehicles, equipment and machinery.	Negative	Landholders on either side of weir site and along access route	Medium	Yes	Land Acquisition Strategy CEMP Weed Management Plan Traffic Management Plan Land Access Protocol. Stakeholder Engagement Plan (including a grievance management process)	Low



SOCIAL IMPACT EVALUATION

SUMMARY OF SOCIAL BENEFITS AND IMPACTS	NATURE OF IMPACT	RECEPTORS	SIGNIFICANCE RATING	CAN THE IMPACT BE QUANTIFIED AND MONETISED	MITIGATION MEASURES/MANAGEMENT STRATEGIES	SIGNIFICANCE RATING POST MITIGATION
LIFESTYLE AND AMENITY IMPACTS						
Potential, temporary impact on rural lifestyle due to dust, noise and visual impacts.	Negative	Landholders/residents near the construction areas and residents along the construction access roads either side of weir site and along access route	Low	No	Land Acquisition Strategy CEMP Traffic Management Plan Land Access Protocol. Stakeholder Engagement Plan (including a grievance management process)	Negligible
IMPACTS ON SOCIAL INFRASTRUCTURE						
Potential, temporary increase in demand on community services, facilities and emergency services.	Negative	Health and emergency service providers	Low	Yes	Emergency management plans	Negligible
TRAFFIC SAFETY IMPACTS						
Potential safety risks due to increased construction traffic on local roads near Project site.	Negative	Workforce and landholders along construction access roads	High	Yes	Traffic Management Plan Stakeholder Engagement Plan	Low
Potential damage to local roads due to Project construction traffic.	Negative	Landholders and residents along construction access roads	Medium	Yes		Negligible
OPERATION PHASE						
WATER SECURITY						
Increased water security and allocations at regional level to cater to the regional growth as per the CQRP.	Positive	Regional community	Very high	Yes	Positive outcome from the Project.	Very high



SOCIAL IMPACT EVALUATION

SUMMARY OF SOCIAL BENEFITS AND IMPACTS	NATURE OF IMPACT	RECEPTORS	SIGNIFICANCE RATING	CAN THE IMPACT BE QUANTIFIED AND MONETISED	MITIGATION MEASURES/MANAGEMENT STRATEGIES	SIGNIFICANCE RATING POST MITIGATION	
IMPROVED ROAD NETWORK							
Improved flood immunity of several river crossings will facilitate the movement of people, machinery and equipment and livestock in periods of flooding and maintain access to services and facilities such as schools and health facilities, social and recreational clubs and networks.	Positive	Regional community	High	Yes	Positive outcome from the Project.	Very high	
PRODUCTIVITY AND PROPERTY IMPACTS							
Loss of land and infrastructure such as pumps, fences and watering points	Negative	Riparian landholders upstream	Low	Yes	Land Acquisition Strategy Compensation Strategy Stakeholder Engagement Strategy Amended Resource Operations Plan	Low	
Loss of property and agricultural business viability	Negative	Riparian landholders upstream	Low	Yes		Low	
Potential increase in cattle bogging	Negative	Riparian landholders	Low	Yes		Low	
Loss of existing water allocation for agricultural activities (drinking water for cattle in water holes in the river bed and water harvesting)	Negative	Riparian landholders	Medium	Yes		Low	
Impacts on access to ground water, inundation of one groundwater bore	Negative	Riparian landholders	Low	Yes		Compensation Strategy	Negligible
Loss of access to parts of properties as a result of flooding	Negative	Riparian landholders and road users	Low	Yes		Land Acquisition Strategy Compensation Strategy	Low



Table 14-4 Social impact management plans/strategies

IMPACT MANAGEMENT PLAN/STRATEGY	KEY FEATURES OF THE PLAN/STRATEGY TO MANAGE SOCIAL IMPACTS
Stakeholder Engagement Plan	<p>The Stakeholder Engagement Plan will include but not be limited to:</p> <ul style="list-style-type: none"> ▪ tools and mechanisms for adequate, timely, clear, concise and regular communication with the stakeholders regarding Project status, water allocations and management of key Project impacts ▪ the strategy is ongoing and includes a range of communication techniques such as a Project website, a 1800 number, dedicated email address, and Project updates and information sessions at key milestones ▪ consultation with landholders, identifying the respective roles and responsibilities of the Project team and landholders ▪ alerts system regarding water releases ▪ grievance and dispute management procedure ▪ co-ordination with Traffic Management Plan and Construction Management Plan.
Land Acquisition Strategy	<p>The Land Acquisition Strategy has been facilitated through the appointment of dedicated land liaison officers for key periods during Project planning. Landholders potentially directly impacted by the Project, have had the opportunity to discuss how their properties and businesses operate (inclusive of existing and future water entitlements) for consideration within the EIS.</p> <p>Issues relating to the loss of land and/or loss of access to land along with impacts on productivity will be negotiated and agreed on a one-on-one basis with directly impacted landholders through the land acquisition process. Consideration will be given to the use of the land, relocation of temporary infrastructure as far as is practicable and reinstatement and rehabilitation. Further advance and ongoing communication with regard to the Project will facilitate that individuals are able to plan for their own operational needs.</p> <p>The Land Acquisition Strategy will include considerations for but not be limited to:</p> <ul style="list-style-type: none"> ▪ the statutory context for land acquisition ▪ implications for securing land and rights to land ▪ preference for acquisition by agreement ▪ the process for acquiring land, use of private land for Project construction and quarrying on private land ▪ timing of land acquisition and payment of compensation ▪ grievance and dispute mechanisms including mediation.
Compensation Strategy	<p>The Compensation Strategy will include considerations for but not be limited to:</p> <ul style="list-style-type: none"> ▪ productivity impacts including temporary or permanent loss of land due to impoundment and easements, loss of viability of the business, time spent on Project activities, loss of cattle due to Project activities, weed spread due to Project activities, loss of agricultural infrastructure such as pumps, costs of new fences and alterations to water allocation ▪ loss of opportunistic river crossings ▪ Improved road access and flood immunity of identified river crossings ▪ opportunities in relation to improved water security ▪ grievance and dispute mechanisms including mediation.



IMPACT MANAGEMENT PLAN/STRATEGY	KEY FEATURES OF THE PLAN/STRATEGY TO MANAGE SOCIAL IMPACTS
Land Access Protocol	<p>The Land Access Protocol will include but not be limited to:</p> <ul style="list-style-type: none"> ▪ providing notice to landholders prior to accessing their property (seven days currently) ▪ liaison with landholders regarding their land activities at the time of the access (for example mustering, sensitive stock, pig shooting, etc.) ▪ opening/closing of property gates ▪ respecting any individual requests from the landholders about timing and considering other land-based activities ▪ limiting Project traffic to agreed tracks ▪ respecting appointment timing ▪ all Project personnel to be identifiable through letters of introduction and clear explanation to landholders of activities proposed ▪ informing landholder as soon as possible of any changes to appointments.
Weed and Pest Management Plan	<p>The Weed and Pest Management Plan will include but is not limited to:</p> <ul style="list-style-type: none"> ▪ assigning designated vehicle wash down/brush down areas ▪ restricting access to designated tracks ▪ facilitating that all machinery and equipment entering the site is weed and pest free as far as practicable ▪ the site will be kept clear and free of waste, and waste will be appropriately stored and removed to approved waste stations (as appropriate).
Traffic Management Plan	<p>The Traffic Management Plan will include but not be limited to:</p> <ul style="list-style-type: none"> ▪ speed limits on access roads ▪ specification of access tracks and roads to be used for Project purpose ▪ time limits on construction traffic movements ▪ development of plan in consultation with landholders and local residents and including considerations for cattle crossing and other road uses ▪ co-ordination with Stakeholder Engagement Plan to inform stakeholders about updates/changes to Project traffic ▪ planning of implementation of river crossing construction and upgrades of crossings at Glenroy, Riverslea, Foleyvale and Hanrahan.
Construction Management Plan	<p>The constructor will be required to develop and maintain the Construction Management Plan, which will include, but not be limited to:</p> <ul style="list-style-type: none"> ▪ workforce requirements including skills requirement, sourcing, accommodation and travel to and from Project site ▪ recruitment planning giving preference to local employment by using local recruitment agencies ▪ contractor terms and conditions regarding recruitment.
Recruitment Plan	<ul style="list-style-type: none"> ▪ provision of appropriate contractual arrangements with construction contractors and the use of local recruiters, that will facilitate opportunities for local employment.
Procurement Plan	<p>The Procurement Plan will include but not limited to:</p> <ul style="list-style-type: none"> ▪ policy specifying preference for local businesses to service the Project ▪ announce work packages through the ICN Gateway (as applicable) in line with the Australian Industry Participation Policy ▪ services, equipment and material required for the Project are considered typical for construction projects in the region and therefore are likely to be locally available.
Other plans applicable to mitigating social impacts	<ul style="list-style-type: none"> ▪ noise Management Plan ▪ Air Quality Management Plan.



IMPACT MANAGEMENT PLAN/STRATEGY	KEY FEATURES OF THE PLAN/STRATEGY TO MANAGE SOCIAL IMPACTS
Social Impact Management Report	<ul style="list-style-type: none"> ▪ Annual report prepared for the Project over a five-year period from commencement of construction ▪ Describes the social impact management strategies and actions implemented and the outcomes achieved ▪ Made publicly available on the proponent’s website for each reporting year.



15 ENVIRONMENTAL ASSESSMENT

CHAPTER SUMMARY AND CONCLUSIONS:

Potential construction impacts addressed in the EMP include:

- Impacts to flora and fauna through clearing/inundation of vegetation and habitat, fauna injury/mortality, disturbance of fauna and introduction of weeds and pests.
- Impacts to the ambient environment through elevated noise levels, increased dust nuisance and changes to the landscape and visual amenity.
- Impacts to water resources through degradation of water quality through spills, erosion and sedimentation and disruption to/diversion of downstream flows.
- Impacts to transport through increased traffic volumes.

Greenhouse gas, waste and emergency planning will also be addressed through the construction EMP.

Benefits from the construction phase will include employment opportunities and potential for the provision of services to the Project with associated economic benefits.

Operational impacts are predicted to be minor and predominately related to water resources including altered stream flow patterns, flood flows and river morphology. Unavoidable impacts as a result of impoundment at the weir site (within the river bed and banks) mainly include the loss of some riparian vegetation and fauna habitat and a restriction of movement of aquatic species. Benefits arising during operation of the Project will include the provision of a secure water supply to support agricultural expansion and industrial and urban growth.

Matters of national and State environmental significance, predicted to be impacted by the Project include:

- Brigalow (*Acacia harpophylla* dominant and co-dominant) threatened ecological community
- Black ironbox (*Eucalyptus raveretiana*) trees
- Regulated vegetation and connectivity areas
- Fitzroy River turtle (*Rheodytes leukops*) and white-throated snapping turtle (*Eelseya albagula*) habitat
- Powerful Owl (*Ninox strenua*) habitat
- Red Goshawk (*Erythrorchis radiates*) habitat
- Waterways providing for fish passage.

In addition to the EMP and species management programs that will be implemented for the above species, offsets are proposed to satisfy State and Commonwealth requirements.

Based on the findings of the impact assessment and given implementation of the EMP and offsets proposals, it is considered that the Project can be undertaken without unacceptable environmental, social or cultural impacts. The Project is not expected to contribute to cumulative impacts at a local and regional scale. The Project presents a range of opportunities and positive benefits to local, regional, State and national economies. Further assessment of the residual impacts will be undertaken through the CBA and the SIE.



15.1 Purpose

This Chapter outlines the approach undertaken in identifying the legislative and regulatory environmental approvals and requirements and identification of potential environmental impacts and mitigation activities for the Reference Project.

15.2 Background

In December 2004, the Queensland Government under its commitment to the NWI Agreement, and in partnership with local government (2004), developed the CQRWSS (DNRW 2006). The CQRWSS identified that further infrastructure on the lower Fitzroy River was required to provide the appropriate long-term reliability of supply for the urban and industrial needs of RRC and LSC local government areas and the needs of GAWB's supply area.

In late 2009, the LFRIP was referred to the Commonwealth Minister for the Environment for a decision on whether the LFRIP proposal required assessment and approval under the EPBC Act. The LFRIP was declared a 'controlled action' to be assessed by EIS on 7 January 2010. The controlling provisions for the LFRIP under the EPBC Act are:

- world heritage properties (Sections 12 and 15A)
- national heritage places (Sections 15 B and 15C)
- listed threatened species and communities (Sections 18 and 18A)
- listed migratory species (Sections 20 and 20A).

The draft EIS was publicly notified in July 2015. In response to submissions received on the draft EIS, A revised draft EIS was prepared. The Coordinator-General accepted the revised draft EIS as the final EIS in September 2016. On 8 December 2016, the Coordinator-General released the Coordinator-General's evaluation report on the environmental impact statement (CGER), recommending that the LFRIP proceed subject to conditions and recommendations and in accordance with commitments described in the CGER.

15.3 Project Approvals

The EIS presented a review of Commonwealth, state and local government legislation and policies relevant to planning, approvals, construction and operation of the LFRIP.

Subsequent to state and Commonwealth approval (tier one approval) and implementation of approval conditions, secondary approvals (tier two approval) will need to be sought. Table 15-1 identifies the key existing and required tier one and two approvals for the LFRIP Project.

Further discussion regarding regulatory and legislative requirements, policies and plans are provided in Chapter 10.



Table 15-1 Approvals

Approval (and relevant legislation or categorising instrument)	Why it applies (categories of development, categories of assessment)
Tier one approvals	
<ul style="list-style-type: none"> ▪ EIS ▪ EPBC Act ▪ SDPWO Act 	<ul style="list-style-type: none"> ▪ The Project is a controlled action (EPBC Referral 2009/5173) and will impact on MNES. ▪ Subject to assessment of the DBC and the outcomes of detailed design, it may be necessary to ask the Coordinator-General to evaluate proposed changes to the Project and/or a condition of the Project.
<ul style="list-style-type: none"> ▪ Designation of premises for development of infrastructure ▪ Planning Act s35 	A designation of 'water cycle management infrastructure' could be sought from the state Minister or local government. May require further environmental assessment report (EAR) unless the minister is satisfied with previous environmental assessment (the EIS).
Tier two approvals	
State planning system development approvals	
<ul style="list-style-type: none"> ▪ MCU change of use of premises ▪ Planning Act ▪ Rockhampton Regional Planning Scheme 2015 ▪ Planning Regulation and Environment Protection Act 1994 (Qld) (EP Act) 	<p>Activities assessable against the Rockhampton Regional Planning Scheme 2015:</p> <ul style="list-style-type: none"> ▪ Temporary construction of workers accommodation ▪ Possible hard rock quarry development ▪ ERA16 – ERA16 Extractive and screening activities in relation to potential dredging and/or extraction of material resources, as governed by the state EP Act
<ul style="list-style-type: none"> ▪ Operational work for waterway barrier works and interfering with a water course ▪ Planning Act ▪ <i>Fisheries Act 1994 (Qld)</i> ▪ Water Act ▪ Planning Regulation: <ul style="list-style-type: none"> ▪ Schedule 10, part 6, division 4, s12 ▪ Schedule 10, part 19, s29 	<ul style="list-style-type: none"> ▪ A development permit for waterway barrier works is required for Rookwood Weir and Hanrahan Crossing, as well as possible permits for bridges at Riverslea and Foleyvale crossings and culverts associated with upgrades to Thirsty Creek Road. ▪ Operational work that involves taking or interfering with water in a watercourse, lake or spring; or a dam constructed on a watercourse or lake is assessable development requiring code assessment.
<p>Operational work for ancillary works and encroachments</p> <ul style="list-style-type: none"> ▪ Planning Act ▪ Planning Regulation schedule 6, part 3, s9; part 5, s26 ▪ TMR 	The Project proposes to upgrade the intersection with the State-controlled Capricorn Highway at Gogango and construct a bridge on the State-controlled Apis-Creek Road at Foleyvale. A development permit (road corridor permit) is required for any part of the land



ENVIRONMENTAL ASSESSMENT

Approval (and relevant legislation or categorising instrument)	Why it applies (categories of development, categories of assessment)
<ul style="list-style-type: none"> ▪ schedule 6 ▪ Transport Infrastructure (State-controlled Roads) Regulation 2006 	that is within 25 metres of the state-controlled roads and/or associated with access to the state-controlled roads.
<ul style="list-style-type: none"> ▪ Building work ▪ Planning Act ▪ Planning Regulation ▪ <i>Building Act 1975</i> (Qld) 	Development application for building works requiring assessment against the <i>Building Act 1975</i> and assessable against a planning scheme.
Non-Planning Act approvals	
Cultural heritage management plans (CHMPs), <i>Aboriginal Cultural Heritage Act 2003</i> (Qld) (ACH Act))	The Project has the potential to disturb items of Aboriginal cultural heritage significance. CHMPs for the Project have been approved and registered. Further cultural heritage surveys and development of management measures is required.
Water permit and/or constructing authority, Water Act	Water for construction of roads, bridges, culverts and other ancillary infrastructure may be provided through a water permit or regulation pertaining to construction authorities.
ROL, Water Act	A ROL, meeting the objectives of the Water Plan (Fitzroy Basin) 2011, is required to authorise the interference with water necessary to construct and operate the weir.
Tampering with a protected animal breeding place NC Act and Nature Conservation (Wildlife Management) Regulation 2006	Species management programs (SMPs) (and offsets management plans) are required to be approved by DEHP and the Commonwealth Minister for the Environment for the Fitzroy River turtle and white-throated snapping turtle and Powerful Owl.
Road corridor permit <ul style="list-style-type: none"> ▪ TI Act ▪ Local Law No. 1 (Administration) 2011) 	A road corridor permit to construct, maintain, operate or conduct ancillary works and encroachments on a state-controlled road is required for the Project. A road reserve works permit is required for works to local government controlled roads.

15.4 Identification of Environmental Impacts

This section provides an overview of some key considerations. The assessment of environmental impacts is based on the detailed analysis undertaken as part of the EIS and updated where practicable.

15.4.1 Planning, land use and land tenure

The Project is located in a rural area, where the main activity occurring on properties affected by the Project is cattle grazing, breeding and fattening. The most common use of the river is for stock watering with cattle generally accessing the water directly or via pump/trough systems.

The Project is not considered to adversely impact on the intended use of rural land for rural purposes. In accordance with local government planning scheme provisions the Project is considered compatible with existing and future land uses in the rural zone. The Project does however have the potential to affect the ability of landholders to graze livestock over the area between the high and low bank outside their legal riparian boundary, to ingress and egress the river, to invite other people and remove trespassers, and to access water for livestock. Impacts on landholders and land use will be mitigated and managed through the development and implementation of a Project EMP which includes:

- Land Access Strategy
- Weed and Pest Management Plan
- Noise and Vibration Management Plan
- Air Quality Management Plan
- Road Use Management Plan (and site-specific traffic management plans)
- Land Acquisition Strategy
- Compensation Strategy
- Stakeholder Engagement Strategy, including a Near Neighbour Policy and Grievance Management Process

15.4.2 Cultural heritage

Desktop database searches, preliminary field surveys and consultation with Aboriginal parties have identified locations within and near the Project areas that possess a range of cultural places and values that constitute Aboriginal cultural heritage as defined in the ACH Act. Activities associated with the proposed Project have the potential to disturb identified Aboriginal cultural heritage that lies within the areas where infrastructure is to be constructed or that will be inundated.

In 2011 four CHMPs were established for the LFRIP, endorsed by Aboriginal parties (Endorsed Parties), to ensure that all practical measures are taken to avoid impacts on Indigenous cultural heritage.

15.4.3 Topography, geology and soils

Construction activities and vegetation clearing have the potential to cause erosion and land instability that could result in a loss of soil resources and the release of sediments to surface waters. An Erosion and ESCP will be developed prior to construction in accordance with the Best Practice Erosion and Sediment Control Guideline (IECA 2008). During operation, there is potential for water releases to cause erosion downstream. Measures to minimise the impact of erosion from water releases have been incorporated into the design and will be refined based on Computational Fluid Dynamic (CFD) modelling.



15.4.4 Contaminated land

Existing land use in and around the Rookwood site is predominantly cattle grazing, with existing potential contamination resulting from the storage and use of hydrocarbons, herbicides, pesticides and livestock dips. Three subject lots in the vicinity of the weir site, but outside of the disturbance footprints, are listed on the Environmental Management Register.

Construction and inundation associated with the LFRIP are not likely to disturb land containing contaminants from such land uses and release these contaminants into the environment. As included in the Project EMP, an incident response plan and appropriate preventative measures will be implemented to minimise the risk of accidental spills and leaks during construction and operation of the Rookwood Weir.

15.4.5 Flora

Desktop assessments, vegetation mapping, field surveys and bio-condition assessments were undertaken to determine existing flora values and potential impacts on flora values as a result of the Project. The following Matters of National Environmental Significance (MNES) and Matters of State Environmental Significance (MSES) relating to flora values were predicted to occur within the impact area for the Project:

- MNES: One endangered ecological community known to occur in the Project footprint (Brigalow threatened ecological community(TEC)) and *Eucalyptus raveretiana* (black ironbox).
- MSES:
 - Regulated vegetation – endangered and of concern Regional Ecosystems (REs) located along sections of the Fitzroy, Mackenzie and Dawson rivers.
 - Areas of essential habitat mapped as occurring within the Project area.
 - Vegetation connectivity areas.

The following measures will be implemented to reduce impact on flora:

- clearing for site works will be restricted to the smallest practical area
- clearly demarcate no-go areas of highly sensitive vegetation
- where practicable, revegetation activities will be commenced after the completion of construction works
- a Weed Management Plan will be prepared for the construction phase
- disturbed areas will be rehabilitated to replicate as closely as possible the habitat prior to construction
- loss of vegetation associated with inundation is unavoidable and offsets are proposed.

Consistent with proponent commitments the Commonwealth Minister has conditioned that prior to clearing/inundation of vegetation, pre-clearance surveys in the impact area must be undertaken to identify the extent of EPBC Act ecological communities.



15.4.6 Aquatic ecology

To document the known aquatic ecology values within the Project footprint, a desktop and field assessment was undertaken. There are no wetlands of high ecological significance directly associated with the Project area. Aquatic fauna values within the Project area summarised below:

- three fish species are considered to have a local conservation value due to restricted geographic range
- six turtle species, with The Fitzroy River turtle as vulnerable and the white throated snapping turtle listed as endangered and critically endangered under the NC Act and EPBC Act, respectively
- estuarine crocodile (*Crocodylus porosus*), listed as vulnerable under the NC Act
- platypus, listed as special least concern under the NC Act, is known to occur but is considered likely to be limited in abundance with a low potential to occur or are absent within Project areas
- studies of macroinvertebrate diversity recorded a total of 4,270 individuals from 59 families of macroinvertebrates during the wet season and 233 individuals from 28 families during the dry season.

Mitigation and management actions in relation to impacts on aquatic fauna include:

- a Fishway Operations Plan and Fish Monitoring Program will be designed and implemented to monitor the effectiveness of fish passage infrastructure
- the development of a species management plan (consistent with the EIS SMP) to be implemented as part of the Project targeting Project specific impacts as well as address the key processes currently impacting the survival of the threatened species
- the construction of a specifically designed turtle passage facility
- turtle nesting habitat impacts will be offset through a land-based proposal
- promote more holistic control of feral animals and weeds.

15.4.7 Terrestrial fauna

Potential impacts to terrestrial fauna during construction and operation of the Project include:

- individual fauna injury and mortality due to clearing and increased construction traffic
- short-term disruption to behaviour of localised wildlife assemblages, though there are no noteworthy terrestrial fauna communal nesting, breeding, roosting or foraging resources surrounding the construction footprint
- loss of terrestrial habitat due to clearing and impoundment
- fragmentation of riparian habitat and loss of movement corridors and connectivity
- encroachment of feral animal species and degradation of habitats
- impacts on four conservationally significant terrestrial fauna; the Koala, Powerful Owl, Squatter Pidgeon and Red Goshawk.

To avoid, mitigate and manage impacts on terrestrial fauna because of the construction and operation of the Project, the proponents are committed to the implementation of a Project EMP and the provision of offsets where residual impacts persist.



15.4.8 Surface water resources

Potential impacts on surface water resources arising from construction of the Project may include disruption to or diversion of downstream flows and Localised drawdown within natural ponded areas (Rookwood Weir).

Potential impacts on surface water resources during operation of the weir include:

- Inundation of river and creek bed and banks and infrastructure upstream within the impoundment.
- Changes to river morphology (fluvial processes) and altered flood flows.
- Uncontrolled releases of water due to system failure.

An Integrated Quantity Quality Model (IQQM) assessment was undertaken to determine whether the proposed high priority water extraction is consistent with the Fitzroy WP WASOs and EFOs for surface water. The assessment identified that unsupplemented WASOs are achieved for three of the four unsupplemented water user groups, with the average annual volume probability for the WASO that was not achieved four per cent below the specified objective. In terms of EFOs, Seasonal base flow EFOs are achieved for the January – April water flow season but were not achieved for the May – August and September – December water flow seasons (recording 0.7 to the required 0.8 – 1.2 target). All other WASOs and EFOs were achieved for the Reference Project.

The operational regime will be developed and/or operating rules modified in response to water demand and supply requirements and subject to meeting the provisions of the Fitzroy Basin Water Plan, including WASOs and EFOs. An operations EMP will address ongoing requirements in relation to monitoring, rehabilitation and reinstatement areas subject to erosion and instability as a result of the LFRIP.

15.4.9 Water quality

Construction activities may create short-term, localised impacts on water quality, such as erosion, run-off and sedimentation and have the potential to introduce pollutants (hydrocarbons). However, this impact is expected to be minimal downstream of the Rookwood site. Management and mitigation measures are defined in the Project EMP and will be developed further for the Construction EMP.

In terms of operations, it is evident that existing water quality in the Project area is heavily influenced by anthropogenic factors in the catchment area and these existing impacts on water quality will persist. The LFRIP operation is not expected to directly alter the sediment load within the system, and apart from local areas of lower velocity around weir structures such as intakes, the weirs are expected to provide unimpeded transfer of sediment downstream.

15.4.10 Transport

The assessment of potential impacts of the LFRIP construction phase for the Capricorn Highway intersection at Gogango found:

- traffic operation on the Capricorn Highway west and east approaches will not be significantly impacted by the Project and are less than five per cent of Annual Average Daily Traffic (AADT)
- the impact of heavy vehicle movement on traffic operation of the Capricorn highway approaches will be minimal (less than five per cent of Equivalent Standard Axle (ESA))
- that the Capricorn Highway approach from the east will require a channelized right turn treatment with a short turn slot (CHR(S)) treatment to cater for the movement of construction traffic scenarios. Further assessment during detailed design will consider intersection form



- traffic operations on local road (Gogango) approaches will be impacted (more than five per cent of AADT), with the impact of heavy vehicle movement on traffic operations considered significant (more than five per cent of ESA).

Construction generated traffic will overlap with school transport services on state-controlled roads but, given the current capacity of these roads, are not expected to impact on the operations of these services. A road use management plan (and where necessary site-specific management plans, for example at Gogango) will be developed in consultation with TMR, the Queensland Police Service and bus operators and appropriate notifications provided. New bridges will be constructed as part of the Project at Riverslea Crossing and Foleyvale Crossing. Flood immunity will be improved and the road network maintained.

15.5 Conclusion

Assessment has been undertaken for environmental, social, cultural and economic values in relation to the Project. The Project is located in a rural area that consists predominantly of large, rural agricultural (cattle grazing) land holdings. Settlement in the area is sparse and scattered.

Potential impacts associated with construction activities, as identified through the environmental impact assessment undertaken for the draft EIS, have in the first instance been avoided through design. Where potential impacts cannot be avoided, mitigation and management measures have been included within the EMP and value-specific management plans, such as the SMP. Potential construction impacts addressed in the EMP include the loss of remnant vegetation and fauna habitat, elevated noise levels and increased dust nuisance, increased traffic volumes and degradation of water quality through erosion and sedimentation. The EMP will inform the development of the construction EMP which will be implemented to mitigate and/or manage the localised and relatively short-term construction-related impacts.

Benefits during operation of the Project will include the provision of a secure of water supply to support urban and industrial growth, and agricultural expansion. The improvements to be made at river crossings will facilitate improvements in reliability and immunity of the road network.

Unavoidable impacts as result of impoundment at the weir sites (within the river bed and banks) mainly include the loss of some riparian vegetation and fauna habitat and a restriction of movement of aquatic species. Social impacts will arise in relation to the loss of some existing uses of riparian land and access to riparian land by adjacent landholders. The Project proponents are committed to undertaking individual negotiations with directly impacted landholders to develop compensation strategies in this regard.

Project design, implementation of the EMP and development of an operational EMP, the provision of offsets and the implementation of a ROL in accordance with the Fitzroy WP will ensure that operational impacts are mitigated and managed appropriately.

Conservation of significant species, including MNES, predicted to be impacted by the Project include Brigalow TEC, black ironbox trees, Fitzroy River turtle and white-throated snapping turtle habitat, and powerful owl and red goshawk nesting habitat. Other MSES include loss of regulated vegetation and connectivity areas, as well as loss of waterway area providing for fish passage. In addition to the EMP and species management programs that will be implemented to mitigate and manage impacts on these species, offsets are proposed to satisfy state and Commonwealth requirements.

The EMP will be further developed and will inform the development of a detailed CEMP and OEMP. These EMPs will include species management programs. The EMPs will:

- build on the commitments to environmental performance made in the Project EIS
- provide a framework to protect the environmental values potentially affected by the Project



- set out environmental management obligations for environmental authorities and permits to assist the authorities when developing project approvals and associated conditions.

Implementation of the final EMP, CEMP and OEMP will ensure that the Project achieves sustainable outcomes.

The outcomes of specialist studies, community consultation and stakeholder engagement, along with regulatory requirements, codes and guidelines all form the framework for of the EMP and commitments made by GAWB and SunWater in relation to the Project.

Based on the findings of the impact assessment and given implementation of the EMP and offsets proposals, it is considered that the Project can be undertaken without unacceptable environmental or cultural impacts. The Project also presents a range of opportunities and positive benefits to local, regional, state and national economies.

Table 15-2 outlines the relationship between the residual environmental impacts and the approach which includes the options to include in a CBA or the Social Impact Evaluation.

Table 15-2 The Relationship Between Environmental Impacts and Approach

RELATIONSHIP BETWEEN ENVIRONMENTAL IMPACTS AND APPROACH			
Residual environmental impact	Quantified	Monetised	Approach
Loss of rural land or ability to undertake agricultural activities (extent of individual impacts is being confirmed through consultation with landholders)	Yes	Yes	Include in CBA
Inundation or acquisition of Native Title areas	Yes	Yes	Include in CBA
Disturbance of cultural heritage	No	No	Include in SIE
Disturbance of contaminated land	No	No – only initial site investigations for identified contaminated sites can be costed.	Include in SIE
Aquatic habitat loss	Yes (660 ha)	Yes (financial offsets and associated studies)	Include in CBA
Fauna (terrestrial and aquatic) injury and mortality	No	No	Include in SIE
Disruptions to fauna behaviour (terrestrial and aquatic)	No	No	Include in SIE



RELATIONSHIP BETWEEN ENVIRONMENTAL IMPACTS AND APPROACH			
Residual environmental impact	Quantified	Monetised	Approach
Loss of remnant vegetation and ecological communities	Yes	Yes - offsets	Include in CBA
Loss of terrestrial habitat	Yes	Yes Offset required for 972 ha of red goshawk habitat Offset required for regulated vegetation is to provide habitat features of powerful owl nesting	Include in CBA
Introduced plants and weeds	No	No	Include in SIE
Potential for erosion, scouring and bank slumping in watercourse	No	No	Include in SIE
Changes to stream flow regimes	Yes	No	Include in SIE
Greenhouse gas emissions	Yes (221,828 t CO ₂ -e inundation) (16,546 t CO ₂ -e fuel use, blasting and vegetation clearing)	Yes	Include in CBA
Waste management	Yes	Yes	Include in CBA
Traffic impacts (road, bridge, crossing upgrades and intersection)	Yes	Yes	Include in CBA



16 FINANCIAL AND COMMERCIAL ANALYSIS

CHAPTER SUMMARY AND CONCLUSIONS:

The total P90 risk adjusted net cost of the LFRIP is \$181.8 million (real \$, 2016-17), or \$183.0 million in nominal terms, equivalent to a NPC of \$180.4 million, based on a 30-year assessment. This is made up of:

- total risk adjusted upfront costs for the LFRIP is \$306.1 million (real \$, 2016-17), or \$322.9 million (\$352.2 million minus \$29.3 million expended), in nominal terms (with a delivery period over 4 years)
- total risk adjusted ongoing operational costs of \$35.3 million (real \$, 2016-17), or \$55.2 million in nominal terms over 26 years of operation
- total estimated revenue of \$159.4 million (real \$, 2016-17), or \$195.1 million in nominal terms over 26 years of operation

The above estimates exclude all costs incurred as of 30 June 2017, approximately \$29.3 million.

16.1 Purpose

The purpose of this chapter is to present the findings from the financial analysis completed in relation to the Reference Project.

Additional work conducted in relation to the financial and commercial analysis included an analysis of the affordability of the LFRIP on a holistic and whole-of-life basis, which involves assessing the Project from both a capital and recurrent budget perspective.

The financial analysis conducted has assisted in informing key aspects of the Reference Project, risk assessment, affordability analysis, economic analysis, and other relevant areas.

16.2 Inputs and Assumptions

A financial model was developed to determine the risk-adjusted net financial cost of delivering the Reference Project, using a Construct Only (with ETI) model. Table 16-1 summarises key inputs and assumptions used in the financial analysis.

Table 16-1 Key inputs and assumptions

COMPONENT	ASSUMPTIONS / INPUTS
Assessment	<ul style="list-style-type: none"> ▪ All references to real dollars in this Report refer to FY17 dollars. Further, all NPV and NPC figures are discounted to 1 July 2017 ▪ In cases where revenues and costs are included in the analysis, Net Present Value (NPV) values are presented. Conversely, when only costs are included (e.g. when calculating the PSC under the Construct Only (with ETI) delivery model), NPC values are presented ▪ Evaluation period of 30 years has been adopted for the financial analysis, noting the affordability assessment considers a 40-year operational period (to align with proponent requirements) ▪ As the Reference Project represent a greenfield project, no current state costs are assumed to be avoided through proceeding with the LFRIP as against the Base Case.



COMPONENT	ASSUMPTIONS / INPUTS
Project Timing & Delivery	<ul style="list-style-type: none"> ▪ Design and construction, 4 years. Starting July 2017 and finishing June 2021 ▪ Commissioning and operations, 26 years. Starting July 2021, finishing June 2047 ▪ It has been assumed that the LFRIP is procured using an ETI contracting approach, in line with the recommendations from the delivery model analysis.
Escalation Assumptions	<p>Where nominal costs are provided, all real costs (including capital, implementation and operating costs) have been escalated by 2.5% per annum. This rate has been determined with reference to the average Australian inflation rate observed over the last 5-year period of 2%, plus a margin of 0.5% to allow for the higher cost increases generally observed in the construction and infrastructure industries.</p>
Capital Costs	<ul style="list-style-type: none"> ▪ SunWater and GAWB prepared an initial real capital cost estimate for the Reference Project ▪ The financial analysis undertaken for the Reference Project utilised the raw capital estimates and further developed minimum, maximum and most likely real unit price for each key capital item and form the basis of the Monte Carlo analysis ▪ P50 and P90 Estimates have been prepared based on this analysis
Raw Operating Costs	<ul style="list-style-type: none"> ▪ The operations and maintenance cost assumptions are based on assumed unit quantities and real annual price distribution ranges ▪ The unit price distribution ranges specify a minimum, maximum and most likely annual real unit price for each key operational and maintenance cost item and form the basis of the Monte Carlo analysis ▪ P50 and P90 Estimates have been prepared based on this analysis. ▪ The key items comprising the ongoing real operations and maintenance cost assumptions include: <ul style="list-style-type: none"> – environment – electrical, controls and communications – mechanical – roads and other external – staff.
Implementation Costs	<ul style="list-style-type: none"> ▪ Implementation costs consider only 'owner costs'. ▪ The financial analysis undertaken for the Reference Project utilised the raw capital estimates and further developed minimum, maximum and most likely real unit price for each key capital item and form the basis of the Monte Carlo analysis. ▪ P50 and P90 Estimates have been prepared based on this analysis
Project risk assumptions	<ul style="list-style-type: none"> ▪ The allocation of total systematic risk (planned and unplanned) between the public sector and the private sector is based on the outcome of the risk analysis performed for the LFRIP ▪ Under a Construct Only (with ETI) delivery model, the state will procure the Project. Consequently, all systematic risk is assumed to be retained by the state (i.e. no risk is assumed to be transferred to the private sector under the ETI delivery model)



COMPONENT	ASSUMPTIONS / INPUTS
Demand	<p>For the central case, it has been assumed that:</p> <ul style="list-style-type: none"> LSC pays for and receives 4,000 ML from commissioning of the weir GAWB pays for and received 30,000 ML from commissioning of the weir Agricultural 'best estimate' demand includes (based on the demand analysis) 13,400 ML of high priority water for feedlot and fodder crops <p>The central case therefore assumes a total of 47,400 ML high priority allocation within 2 years of operation (with first year to be a total of 45.900 ML due to ramp up of feedlot).</p> <p>A number of scenarios have been run to consider both pricing and demand scenarios</p>
Pricing	<p>Key assumptions adopted in the building up of the price include:</p> <ul style="list-style-type: none"> the assumed pricing approach is the allocation method Operating expenses are passed through at cost in the pricing build up, assuming that the costs are 100% efficient and directly related to the operations It is assumed that a return on and of all capital expenses (including the DNRM allocation fee, planning, construction, business case and implementation costs) is able to be recovered in the pricing build up It is assumed that the Federal Government funding is not able to be recovered from the customers as part of the return on capital expenditure Depreciation is recovered (a return of capital) on a straight-line basis over 40 years Indexation of the asset base (and operating expenses) is included at 2.5% per annum Pricing is calculated on a pre-tax basis. Financing is not considered in the calculation. A number of scenarios have been run to consider both pricing and demand scenarios

16.3 Whole of life financial analysis

16.3.1 Outputs

Table 16-2 summarises the P90 net financial cost to the state of delivering the Reference Project using a Construct Only (with ETI) model. The risk-adjusted net financial cost to the state is presented in both real and nominal terms, and as an NPV. The cost presented below excludes costs incurred up to 30 June 2017 of \$29.3 million.

Table 16-2 P90 Financial Analysis of the Reference Project

COMPONENT	REAL \$M	NOMINAL \$M	NPV \$M
Total risk adjusted upfront costs	(306.1)	(322.9)	(287.2)
Operations and maintenance costs	(35.3)	(55.2)	(21.2)
Total costs (including risk provisions)	(341.3)	(378.0)	(308.4)
Total revenue	159.4	195.1	128.0
Total cost of the Reference Project (P90)	(181.8)	(183.0)	(180.4)



COMPONENT	REAL \$M	NOMINAL \$M	NPV \$M
Total cost of the Reference Project (P50)	(165.6)	(165.0)	(164.9)

The total P90 risk adjusted net cost of the LFRIP, over 30 years, is \$181.8 million (real \$, 2016-17), or \$183.0 million in nominal terms, equivalent to a NPC of \$180.4 million. This is made up of:

- total risk adjusted upfront costs for the LFRIP is \$306.1 million (real \$, 2016-17), or \$322.9 million (\$352.2 million minus \$29.3 million expended), in nominal terms
- total risk adjusted ongoing operational costs of \$35.3 million (real \$, 2016-17), or \$55.2 million in nominal terms
- total estimated revenue of \$159.4 million (real \$, 2016-17), or \$195.1 million in nominal terms

The above estimates exclude all costs incurred as of 30 June 2017, approximately \$29.3 million.

16.3.2 Sensitivities

Sensitivity analysis have been performed on the Base Case assumptions to provide further insight on the potential impact of movements in key variables on the NPV of the Reference Project. Table 16-3 summarises the assumptions that have been adjusted for the purposes of completing the sensitivity analysis on the NPV of the Reference Project.

Table 16-3 Reference Project Sensitivities

ASSUMPTION	DESCRIPTION
Capital expenditure	Percentage variations in the capital expenditure by $\pm 10\%$
Implementation expenditure	Percentage variations in the implementation costs by $\pm 10\%$
Operations and maintenance costs	Percentage variations in the operations and maintenance costs by $\pm 10\%$
Escalation	Absolute variations in the escalation rates adopted by $\pm 1\%$
Discount rate	Absolute variations in the discount rate adopted by $\pm 1\%$

A summary of the outputs of our sensitivity analysis on the NPV of the Reference Project is set out in Table 16-4.

Table 16-4 P90 Sensitivity Analysis on the NPV of the Reference Project

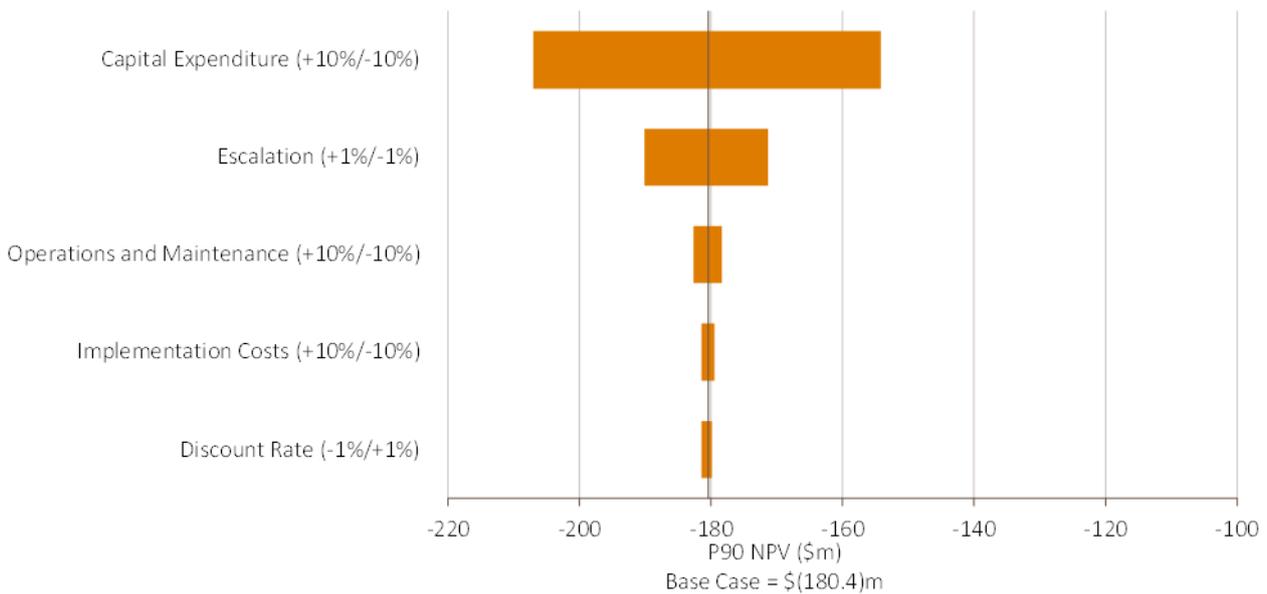
SENSITIVITY	NPV \$M	DIFFERENCE TO REFERENCE PROJECT (\$M)	DIFFERENCE TO REFERENCE PROJECT (%)
REFERENCE PROJECT			
Central Case	(180.4)	Not applicable	Not applicable
CAPITAL EXPENDITURE			
+10%	(207.0)	(26.6)	14.8%
-10%	(154.1)	26.3	(14.6%)



SENSITIVITY	NPV \$M	DIFFERENCE TO REFERENCE PROJECT (\$M)	DIFFERENCE TO REFERENCE PROJECT (%)
IMPLEMENTATION COSTS			
+10%	(181.4)	(1.0)	0.6%
-10%	(179.5)	0.9	(0.5%)
OPERATIONS AND MAINTENANCE			
+10%	(182.6)	(2.2)	1.2%
-10%	(178.3)	2.1	(1.2%)
ESCALATION			
+1%	(190.1)	(9.7)	5.4%
-1%	(171.3)	9.1	(5.0%)
DISCOUNT RATE			
+1%	(179.9)	0.5	(0.3%)
-1%	(181.4)	(1.0)	0.6%

The P90 results in Table 16-4 above are shown graphically in Figure 16-1.

Figure 16-1 Graphical Representation of Reference Project Sensitivity Analysis (P90)



The results presented in Table 16-4 and Figure 16-1 above outlines the NPV of the Reference Project is materially impacted by changes in each of the key variables considered, though is particularly sensitive to movements in capital costs, where a 10 per change in cost can result in approximately 15 per cent change in the risk adjusted NPC of the LFRIP.

A range of demand and pricing scenarios for the LFRIP have been considered with financial and commercial findings from key scenario presented under the affordability analysis.



16.4 Conclusion

Under the central case demand scenario, the Reference Project has a P90 risk-adjusted NPC of \$180.4 million, over a 30-year assessment period. Over 40 years of operations, as considered in the affordability assessment, the P90 risk-adjusted NPC is approximately \$185.1 million.

The net financial position is highly sensitive to changes in capital costs, as well as changes in the pricing and/or water demand scenarios.



PART E – DELIVERY



17 DELIVERY MODEL ANALYSIS

CHAPTER SUMMARY AND CONCLUSIONS:

- A number of project delivery options can be used to undertake the Project. Broadly speaking, these delivery options can be categorised as follows:
 - Traditional delivery model options (i.e. Construct Only; Construct Only with ETI subset; Design and Construct (D&C); D&C with ECI subset; Design, Construct, Maintain and Operate (DCMO); Alliance; and Managing Contractor).
 - Partnership delivery model options (i.e. Availability Payment PPP and Build, Own, Operate (BOO) / Transfer (BOOT)).
- For the purpose of the delivery model analysis:
 - The assumed packaging consists of the construction of the Rookwood Weir and ancillary infrastructure, Riverslea crossing, Foleyvale crossing, and Hanrahan crossing.
 - It has been assumed that the Reference Project will be delivered in one stage.
- Based on the qualitative assessment of the VFM drivers, it was concluded that there is insufficient scope for value generation from a partnership delivery model. As such, only traditional delivery model options were included in the delivery model assessment.
- Based on the assessment of the most suitable delivery model options, it was concluded that the most appropriate traditional delivery model is D&C with ETI, with Construct Only with ECI scoring similarly. As ETI and ECI are subsets of the Construct Only and D&C delivery models, the preferred delivery model is proposed as Construct Only (with ETI to be considered during the procurement process and dependent on the advancement of the design at that point in time). D&C is noted as an alternatively acceptable delivery model (with ECI to be considered during procurement). This decision will be dependent on the deemed level of design work undertaken up to award.

17.1 Purpose

The purpose of this chapter is to assess the delivery model options available and to perform a qualitative VFM assessment. This chapter:

- presents the delivery models available (Section 17.2)
- examines packaging and staging opportunities (Section 17.3)
- completes a qualitative VFM assessment for the Project (Section 17.4)
- determines the most suitable delivery model option for the Project (Section 17.5).

17.2 Delivery Models Available

A number of project delivery options can be used to deliver the Reference Project. Broadly speaking, these delivery options can be categorised as follows:

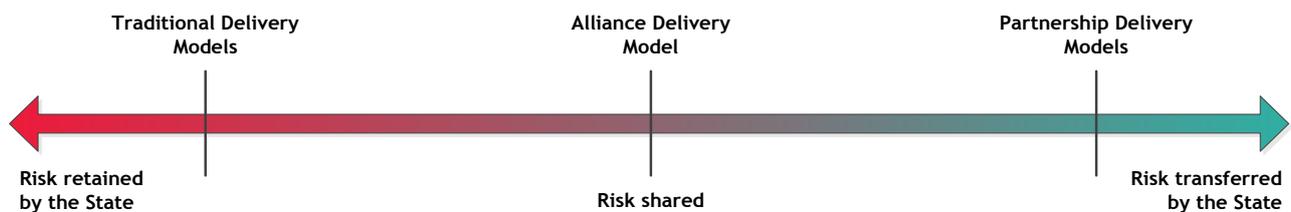
- traditional delivery model options, including:
 - Construct Only



- Construct Only with ETI
- D&C
- D&C with ECI
- DCMO
- Alliance
- Managing Contractor.
- partnership delivery model options, including:
 - Availability Payment PPP
 - BOOT.

Each of the delivery model categories referred to above can be placed on a continuum according to the amount of risk capable of being transferred to the private sector, as set out in Figure 17-1.

Figure 17-1 Delivery Model Continuum



ETI and ECI are subsets of Construct Only and D&C respectively, with the prime difference being that a limited field of prime contractors are involved earlier in the procurement process to obtain feedback and input on the design and/or construction process.

A comprehensive review of other comparable water infrastructure projects has been completed to:

- highlight the models mostly commonly used for delivering water infrastructure projects
- determine the delivery models most suitable for the Reference Project.

Table 17-1 provides a general discussion on the characteristics of each delivery model available as well as information on the suitability and key drivers of each model. Table 17-1 also refers to examples of other comparable water infrastructure projects.



Table 17-1 Characteristics, Suitability and Key Drivers of Available Delivery Models

DELIVERY MODEL	SUITABILITY AND KEY DRIVERS
Traditional Delivery Model Options	
<p>Construct Only: The government retains full responsibility for design and documentation (via engaging a design consultant) and tenders for construction contractors</p> <p>Example:</p> <ul style="list-style-type: none"> ▪ Keepit Dam Safety Upgrades, NSW 	<ul style="list-style-type: none"> ▪ The project scope and works are routine, uncomplicated, and of a small-to-medium size and duration. ▪ The project content is well defined through a consolidated/peer reviewed design process. ▪ The timeframe for project delivery is not compressed, allowing the design and construction to be conducted sequentially. ▪ Construction innovation is not considered a priority. ▪ The Principal is willing to retain design risk as it relates to the construction, as well as the majority of other risks. ▪ A high degree of cost certainty at the time of award is desirable. ▪ Government has suitably skilled and experienced resources to manage the project delivery.
<p>Early Tenderer Involvement (ETI): A subset of the Construct Only delivery model, this model involves selecting shortlisted competing contractors to participate in value engineering and refinement of a client’s preliminary designs</p> <p>Examples:</p> <ul style="list-style-type: none"> ▪ Shannon Creek Dam, Clarence Valley Council ▪ Mt Crosby East Bank Water Treatment Plant - Centrifuge Upgrade Project, Seqwater 	<p>In addition to the points noted under Construct Only:</p> <ul style="list-style-type: none"> ▪ A relationship (not adversarial) contracting environment is desirable. ▪ The scope is well defined. ▪ There is a perceived benefit of early involvement of the contractor, in identifying the most effective method to procure and manage the construction. ▪ There is scope for value engineering / refinement of existing design documentation. ▪ There is market interest and scope for competition.
<p>Design and Construct (D&C): The government contracts with a single entity that is responsible for both design and construction of the project</p> <p>Examples:</p> <ul style="list-style-type: none"> ▪ Meander Dam Construction Project, Tasmania ▪ Bootawa Dam Water Treatment Plant, NSW ▪ Folsom Dam Joint Federal Project, USA ▪ Calveras Dam Replacement Project, USA ▪ Olivenhain Dam, USA ▪ Glencorse Water Treatment Works, Scotland 	<ul style="list-style-type: none"> ▪ The project scope and works are routine, uncomplicated, and well-defined. ▪ It is desirable to fast-track the project timeframe, by running design and construction activities partially in parallel. ▪ A degree of innovation in the design is desirable. ▪ A high degree of cost certainty at the time of award is desirable. ▪ The Government has suitably skilled and experienced resources to manage the project delivery. ▪ There is a desire to have a single point of responsibility for design and construction. ▪ There is an opportunity to realise benefits by combining the design and construction.



DELIVERY MODEL	SUITABILITY AND KEY DRIVERS
<p>Early Contractor Involvement (ECI): A subset of the D&C delivery model, this model involves engaging a construction contractor prior to commencing a project to work in collaboration with the project sponsor</p>	<p>In addition to the points noted under D&C:</p> <ul style="list-style-type: none"> ▪ There is a perceived benefit of early involvement of the contractor, in assisting with scoping the project and outcomes. ▪ A relationship (not adversarial) contracting environment is desirable.
<p>Design, Construct, Maintain and Operate (DCMO): The government contracts with a single entity that is responsible for both design and construction of the project as well as the operations and maintenance components Examples:</p> <ul style="list-style-type: none"> ▪ Adelaide Desalination Plant, SA ▪ Kurnell Desalination Plant, NSW ▪ Tampa Bay Seawater Desalination Plant, USA 	<p>In addition to the points noted under D&C:</p> <ul style="list-style-type: none"> ▪ There is a desire to have a single point of responsibility for the design, construction, operations and maintenance phases. ▪ There is an opportunity to realise benefits by combining design, construction, operations and maintenance into one package. ▪ Innovation across the whole-of-life of the facility or infrastructure is desirable and achievable. ▪ There is a desire/opportunity to realise efficiencies in the ongoing operations and maintenance components of an asset and associated service/s.
<p>Alliance: The government enters into a transparent ‘open book’ co-operative contracting arrangement with the private sector wherein unforeseen risks and benefits are essentially shared Examples:</p> <ul style="list-style-type: none"> ▪ Wyaralong Dam, Queensland ▪ Logan River Catchment Project, Queensland ▪ Burnett Water Project, Queensland ▪ Hinze Dam Stage 3 Construction, Queensland ▪ Eildon Weir Improvement Works, Queensland ▪ Thames Water Desalination Plant, UK 	<ul style="list-style-type: none"> ▪ The project is complex or high-risk. ▪ The scope is unclear and the risks are unpredictable. ▪ A high level of innovation is required, particularly in resolving technical challenges or maximising operating efficiencies and performance. ▪ Where a transparent relationship is possible and desirable. ▪ Where flexible schedule is desirable. ▪ A knowledge transfer between parties is highly desirable. ▪ Where risks are best managed collectively and collaboratively. ▪ Close involvement of the owner can add value. ▪ There is sufficient capacity and capability to resource the alliance.



DELIVERY MODEL	SUITABILITY AND KEY DRIVERS
<p>Managing Contractor: The government engages a head contractor to coordinate, engage and manage the design, procurement, and construction, while retaining the ability to directly influence the design development. Often delivered under a negotiated capped price (guaranteed construction sum or CGS)</p>	<ul style="list-style-type: none"> ▪ The project is complex or high-risk. ▪ The scope is unclear and the risks are unpredictable. ▪ There may be significant time constraints, necessitating bundled delivery. ▪ A high level of innovation is required, particularly in resolving technical challenges or maximising operating efficiencies and performance. ▪ Where a transparent relationship is possible and desirable. ▪ Where delivery is essential, but a flexible schedule is desirable. ▪ A knowledge transfer between parties is desirable. ▪ Where risks are best managed collectively and collaboratively. ▪ Close involvement of the owner can add value ▪ There is sufficient capacity and capability to resource the alliance.
<p>PARTNERSHIP DELIVERY MODEL OPTIONS:</p>	
<p>Availability Payment Public Private Partnership (PPP): A Special Purpose Vehicle (SPV) receives a guaranteed fixed payment from the government in return for delivering a project on behalf of the public sector (i.e. an availability payment) Example: Mundaring Weir Water Treatment Plant, WA Tuaspring Desalination and Integrated Power Plant, Singapore</p>	<ul style="list-style-type: none"> ▪ There is a major and complex capital investment programme, requiring effective management of risks associated with construction and operations and maintenance. ▪ The private sector has the expertise to deliver the project and there is good reason to think it will offer value for money. ▪ The public sector can clearly define its needs as service outputs that can be adequately measured and contracted for in a way that ensures effective, equitable and accountable delivery of public services into the long-term and where risk allocation between public and private sectors can be clearly made and enforced. ▪ The assets and services identified as part of the partnership scheme are capable of being costed on a whole-of-life long-term basis and there is scope for innovation. ▪ The value of the project is sufficiently large to ensure that procurement costs are not disproportionate. ▪ The technology and other aspects of the sector are stable, and not susceptible to fast-paced change. Or, if the technology relevant to the project is subject to rapid change, the private sector is able to allow for an appropriate technology refresh without impacting service requirements and/or introducing significant pricing uncertainty. ▪ Planning horizons are long-term, with assets used well into the future.
<p>Build, Own, Operate / Transfer (BOO/T): A SPV builds, owns and operates an asset for a specified period during which time the SPV is entitled to collect user charges Example: Prospect Water Filtration Plant Macarthur Water Filtration Plant</p>	<p>In addition to the points noted under Availability Payment PPP:</p> <ul style="list-style-type: none"> ▪ An element of demand/revenue risk is transferred to the private sector. ▪ Project returns depend in part on the user charges expected to be collected during the operations phase. ▪ The state may be required to make capital contributions during the construction phase to help fund the project. ▪ The state may be required to underwrite a minimum level of demand for the project (usually only sufficient to cover the debt obligations of the SPV). ▪ Applicable to greenfield or brownfield projects (but most commonly used for brownfield projects in the current environment). ▪ Residual risk may be transferred to the private sector under a BOO model.



For completeness, it is noted the above example projects are indicative only and based on an interpretation of publicly available material. In some instances, projects may have been delivered using combined elements of different delivery models.

17.3 Packaging and Staging Opportunities

17.3.1 Packaging and Staging Overview

Packaging and staging options for the Project have been identified and considered, to ensure that opportunities for additional benefits and VFM been assessed. This includes consideration of the various assets that may form components of the Project, services that may be bundled within the scope of the Project, and the ability for elements of the Project to be delivered across stages.

This involved consideration with regard to:

- differentiation between core and non-core assets and services
- potential constraints on packaging assets and services
- expected efficiencies from packaging construction and operational and maintenance components
- the ability of a staged approach to satisfy the timeline and service requirements
- the impact of packaging and staging on risks and risk transfer.

17.3.2 Assumed Packaging

For the purpose of the delivery model analysis, the assumed packaging consists of the construction of the Rookwood Weir and ancillary infrastructure, Riverslea crossing, Foleyvale crossing, and Hanrahan crossing. The operations and maintenance of the weir is also potentially an element of the package, to be confirmed through the assessment.

Potentially separable portions or packages of the Project include:

- Construction and capital works:
 - The construction of the Rookwood Weir and associated ancillary infrastructure.
 - Augmentation and construction of access roads consisting of the Thirsty Creek Road and the intersection with the Capricorn Highway at Gogango.
 - Construction of bridges upstream at Riverslea and Foleyvale crossings, including augmentation of the approaches to accommodate the high elevation of the new bridges (approximately 25 metres above normal river level).
 - Installation of culverts at Hanrahan Crossing downstream of Rookwood Weir.
- Operational and maintenance works:
 - Maintenance and management of the weir infrastructure.
 - Operations and maintenance of Riverslea crossing, Foleyvale crossing, and Hanrahan crossing.
 - Operation and maintenance of Thirsty Creek Road and access roads through Gogango.
 - Offsets and environmental obligations.



The Riverslea crossing and Foleyvale crossing are both critical to the delivery schedule of the Rookwood Weir, and both the market and the proponents have indicated the need to bundle it with the weir to ensure the delivery schedule is achieved and to better coordinate required materials and resources.

The Hanrahan crossing is smaller in scale and is also critical to the Project's delivery schedule in terms of safe operational release of water downstream. GAWB and SunWater have indicated that delivery of these works via local contractors some desirability to engage local employment and aligned with the EIS. For the purpose of the analysis, these crossings are assumed to be within the main package offered to the lead contractor (noting these works form a small percentage of the total estimated capital works and associated cost).

For completeness, it is noted this assumption does not preclude the Foleyvale and Hanrahan crossings being delivered by local contractors. For example, a requirement for the lead contractor to engage with local contractors for the delivery of the Foleyvale and Hanrahan crossings may form part of the procurement criteria or other conditions imposed by the state (depending on the delivery model selected).

Construction and operation and maintenance of roads, and the operation and maintenance of the crossings is assumed to be undertaken by RRC and TMR. On this basis, they have been excluded from the package assumed for the delivery model assessment.

The new Foleyvale and Rookwood bridges are anticipated to become contributed assets of TMR and RRC respectively, with both organizations integral to the bridge design and construction.

17.3.3 Assumed Staging

For the purpose of the delivery model assessment, the Reference Project is assumed to be delivered as a single stage. Funding and construction of any subsequent stages would be subject to additional analysis and funding submission.

17.4 Qualitative VFM Assessment

17.4.1 Overview

A key element of this business case is to provide an indication of whether there is potential to achieve a VFM outcome for the state by delivering the Project under a partnership delivery model as opposed to a traditional delivery model.

The Project Team followed the principles of National PPP Guidelines and the Building Queensland BCDF, modelled on the state's PAF, to complete a qualitative VFM assessment. This included developing a VFM discussion paper which assisted the Project stakeholders to consider: the potential qualitative VFM drivers; the impact the drivers may have on the Project; and the potential for these drivers to deliver VFM compared to traditional procurement. An overview of the methodology followed and the qualitative VFM assessment outcomes is set out in the following sections.

For completeness, it is noted that a quantitative VFM assessment has not been completed as part of the DBC. This is in line with the PAF guidelines which stipulate only a qualitative VFM assessment is required to be undertaken.

17.4.2 Value for Money Drivers

The qualitative VFM assessment involves examining the extent to which key VFM drivers are present in partnership delivery models.



The Building Queensland Framework, incorporating PAF, sets out the drivers to consider in evaluating the presence of VFM in partnership models. These VFM drivers can be broadly categorised into the following five categories (each of which are assumed to be of equal importance for the purposes of completing the Base Case qualitative VFM analysis):

- risk allocation
- whole-of-life costing
- innovation
- improved asset utilisation
- economies of scale
- competitive market.

The relevance and importance of these drivers will vary from project to project. That is, the drivers may or may not be assumed to be of equal importance. In some cases, one or more of the drivers may not be considered relevant to a project at all.

For the purposes of completing the Base Case qualitative VFM assessment of the Project however, each driver is assumed to be of equal importance. Sensitivities on the weightings are then considered to determine whether the VFM outcomes materially differ according to the weightings assumed.

Table 17-2 provides a brief summary of the matters that are typically considered in determining whether each driver has the potential to deliver VFM to the state for a particular project.

Table 17-2 Value for Money Drivers

VFM DRIVER	POTENTIAL FOR VFM UNDER PARTNERSHIP DELIVERY MODEL
Risk allocation Weighting = 16.7%	<ul style="list-style-type: none"> ▪ Have risks been allocated to the party best able to manage and control the risks? ▪ Is there a genuine transfer of risk to the private sector? ▪ Does the market have sufficient management quality to control the transferred risks? ▪ Does the market have the appetite to take the risks being transferred? ▪ Is there sufficient credit quality in the market? ▪ Can the contract be developed to enforce the risk allocation? ▪ Can the risk allocation be relied upon even under extreme circumstances, such as private sector default? ▪ Have design, planning, completion and operational risks been allocated to the private sector? ▪ To what extent is residual value risk transferred to the private sector? ▪ Is payment at risk to service performance?
Whole-of-life costing Weighting = 16.7%	<ul style="list-style-type: none"> ▪ Is the private sector free to determine the operating and maintenance requirements to meet the output specification? ▪ Is the private sector responsible for all refurbishment requirements? ▪ Is the private sector responsible for performance of the asset throughout the contract period?
Innovation Weighting = 16.7%	<ul style="list-style-type: none"> ▪ Is the private sector free to determine how to deliver the services? ▪ Is the manner of the design and construction of the asset a decision under the control of the private sector? ▪ Is there scope for innovation either in asset design or service delivery?



VFM DRIVER	POTENTIAL FOR VFM UNDER PARTNERSHIP DELIVERY MODEL
	<ul style="list-style-type: none"> ▪ Is the scope of service delivery sufficient to provide incentive for innovative design solutions? ▪ Is the private sector responsible for all or only part of the services required? ▪ To what extent is the public sector responsible for service delivery utilising the asset?
Improved asset utilisation Weighting = 16.7%	<ul style="list-style-type: none"> ▪ Is the private sector service provider able to generate additional third party income from the asset? ▪ Can the private sector provide additional services to third parties? ▪ Is third party revenue generation likely to reduce the overall cost of the service to the Government?
Economies of scale Weighting = 16.7%	<ul style="list-style-type: none"> ▪ Is the market for the service large enough to access significant economies of scale, in either construction or operation?
Competitive market Weighting = 16.7%	<ul style="list-style-type: none"> ▪ Are there a number of private sector bidders for this type of project? ▪ Is there a strong market appetite to participate in the project?



17.4.3 Qualitative Value for Money Assessment

Analysis of each VFM driver provides a value generation score for each driver of the Project, based on the following scoring system:

- ✘ = no scope for value generation relative to traditional procurement (Score = 1)
- ✓ = some scope for value generation relative to traditional procurement (Score = 2)
- ✓✓ = reasonable scope for value generation relative to traditional procurement (Score = 3)
- ✓✓✓ = excellent scope for value generation relative to traditional procurement (Score = 4).

An overall value generation score of less than 2.0 suggests there is no potential for achieving a VFM outcome under either the Availability Payment PPP or BOO/T delivery models. An overall value generation score of 2.0 or greater suggests there is potential for achieving a VFM outcome under the Availability Payment PPP or BOO/T delivery models.

A VFM assessment workshop, attended by representatives from Building Queensland, GAWB, SunWater, DEWS, Queensland Treasury and nominated external advisors, was conducted to determine the suitability of a partnership model. During this process, participants had regard to the outcomes of the market sounding process, the demand analysis and the research on other comparable projects.

A qualitative assessment of the VFM drivers is set out in Table 17-3.

Table 17-3 VFM Drivers Assessment

VFM DRIVER	ASSESSMENT	REASONING
Risk allocation Weighting = 16.7%	✓ (Score = 2)	<ul style="list-style-type: none"> ▪ The private sector appears willing and able to bear and manage a significant portion of the risks associated with delivering and maintaining the required infrastructure for the Project ▪ The private sector may also accept an element of demand risk but is likely to require some form of government support (e.g. an agreement to underwrite a minimum level of demand or a cap and collar arrangement). As such, any attempt to completely transfer demand risk to the private sector may result in a less than optimal VFM outcome to the state, given the risk premium that would likely be applied ▪ Risks associated with capital expenditure, and program and service delivery pricing risks can be readily managed by the private sector, provided the technical specifications and the operational requirements of the Project are clearly defined ▪ A broad range of payment mechanisms is likely to be possible, including fixed payments and user charges. Further, the payment mechanism is also likely to be able to be structured to allow for contract variations and abatements for unsatisfactory performance
Whole-of-life costing Weighting = 16.7%	✘ (Score = 1)	<ul style="list-style-type: none"> ▪ The private sector may be offered the opportunity to determine the operating and maintenance requirements necessary to meet the output specifications of the state. However, there are a number of current laws and regulations that will heavily dictate every aspect of the asset's operation (potentially constraining the ability of the private sector to operate the asset in a materially different way to the state) ▪ The private sector could be held responsible for the performance of the infrastructure over the life of the contract as measured against a clear set of key performance indicators ('KPIs') and service level agreements ('SLAs') (e.g. compliance with environmental conditions). The payment mechanism may be



VFM DRIVER	ASSESSMENT	REASONING
		<p>structured to allow for contract variations and abatements for unsatisfactory performance against these KPIs and SLAs</p> <ul style="list-style-type: none"> As the annual operating and maintenance costs are estimated to represent a relatively small proportion of the total capital cost (<1%), the scope for private sector efficiency is limited
Innovation Weighting = 16.7%	✘ (Score = 1)	<ul style="list-style-type: none"> There is limited scope for the private sector to develop innovative solutions for reducing the cost of delivering, operating and maintaining the Project's assets Current laws and regulations are likely to prevent the private sector from operating the asset (once completed) in a materially different way to the state It may be possible for the private sector to incorporate further innovations in elements of the dam's design (e.g. identifying a more cost effective or geotechnically stable location for the dam), however this would likely entail re-starting the design and environmental approvals process (which has taken more than 10 years to date). The time and cost associated with re-starting the design and environmental approvals process is prohibitive, particularly as any improvements which may be incorporated into the Project's design are unlikely to materially improve the overall cost or quality of the Project
Improved Asset Utilisation Weighting = 16.7%	✘ (Score = 1)	<ul style="list-style-type: none"> There may be some scope to incorporate hydroelectric generators as part of the weir's design to assist with cost recovery. Although further work is required to properly define the opportunity, it is estimated that between \$800k and \$900k of project costs per annum may be offset if hydroelectric generators are installed. At present, the installation of hydroelectric generators does not form part of the Reference Project adopted for the preparation of the detailed business case Aside from the above opportunity, the opportunity for the private sector to reduce costs to government through third party utilisation or through more efficient design to meet performance specifications is limited
Economies of Scale Weighting = 16.7%	✘ (Score = 1)	<ul style="list-style-type: none"> The market for providing the operating and maintenance services required by the Project is unlikely to be large enough to access economies of scale. Indeed, GAWB and SunWater may be more efficient than the private sector given their large portfolio of existing assets and significant operating experience. The Project's relatively small operating and maintenance component also reduces the opportunities for economies of scale The market for providing the construction services required by the Project is large, however the Project's relatively modest capital cost reduces the opportunities for economies of scale in construction
Competitive Market Weighting = 16.7%	✓ (Score = 2)	<ul style="list-style-type: none"> There is strong demand from contractors to build the infrastructure for the Project There is also strong demand from the market to fund the Project but only if the state agrees to enter into an Availability Payment PPP or underwrite a minimum level of demand Competition may increase if the Project is broken down into various packages (e.g. the bridges required for the Project may be delivered by smaller operators based in the surrounding regional area), though it is noted that some efficiency gains from combined deliver may be lost.
Overall	1.3	



On the assumption that the VFM drivers are of equal importance and should therefore be equally weighted, an overall value generation score of 1.3 is calculated for the Project. As discussed previously, an overall value generation score of 2.0 or greater suggests there is potential for achieving a VFM outcome under the Availability Payment PPP or BOO/T delivery models.

Based on the analysis set out in Table 17-3 there is insufficient scope for value generation from either an Availability Payment PPP or BOO/T delivery model. On this basis, it is recommended the state proceed with a traditional delivery model. As such, this DBC does not include an assessment of a Public Sector Comparator, which would only be required under a PPP model.

For completeness, it is noted that no VFM driver has a rating of greater than 2.0 and several VFM drivers have a rating below 2.0. Assuming that all criteria have some weighting, no weighting scenario can alter the outcome of the qualitative VFM assessment.



17.5 Delivery Model Analysis

17.5.1 Assessment Framework

The delivery model options analysis has been conducted drawing on a draft PAF supplementary guidance document provided by Queensland Treasury which supersedes Building Queensland's BCDF guidance. This guidance document recommends a comparative assessment of the delivery models across a range of weighted analysis criteria.

17.5.2 Analysis Criteria

The assessment was completed across a range of cost and quality criteria, based on those proposed in the guidance document. Discussions with the Project Team and the proponents identified that an increased level of granularity in the criteria would be beneficial, resulting in the following delivery option analysis criteria:

- Cost criteria
 - capital cost
 - O&M costs
 - risk – capital
 - risk – O&M
 - transaction and contract management costs.
- Quality criteria
 - capital outcomes
 - operational outcomes
 - design innovation
 - operational innovation
 - timeliness
 - flexibility
 - stakeholder control and input
 - policy alignment.

These criteria were weighted in relation to their significance and relevance to the Project, based on the characteristics of the Project.

17.5.3 Criteria Weightings

The most suitable delivery model for the Project can be determined by assessing the key drivers of each delivery model (as outlined above) against the characteristics of the Project itself.

Table 17-4 summarises the key characteristics of the Project in broad terms, having regard to the factors outlined above, and provides details of the weighting applied to each criterion in the determination of the most suitable delivery model.



Table 17-4 Project Characteristics and Criteria Weighting

Factor	Project Characteristics and Comments	Weighting
Cost criteria		55.0%
Capital cost	<ul style="list-style-type: none"> Capital costs receive a higher weighting as they represent the majority of the Project costs (i.e. O&M costs are a relatively small component). Although the Project is relatively moderate in terms of its size (total estimated cost of \$300 million to \$350 million), there is strong demand from tier 1 contractors to build the Project (i.e. competitive tender pricing should be possible) 	32.5%
O&M costs	<ul style="list-style-type: none"> O&M costs represent a relatively small component of the total Project cost (~\$1.5 million per annum) and are thus weighted significantly lower than the capital costs 	7.5%
Risk - capital	<ul style="list-style-type: none"> Capital costs are able to be estimated with a reasonable degree of accuracy and it is possible for the state to transfer design / construction risks to the private sector under selected traditional models 	10.0%
Risk – O&M	<ul style="list-style-type: none"> O&M costs are able to be estimated with a reasonable degree of accuracy (but are considerably less material than capital costs) 	2.5%
Transaction and contract management costs	<ul style="list-style-type: none"> Procurement costs are unlikely to be significant relative to the total Project cost (e.g. external consultant costs). Implementation costs are also unlikely to be significant relative to the total Project cost (<5%). On this basis, transaction and contract management costs are weighted relatively low 	2.5%
Quality criteria		45.0%
Capital outcomes	<ul style="list-style-type: none"> Ensuring a high-quality capital outcome is an important objective of the Project 	7.5%
Operational outcomes	<ul style="list-style-type: none"> Operational outcomes are considered as important as the capital outcomes given the nature of the asset and the various regulatory and compliance requirements that must be adhered to (notwithstanding the relatively small scale of the O&M component) 	7.5%
Design innovation	<ul style="list-style-type: none"> There is limited scope to incorporate innovative designs into the construction of the weir to improve its function 	2.5%
Operational innovation	<ul style="list-style-type: none"> Operational innovation is considered less important given the nature of the asset and the relatively small scale of the O&M component 	2.5%



Factor	Project Characteristics and Comments	Weighting
Timeliness	<ul style="list-style-type: none"> ▪ Timeliness is an important feature of the Project. Currently, the construction of the weir is expected to occur over two dry seasons to avoid flood risks. As the weir can only be constructed during certain periods, a delay in the Project's construction schedule may result in an exponential delay in the Project's completion date (for example, a two-month delay in the construction schedule may result in a one year delay in the Project's completion due to seasonal risks pertaining to in-river construction). This may be an issue in circumstances where the state has entered into contracts with customers based on the expected completion date but is unable to deliver the water. In these circumstances, the state may occur penalties for failing to meet its obligations under the contracts it has entered into. It is noted the forecast demand is expected to come on gradually over time (not immediately), so the benefits associated with delivering the Project earlier may not be overly significant. 	7.5%
Flexibility	<ul style="list-style-type: none"> ▪ A degree of flexibility regarding the delivery schedule. 	7.5%
Stakeholder (Owner) control and input	<ul style="list-style-type: none"> ▪ An ability to exert control over / provide input to the design and construction of the weir is desirable as the asset needs to operate within GAWB's and/or SunWater's existing operating environment. 	7.5%
Policy alignment	<ul style="list-style-type: none"> ▪ Alignment with the state's strategic objectives is an objective of the Project. ▪ It is noted that GAWB and SunWater wish to retain the responsibility for operating and maintaining the weir (as that is their raison d'etre). ▪ Although no official policy exists in this regard, it is noted that the private sector is highly unlikely to be able to operate and maintain the weir as efficiently as GAWB and/or SunWater, given their experience and large portfolio of existing bulk water storage assets. 	2.5%

17.5.4 Assessment of Most Suitable Delivery Model

A delivery model options workshop was conducted to determine the most suitable delivery model based on the criteria and weightings that had been agreed. During this process, participants had regard to the outcomes of the market sounding process, the demand analysis and the research on other comparable projects.

Participants worked collaboratively to apply their expertise to identify raw scores out of 100 for each criterion for each delivery model under consideration. These inputs form the raw scores for each delivery model, and are detailed in Table 17-5. On the basis of the qualitative VFM assessment outcomes, partnership delivery models have not been considered in this analysis.



Table 17-5 Raw Delivery Model Scoring and Comments

Criteria	Key Comments	Construct Only	ETI	D&C	ECI	DCMO	Alliance	Managing Contractor
Cost criteria								
Capital cost	<ul style="list-style-type: none"> Capital costs are expected to be lower under models that involve 'lump sum' pricing and greater tender price competition (i.e. construct only, ETI, D&C and ECI). Capital costs are expected to be lowest under the ETI and ECI models as these models also provide contractors with the opportunity to better understand and thus price key project risks (in particular, geotechnical and materials risks) before submitting a lump sum fixed price contract while still maintaining competition. A DCMO model is expected to result in higher upfront capital costs, as contractors are more focused on whole of life opportunities (i.e. contractors are typically more focussed on delivering a higher quality capital asset under a DCMO model). An alliance model is expected to result in higher capital costs. Under an alliance model, there is less tender price competition and less price certainty. Although the parties are incentivised to complete the Project on time and within budget, the state is not provided with a 'lump sum' fixed price contract. A managing contractor model is also expected to result in higher capital costs. Under this model, a 'lump sum' fixed price contract is typically negotiated, not competitively tendered. The limited number of potential suitable tenderers may also lead to higher cost in management margins. 	70	75	65	75	50	45	50
OandM costs	<ul style="list-style-type: none"> Construct only, ETI, D&C, ECI and managing contractor models typically have less focus on lifecycle and other operational costs (government retains whole of life asset risks). An alliance model may also place less focus on lifecycle and other operational costs, however there is potentially more scope to incorporate operations and maintenance design efficiencies during the design process given their innovative culture and focus on finding 'best-for-project' solutions. 	50	60	55	60	75	70	50



DELIVERY MODEL ANALYSIS

Criteria	Key Comments	Construct Only	ETI	D&C	ECI	DCMO	Alliance	Managing Contractor
	<ul style="list-style-type: none"> Under the DCMO model, lifecycle costs can be reduced if the contractor takes into account ongoing maintenance obligations when designing and constructing the facility. 							
Risk - capital	<ul style="list-style-type: none"> An alliance model provides flexibility to modify design and allows on-going changes to be incorporated during construction. The model also incentivises parties to complete the Project on time and within budget under the 'gain-share / pain-share' philosophy. The cost of adversarial conduct, claims and disputes is also eliminated under the 'no-blame' culture. Under the 'lump sum' fixed price models, the state is generally liable for time and cost overruns due to design modifications and/or variations (although these risks may be minimised by engaging contractors earlier in the process). 	70	80	75	70	75	80	75
Risk – O&M	<ul style="list-style-type: none"> Under a DCMO model, whole of life asset risks are largely transferred to the private sector. The state retains whole of life asset risks under the other delivery models considered. 	50	60	50	60	75	70	50
Transaction and contract management costs	<ul style="list-style-type: none"> Tendering costs for both tenderers and the State are typically lower under a construct only model (although design costs are borne by the state). The demand on departmental project management resources is also significantly reduced under a managing contractor model. A longer tender period (and thus additional transaction and contract management costs) is typically observed under a D&C, DCMO, ETI and ECI model. Transaction and contract management costs under an alliance model are also typically high given the high level of involvement of departmental project management resources. 	90	70	75	50	65	40	80
Quality criteria								
Capital outcomes	<ul style="list-style-type: none"> The construct only model is capable of producing high quality capital outcomes but does not benefit from the contractor's experience and design input. 	70	85	75	75	85	70	65



DELIVERY MODEL ANALYSIS

Criteria	Key Comments	Construct Only	ETI	D&C	ECI	DCMO	Alliance	Managing Contractor
	<ul style="list-style-type: none"> The other models enable the contractor to contribute their experience and knowledge to the design to varying degrees, potentially improving the quality of the asset. 							
Operational outcomes	<ul style="list-style-type: none"> Construct only, ETI, D&C, ECI and managing contractor models typically have less focus on lifecycle and other operational costs (government retains whole of life asset risks). An alliance model has the potential to incorporate O&M design efficiencies during the design process given their innovative culture and focus on finding 'best-for-project' solutions. Under the DCMO model, the ongoing maintenance obligations are a key focus of the contract in designing and constructing the facility. 	60	60	60	60	80	75	60
Design innovation	<ul style="list-style-type: none"> The construct only model provides little incentive for innovation and minimum opportunity for cost value management or 'buildability' input from contractor into the design. The D&C, ECI, DCMO and Alliance models provide the contractor with the ability to provide significant input into the design of the project. The ETI model also provides some scope for the contractor to provide input, although less than the other models identified above. The managing contractor model provides the contractor with the opportunity to advise the design team on building issues during the design development process, which facilitates the integrated planning of construction and operations. However, the state retains control of the design development stage under this model. 	50	60	75	75	75	85	60
Operational innovation	<ul style="list-style-type: none"> Construct only, ETI, D&C, ECI, alliance and managing contractor models typically have less focus on lifecycle and other operational costs (government retains whole of life asset risks). An alliance model is capable of incorporating operations and maintenance design efficiencies during the design process however given their innovative culture and focus on finding 'best-for-project' solutions. Under the DCMO model, contractors are incentivised to take into account the ongoing maintenance obligations when designing and constructing the facility, which encourages innovation. 	40	50	60	70	75	70	50



DELIVERY MODEL ANALYSIS

Criteria	Key Comments	Construct Only	ETI	D&C	ECI	DCMO	Alliance	Managing Contractor
Timeliness	<ul style="list-style-type: none"> The construct only model has relatively long lead times due to the requirement to prepare design documentation (i.e. it is relatively difficult to fast track). The design element is also separated from the construction element, which can lead to claims and delays in circumstances where the design is deficient. The D&C, ECI and DCMO models are easier to fast track, as construction can commence ahead of full design documentation to save time (provided there is adequate control over design quality). The managing contractor model also provides the potential for a shorter design and construction program, as construction can commence during design development (however time and cost overruns can be expensive if the design is not fully agreed and documented prior to construction commencing). Alliance models are particularly suited to projects with significant time constraints as contractors and consultants are involved early in the process and can jointly assist to develop target completion dates during the pre-construction phase. 	60	90	85	85	75	70	60
Flexibility	<ul style="list-style-type: none"> It is difficult to incorporate variations in the 'lump sum' fixed price models without incurring significant additional costs. An alliance is the most flexible model as it allows the design to be modified and changes to be incorporated during the construction process. 	40	60	45	60	45	95	40
Stakeholder control and input	<ul style="list-style-type: none"> The construct only model provides the highest level of departmental control and scope certainty. Under this model, the project principal engages design consultants and the scope is well defined prior to any works commencing. A significant degree of departmental control and input is also possible under the ETI, ECI and alliance models (i.e. the state can provide significant input into the design). Less departmental control and input is possible under the D&C model (as the contractor is responsible for the design) and the DCMO model as the O&M component is outsourced. 	95	80	60	80	50	70	80



DELIVERY MODEL ANALYSIS

Criteria	Key Comments	Construct Only	ETI	D&C	ECI	DCMO	Alliance	Managing Contractor
Policy alignment	<ul style="list-style-type: none">The DCMO model (which involves outsourcing O&M activities to the private sector) has been scored lower than the other models.	75	75	75	75	50	75	75



The raw scores identified in Table 17-5 were multiplied by the criteria weighting proposed in Table 17-4, resulting in the final scores for each delivery model on a scale of 100. Table 17-6 below provides a summary of the final scoring for each delivery model, enabling their direct comparison and the selection of the most suitable delivery model.

Table 17-6 Weighted Delivery Model Scoring

Criteria	Weighting	Construct Only	ETI	D&C	ECI	DCMO	Alliance	Managing Contractor
Cost criteria	55.0%	37	40	36	39	33	31	31
Capital cost	32.5%	23	24	21	24	16	15	16
O&M costs	7.5%	4	5	4	5	6	5	4
Risk - capital	10.0%	7	8	8	7	8	8	8
Risk – O&M	2.5%	1	2	1	2	2	2	1
Transaction/contract management	2.5%	2	2	2	1	2	1	2
Quality criteria	45.0%	29	33	30	33	30	34	28
Capital outcomes	7.5%	5	6	6	6	6	5	5
Operational outcomes	7.5%	5	5	5	5	6	6	5
Design innovation	2.5%	1	2	2	2	2	2	2
Operational innovation	2.5%	1	1	2	2	2	2	1
Timeliness	7.5%	5	7	6	6	6	5	5
Flexibility	7.5%	3	5	3	5	3	7	3
Stakeholder control and input	7.5%	7	6	5	6	4	5	6
Policy alignment	2.5%	2	2	2	2	1	2	2
Total / Weighted Score	100.0%	66	73	66	71	63	65	58

Subtotal rows may not sum to the total row, due to rounding. Intermediate calculation stages have been rounded for presentation only, and decimal places have been carried through to the final weighted score.



17.6 Conclusion & Approach

Having regard to the information in Table 17-6, the most appropriate traditional delivery model is the Construct Only ETI delivery model, with D&C ECI scoring similarly. As ETI and ECI are subsets of the Construct Only and D&C delivery models, the preferred delivery model is proposed as Construct Only (with ETI to be considered during the procurement process). D&C is noted as an alternatively acceptable delivery model (with ECI to be considered during procurement).

An ETI is deemed the appropriate contracting approach, where a construct only approach is required and the proponent 'is seeking to improve constructability with input from the shortlisted tenders, prior to the design being finalised'¹³⁶.

The process for engagement and execution of contracts under the ETI approach are outlined in Figure 17-2.

Figure 17-2 ETI process to be adopted for the LFRIP



An industry briefing for the LFRIP would be held, followed by an EOI to identify suitably qualified contractors that can adequately address the prepared selection criteria. Shortlisting is 'based on 100 per cent of the scoring of the non-price criteria'¹³⁷, at which point 'it is anticipated that at least two preferred tenderers will be invited to execute an ETI Agreement, thereby making them ETI Participants'¹³⁸. Following this, ETI Participant teams will be asked to review the partially completed detailed design and through an interactive workshop, discuss issues and delivery solutions with the proponent.

Each ETI Participant will be required to prepare and submit a final tender, which will be assessed predominately on price-only evaluation criteria, from which the proponent will select one ETI Participant to enter into a final construction contract.

Based on the delivery model analysis, it is the preferred approach that the operations and maintenance of the weir and the associated infrastructure be excluded from the package of works based. This recommendation is broadly consistent with the feedback received from the market during the market sounding process (refer to Chapter 8 – Market Considerations).

¹³⁶ Procurement of Infrastructure Project Thresholds Engineering Policy 150, TMR Guidelines. Feb 2017.

¹³⁷ Ibid.

¹³⁸ Ibid.



18 AFFORDABILITY ANALYSIS

CHAPTER SUMMARY AND CONCLUSIONS:

- The P90 overall cost to government of the LFRIP, under the central 'Best Estimate' high priority demand scenario and prior to funding commitments, is approximately \$214.4 million in nominal terms (over 40 years). This is made up of:
 - \$322.9 million in nominal terms for all upfront costs and risk cost provisions
 - \$103.1 million in nominal terms for all operating and maintenance costs over 40 years
 - \$240.9 million in nominal terms for all operating revenue over 40 years
 - \$29.3 million of actual costs incurred upto 30 June 2017.
- The nominal P90 total cost of the Reference Project is \$214 million.
- Commonwealth funding is critical for reducing the net funding gap. Breakeven prices, with no Commonwealth and Queensland Government funding is likely to result in water prices that are unattractive for water users, particularly for agricultural producers.

18.1 Purpose

Project affordability is a key consideration for all stakeholders. This chapter draws upon the financial analysis (outlined in Chapter 17) to assess the expected affordability of the LFRIP and to outline the potential budget and funding requirement. The discussion is aimed at assisting stakeholders and decision makers in making an informed decision regarding affordability and funding commitments.

The affordability assessment has been based construction and 40 years of operation, to align with proponent requirements.

18.2 LFRIP cost profile

Table 18-1 summarises the annual cash flow profile for the Reference Project in nominal dollars on a P90 basis, based on 40 years of operations, the central case 'Best Estimate' demand scenario, and prior to any funding commitments from the Commonwealth or Queensland Governments.

Table 18-1 Nominal costs for the LFRIP (P90)

Component	2018	2019	2020	2021	2022	2022 and ongoing	Total
Total upfront Costs	46.0	83.6	114.5	78.7	-	-	322.9
Operating Costs, 40 years	-	-			1.7	101.4	103.1
Total costs (\$M)	46.0	83.6	114.5	78.7	1.7	101.4	426.0

(A): Construction costs include the unplanned risk amount of \$15.2 million.

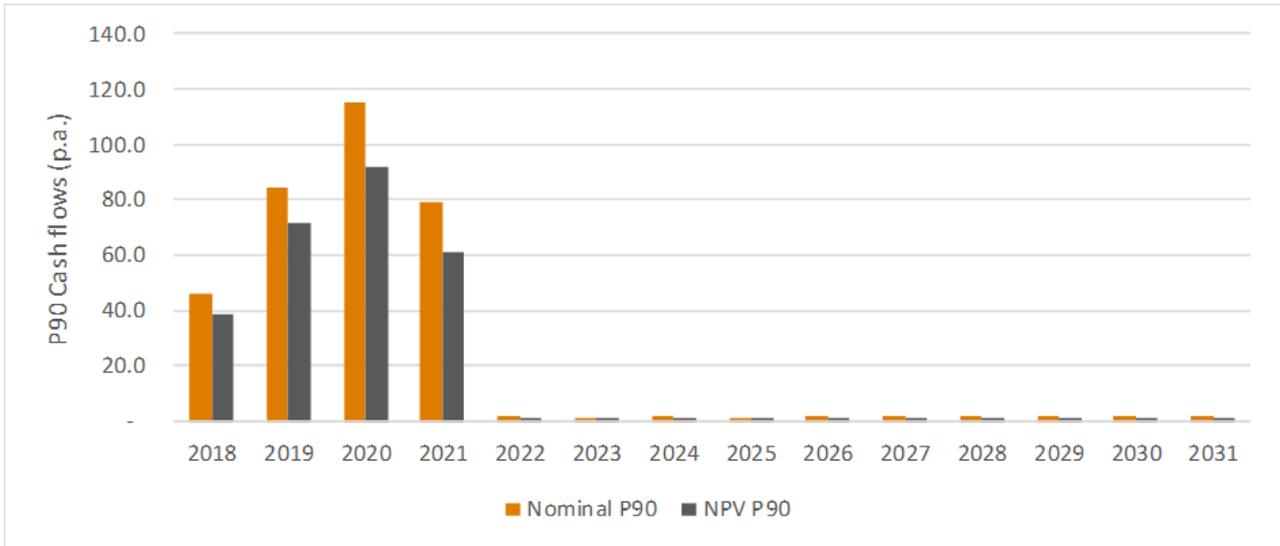
Table 18-1 above shows the Project cash flows peak over the period 2018 to 2020, which coincides with the construction period for the LFRIP. Table 18-1 above also shows the total cost of the Reference Project, excluding any revenue or funding, on a P90 basis is \$426.0 million in nominal terms over 40 years. The total



cost of the Reference Project under a P50 cost estimate, excluding revenue and funding is approximately \$405.8 million in nominal terms.

Figure 18-1 sets out a graphical representation of the P90 annual costs for the Reference Project in nominal terms.

Figure 18-1 Graph of the P90 Annual Reference Project Cash Flows (Nominal Terms)



18.3 LFRIP revenue profile

The total revenue anticipated to be generated under the central case ‘Best Estimate’ high priority demand is \$240.9 million in nominal terms over 40 years of operations. Table 18-2 provides a summary of the estimated revenue under the central case.

Table 18-2 Nominal revenue for the LFRIP (P90)

Component	2018	2019	2020	2021	2022	2022 and ongoing	Total
Revenue	-	-	-	-	143.7	97.2	240.9
Total costs (\$M)	-	-	-	-	143.7	97.2	240.9

The above revenue includes funding contributions from GAWB for 30,000 ML and from LSC for 4,000 ML. These payments are realised in the first year of operations.

18.4 Overall cost to government

The overall cost to government from the LFRIP is the summation of the costs and revenues, plus the inclusion of sunk costs incurred in the preparation of the EIS and DBC¹³⁹. The overall NPC of the Reference Project to the state is summarised in Table 18-3.

¹³⁹ For a true indication of the total cost of the LFRIP, sunk costs are identified and included in the overall cost to Government. Sunk costs include all costs incurred up to 30 June 2017.



Table 18-3 Overall Net Cost of the LFRIP (P90)

COMPONENT	NOMINAL \$M
Total risk adjusted upfront costs	(322.9)
Operations and maintenance costs	(103.1)
Total costs (including risk provisions)	(426.0)
Total revenue	240.9
Reference Project Costs (without sunk costs)	(185.1)
Sunk Costs	(29.3)
Reference Project Costs (with sunk costs)	(214.4)

Table 18-3 above identifies the P90 overall cost to government of the LFRIP, under the central case 'Best Estimate' high priority demand scenario and prior to funding commitments (refer Section 18.5), is approximately \$214.4 million in nominal terms (over 40 years). This is made up of:

- \$322.9 million in nominal terms for all upfront costs and risks
- \$103 million in nominal terms for all operating and maintenance costs over 40 years
- \$240.9 million in nominal terms for all operating revenue over 40 years
- \$29.3 million of actual costs incurred up to 30 June 2017.

Importantly, the overall cost to Government is subject to the water demand and pricing scenarios.

It is also noted that the total net cost of the LFRIP excludes any costs relating to the Gladstone-Fitzroy Pipeline project, which will be required to be constructed by GAWB in order to be able to transport and utilise the water from the Rookwood Weir (refer Section 2.4).

18.5 Commonwealth funding

In May 2016, the Commonwealth Government allocated \$2 million for the Queensland Government to develop a business case for the LFRIP (this report). In addition, the Commonwealth Government made an election commitment to provide \$130 million towards the construction of Rookwood Weir, subject to the outcomes of the business case, and the LFRIP receiving environmental and planning approvals and other matters.

The Commonwealth funding is being provided under the NWIDF, and is separated into a feasibility component and a capital component. As per the current agreement, the \$2 million allocated for the DBC has been progressively released to the Queensland Government, with \$1 million received in 2016 and a further \$1 million anticipated to be provided upon finalisation of this DBC.

The \$130 million capital component of the Commonwealth Government commitment is subject to eligibility criteria, funding terms and conditions as well as mandatory assessment criteria as set out in the NWIDF – Capital Component, Expression of Interest Guidelines, Department of Agriculture and Water Resources (refer Section 18.6.1).

The LFRIP requires additional government funds to realise a marketable price for all water users with the Commonwealth funding seen as a critical component in achieving such a price.



18.6 Funding risks and opportunities

In addition to the issues discussed below, consideration was given to the potential for value capture opportunities, though none have been included in the current affordability assessment.

18.6.1 Commonwealth funding scenarios

The Commonwealth Government funding is subject to eligibility criteria¹⁴⁰, funding terms and conditions as well as mandatory assessment criteria under the NWIDF. Table 18-4 summarises these criteria and the alignment and/or issues of the LFRIP.

Table 18-4 NWIDF criteria and potential implications

CRITERIA AND RELEVANT CONDITIONS	IMPLICATION / ISSUES
Only state and territory governments may apply for funding	<ul style="list-style-type: none"> No issues.
Only projects ready to progress to construction are to be eligible for funding	<ul style="list-style-type: none"> It is estimated that LFRIP could begin construction within six months of signing a bilateral schedule between the Commonwealth and Queensland Government. It is noted that the implementation activities and conditions set out in the recommendations of this DBC will require some additional work on behalf of the proponent prior to any formalisation of the bilateral schedule
Applications must have the support of the Minister responsible for water	<ul style="list-style-type: none"> Ministerial approval will be sought upon finalisation of the DBC
State/territory governments must commit to the implementation of water management arrangements in the relevant catchment that are consistent with the NWI	<ul style="list-style-type: none"> No current known issues
Australian Government contributions from all sources will not exceed 50 per cent of the total project cost.	<ul style="list-style-type: none"> Risk / issues with size of Commonwealth funding contribution considered further below. It is acknowledged that further discussion with the Commonwealth Government is subject to the finalisation of this DBC and adoption of the recommendations.
Projects must be completed by 30 June 2025	<ul style="list-style-type: none"> Assuming the construction of the LFRIP commences no later than November 2022, the Rookwood Weir will commence operations before this date.

There is strong alignment between the Reference Project and the NWIDF capital component guidelines. In particular, the Reference Project:

- is aligned with the objectives and intended outcomes of the NWIDF, in that it will provide water security and reliability to underpin regional economic growth in the Rockhampton and Gladstone regions, including the large-scale expansion of irrigated agricultural production in the Lower Fitzroy region
- will be in a position to proceed to construction upon adoption and finalisation of the recommendations and conditions outlined in this DBC

¹⁴⁰ NWIDF Fund Guidelines – Capital Component, Department of Agriculture and Water Resources (2006)



- will be managed under water management and pricing arrangements that are consistent with the NWI and ensure that the economic value derived from the use of water resources is maximised
- is consistent with several of the Commonwealth Government’s policies, plans and strategies, including the White Paper on Developing Northern Australia, the Northern Australia Audit, and the Australian Infrastructure Plan
- represents VFM for Commonwealth Government funds by contributing to the economic development potential in the region, particularly in relation to the growth in agricultural production in the Lower Fitzroy that will be facilitated by the Project
- is unlikely to proceed, at least in the foreseeable future, without the provision of financial assistance from government
- has been subject to an EIS that has received conditional approval from the Coordinator-General, meaning that all necessary regulatory and planning approvals have been obtained and has been subject to a robust business case process in accordance with Building Queensland’s BCDF.

It is important to note that while the Project has the benefit of providing increased water supply security and reliability to urban population in the Rockhampton and Capricorn Coast regions, the primary use of the water to be made available by the Project will be for activities that will underpin long-term economic development in the region, primarily irrigated agriculture.

18.7 Potential Accounting and Tax Implications

In implementing the LFRIP Project, there will be a range of accounting implications for the relevant state entity/entities. Table 18-5 provides an overview of the key taxation considerations that may arise from the LFRIP including those related to income tax, goods and services tax (GST), transfer duty, land tax and customs duty under the various project delivery model options.

Table 18-5 Tax implications, issues and considerations

EVENT / ISSUE	KEY TAX CONSIDERATIONS
Establishment of Ownership Entity	<ul style="list-style-type: none"> ▪ SunWater, GAWB and a JV company that is formed between SunWater and GAWB will be subject to the National Tax Equivalents Regime. Accordingly, the income tax considerations that are discussed below will apply regardless of which entity is used to operate and own the LFRIP. ▪ From both a duty and GST perspective, it should not make a material difference whether the operator is SunWater, GAWB or a separate company that is formed between SunWater and GAWB. ▪ Further taxation advice may be required should an unincorporated JV structure be selected.
Government Grants	<ul style="list-style-type: none"> ▪ Government grants received as funding for construction will be assessable for income tax purposes to the operator in receipt of the grant. The timing of the assessment of the grant will depend on the terms and conditions of the funding agreement. ▪ Where the terms of the grant imposes an obligation on the operator to use the funds for the Project, the grant will be subject to GST.



EVENT / ISSUE	KEY TAX CONSIDERATIONS
Land Resumptions/Occupation	<ul style="list-style-type: none"> ▪ Costs incurred by the operator to compulsorily acquire private land will form part of the cost base of the land and will not be immediately deductible for income tax purposes. ▪ Where the land is compulsorily resumed and the landowner takes no positive action in respect of the resumption, there is no supply by the landowner and therefore no GST will apply. ▪ Provided the land is resumed by the state and not GAWB, an exemption from duty should be available for the resumption.
Long term lease / Transfer of land	<ul style="list-style-type: none"> ▪ It is not anticipated that any lease payments made by the operator for the right to occupy the land for the purposes of the LFRIP to be deductible for income tax purposes. ▪ The grant of the long-term leases will be a taxable supply and GST will need to be remitted on the consideration payable by the operator. The consideration will include both the monetary consideration and any non-monetary consideration (which could potentially include the GST inclusive market value of the construction costs). ▪ The grant of the long-term leases will be subject to duty if a lease premium is payable. Depending on the terms of the lease, the lease premium could include the GST-inclusive value of the construction services provided by the operator. This will need to be considered further at the time of the drafting the agreements and contractual documentation.
Construction Costs	<ul style="list-style-type: none"> ▪ Construction costs associated with the construction of the Weir and infrastructure such as roads, dams and bridges will generally be deductible over 40 years unless the rules apply to deny or reduce those deductions because the asset is used by a tax-exempt entity. ▪ If the majority of end users will be in the primary production industry, consideration should be given as to whether the JV company may be more appropriate in order to access immediate deductions for expenditure on water facilities. ▪ From a GST perspective, the operator should be entitled to claim full input tax credits in relation to the GST on the construction costs as the acquisitions are being made for a fully creditable purpose.
Financing Arrangements	<ul style="list-style-type: none"> ▪ It is anticipated that interest paid on funds borrowed to construct the Weir and associated assets would be deductible for income tax purposes. ▪ Where the Project is funded by way of loans, this may be an input taxed financial supply for the entity loaning the funds (subject to its specific circumstances) and for the operator. As the operator will also be undertaking the construction, it is unlikely that the operator will exceed the financial acquisitions threshold. Where this is the case, it should be entitled to recover full input tax credits on acquisitions that relate to making financial supplies.



EVENT / ISSUE	KEY TAX CONSIDERATIONS
Income from Operations	<ul style="list-style-type: none"> ▪ Receipts in relation to the sale of water on a usage basis will be assessable, generally upon the issue of the invoice to the customer. ▪ Receipts in relation to the sale of water based on allocations will be assessable. The timing of the assessment of income will depend on the agreement between the operator and customer. ▪ The supply of water both on the usage basis and on the allocation basis should be a GST-free supply. The grant of the water allocation to GAWB will also be a GST-free supply. ▪ The grant of the water allocation to GAWB will be a dutiable transaction. Duty will be payable on the higher of the consideration or the unencumbered value of the water allocation. ▪ The sale of water itself should not be subject to duty in Queensland.
Operation Costs	<ul style="list-style-type: none"> ▪ Operating costs such as maintenance, salary and wages and utilities are generally immediately deductible. ▪ Where capital assets such as plant and equipment is required for operations, the cost of the capital asset will be deductible over the effective life of the asset. ▪ From a GST perspective, the operator should be entitled to claim full input tax credits for the acquisitions it incurs in operating the Weir as the acquisitions are for a fully creditable purpose. ▪ Where the state and the local councils continue to hold the land (subject to a lease to the operator), they will be responsible for paying land tax on that land. However, it they may be entitled to an exemption.

18.8 Conclusion

The affordability analysis set out in this section demonstrates Commonwealth funding is critical for reducing the net funding gap. Breakeven prices, with no Commonwealth and Queensland Government funding is likely to result in water prices that are unattractive for water users, particularly for agricultural producers.



19 IMPLEMENTATION PLAN

- This chapter describes the plans for procurement and implementation of the LFRIP should the DBC be approved and an overview of proposed Project governance structure, and provides commentary on GAWB and SunWater as individual Proponents.
- The implementation phase of the Project includes the following two stages:
 - Preparatory Works (Early Works)
 - Construction Phase.
- The market will be approached in a multi-phased procurement process involving the following stages:
 - EOI
 - request for proposals
 - negotiations and completion.
- In parallel with the development of the DBC, an early works program has also been undertaken by the Proponents in order to support the development of the Rookwood Weir should the DBC confirm that that the development and construction of Rookwood Weir proceed.
- Subject to ministerial approvals and compliance with conditions precedent, award of the construction contract is required by November of any year, allowing for mobilisation of the contractor, with site based construction activities are scheduled to start in March. Allowing for wet weather periods, construction is expected to extend over two dry seasons. Subject to commencement of any “bring forward” or early works, the Project has a minimum overall duration including development works of three years and six months.
- Subject to the Proponent’s progress with satisfactory completion of conditions precedent, the early construction contract award dates range from a November 2018 to a November 2019, with a November 2019 construction award date considered most likely.

19.1 Purpose

This chapter describes the plans for procurement and implementation of the LFRIP should the DBC be approved to proceed. This chapter provides decision makers with:

- information on the Project’s governance structure
- a high-level overview of the Procurement Plan
- a high-level overview of the Implementation Plan
- an understanding of the key risks identified for the procurement and implementation stages and strategies for managing them
- an estimate of the procurement costs
- change management
- proposed timeline for implementation of the various project stages.



19.2 Background

The DBC has been developed on the basis that the proponent is a JV between GAWB and SunWater. SunWater and GAWB are currently joint proponents for the Rookwood Weir, and the proponency agreement extends to the completion of the business case.

The project has been developed under a 'co-proponency' arrangement whereby GAWB and SunWater jointly progress the LFRIP on a 50/50 financial input in accordance with the executed Cooperation Agreement.

If the DBC is approved, ministerial approval will also be required regarding confirmation of the preferred proponent, to continue with the JV, or to appoint either SunWater or GAWB as the proponent.

GAWB has been formally assessing options for a second water source for approximately 15 years, involving extensive public consultation and analysis. A supply from the Lower Fitzroy River has always been assessed as the preferred next source, under almost all scenarios and GAWB developed a contingent supply strategy that would allow it to respond to unexpected supply or demand events within a defined period. For the case of a severe drought, GAWB requires a new supply of 30,000 ML to be available within two years of trigger, in order to extend its ability to supply by at least two wet seasons.

GAWB's preferred next augmentation is a supply from Rookwood Weir delivered via the GFP. GAWB's strategy is to defer expenditure until necessary, however, the opportunity to be part of a larger weir supported by a commonwealth grant provides better value than deferral. Early construction of Rookwood Weir allows GAWB to improve certainty of ongoing supply for its customers at least cost.

The Rookwood Weir project allows GAWB to mitigate its greatest outstanding risks for a future execution of the CSS (which would also require the construction of the GFP project), and GAWB has been involved in various studies related to Rookwood weir since 2004.

Since the 2004 SWP, GAWB has developed its CSS. The CSS is GAWB's strategic approach to planning and implementation of source augmentation to address water source security issues. It represents a prudent approach to source augmentation infrastructure planning and implementation that delivers efficient outcomes for customers. This approach involves attaining and maintaining a state of preparedness (or capability) to enable augmentation decisions to be made "as late as is safe" utilising the best available data while not compromising the requisite certainty associated with the implementation of such infrastructure by nominated milestones. GAWB's preferred source augmentation option for both drought and demand triggered augmentation scenarios is the GFP. GAWB has attained and maintained a state of preparedness in relation to its planning for the GFP such that when needed it has the capability to implement a GFP augmentation solution within three years of being triggered (two-year construction schedule with approximately 1 year of early works covering workforce mobilisation, confirmation of all construction-related regulatory and other approvals and finalisation of commercial arrangements with customers).

The proponents have undertaken extensive planning and preparatory works on the project to date, and the independent cost reviewer has advised that the level of project definition developed for the weir is advanced, and it would not require significant effort to complete design documentation, ready for contract award.

The proponents have undertaken a number of activities related to the development of the Reference Project, including:

- site investigation, including various site geotechnical studies, including borrow area and stockpile studies
- community and stakeholder engagement, including discussions with directly impacted landowners, and distribution of project updates and newsletters



- hydrology and engineering studies, including production of various design drawings and associated documentation for the weir and associated infrastructure
- early works, including road design, development approvals and geotechnical investigation studies.

The proponent has also developed a number of project management plans and associated documentation including:

- Project Execution Plan
- construction methodology, including river diversion and dry weather strategies
- Basis of Estimate Report including a risk based first principles capital and operating cost estimate
- Primavera P6 project schedule.

19.3 Proponency

The DBC has been developed on basis of a JV between GAWB and SunWater, however, in order to underpin an assessment of the suitability of either SunWater or GAWB as proponent, the individual proponents have been assessed against a number of key principles provided by DEWS, including:

1. There needs to be demonstrable capacity and capability to undertake each proponency role, including as developer owner, operator and water rights marketer.
2. The entity that builds the Rookwood weir should also be the owner going forward.
3. The entity/s operating the scheme needs to be incentivized to run infrastructure efficiently, including operating in conjunction with existing schemes in the Fitzroy River.
4. All potential conflicts of interest need to be dealt with.

In addition to the above four key principles, SunWater and GAWB proposed to include the following principles:

5. The proponent should provide Queensland with the most efficient delivery model.
6. The nominated proponent(s) should not be subject to any legal or regulatory impediments on performing their nominated role.

19.4 Project Governance Structure

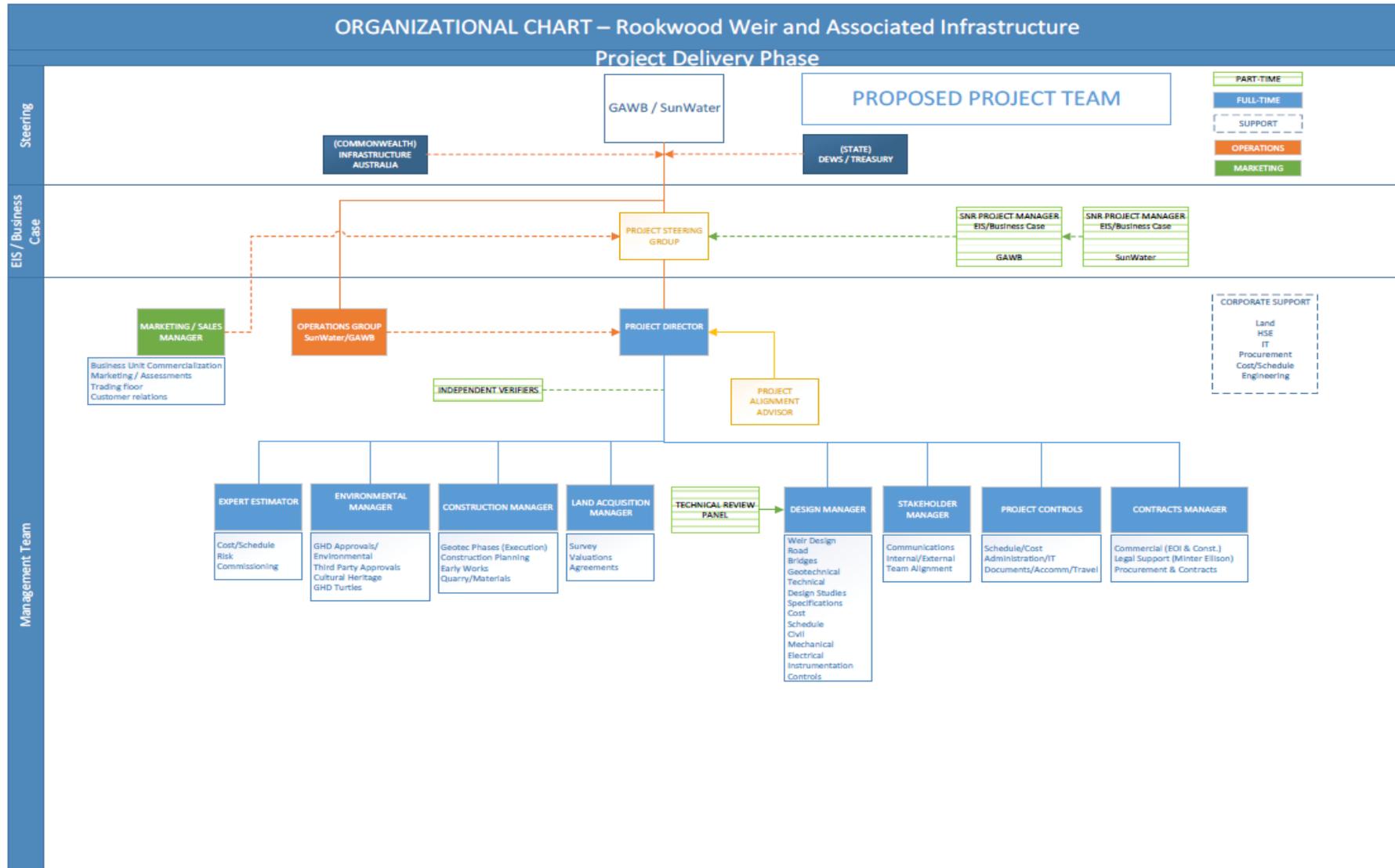
The procurement, implementation and delivery of the LFRIP until operational readiness will be led by the Project Director, who reports into the Project Control Group. The Project Steering Group reflects the interest of the JV.

The project organisational structure includes for a marketing/sale role which will be responsible for identifying and securing suitable commercial contracts as part of the conditions precedent recommendations.

Figure 19-1 summarises the proposed governance structure for the LFRIP.



Figure 19-1 Governance and organisational chart for the delivery of the LFRIP





19.4.1 Project Control Group (PCG)

The PCG is comprised of the CEOs of GAWB and SunWater, or their designated alternatives, an Independent Chair, and any other members both parties agree to include. The PCG is the ultimate decision-making authority of the LFRIP project during the implementation phase. The PCG is accountable to the state, via responsible Ministers, for the overall performance of the LFRIP.

19.4.2 Project Steering Group (PSG)

The PSG is comprised of at least one member from GAWB and SunWater, as nominated by the PCG, and the Project Director. The PSG reports to the PCG.

The PSG will have primary oversight and governance responsibilities for the delivery of the project. The purpose of the PSG is to provide leadership and direction to the LFRIP through all project phases. The PSG has primary responsibility of the Implementation Plan and is accountable for its execution through delegated responsibility as shown in the organisation structure above. The PSG will meet on a monthly basis to oversee the implementation phase.

Key functions of the PSG include, but are not limited to:

- ensuring that the project objectives are aligned with implementation plan, and that the project meets those objectives
- to provide strategic direction and leadership in implementing and delivering the project
- maintaining oversight of the project scope to ensure that the expected project benefits are realised
- maintaining oversight of the project budget
- maintaining oversight of the project schedule
- maintaining oversight of the project risks and opportunities
- ensuring that the project is adequately resourced
- acting as the primary change control approval body (i.e. variations etc.).

19.4.3 Project Director

The Project Director will be responsible for overseeing all day to day management activities for the LFRIP. This includes responsibility for all aspects of the implementation plan, including:

- achieving project schedule and milestones
- obtaining associated approvals and processes
- implementing procurement approach and activities
- delivering management strategies and associated activities, including:
 - Stakeholder engagement and communication
 - Benefits management and realisation
 - Risk management
 - Cost plans



- commissioning and handover activities.

19.5 Procurement Plan

The Procurement Plan will be led by the proponent entity and the procurement plan will be overseen by the existing PCG, which will provide seamless and bespoke direction continuing on from the DBC.

In parallel with the development of the DBC, an early works program has also been undertaken by the proponents in order to support the development of the Rookwood Weir should the DBC confirm that that the development and construction of the weir proceed. Subject to outcome of the business case and ministerial approval in November 2017, the proponent proposes to continue with early works activities post business case approval, and subject to satisfactory completion of conditions precedent, award construction contract from November 2018 earliest.

These early activities are 'bring forward' activities included within cost estimate, and include:

- geotechnical investigations and studies (roads, bridges and intersections)
- design development for roads, bridges and intersection upgrades
- commencement of land access and acquisition process for the key infrastructure sites
- commencement of work required to obtain key tier 2 environmental approvals
- development of work to provide environmental offsets required for construction to commence.

19.5.1 Guidelines and Objectives

The procurement plan will be consistent with the proponents approved procurement management procedures and policies. The key objectives of the procurement plan include:

- ensuring the procurement process is fair and open
- establishing appropriate project management governance, monitoring and reporting frameworks
- ensuring effective internal and external communications
- facilitating the analysis of key data to ensure the expected LFRIP benefits will be realised and value for money will be ensured
- ensuring the needs of both GAWB and SunWater are met throughout the procurement process
- ensuring competitive tension is maintained throughout the procurement process
- establishing processes to identify and address key risks
- establishing processes to enable regular and appropriate reporting to the PSG and PCG
- consistent with Queensland Government Procurement Guidelines and Policies.

19.5.2 Contracting Strategy

As identified in Chapter 17, the proponents preferred contracting approach for the LFRIP is an ETI model, which is a subset of the construct only model. The ETI model involves selecting shortlisted competing contractors to participate in value engineering and refinement of a client's preliminary designs.

In developing the Procurement Plan, it will be necessary to confirm the portion of the LFRIP that will be tendered to the market. For the purpose of completing the delivery model analysis in this DBC, it was assumed the construction of the Rookwood Weir and ancillary infrastructure, Riverslea crossing, Foleyvale



crossing, and Hanrahan crossing would be tendered to the market. The construction and maintenance of roads, and the maintenance of the crossings was assumed to be undertaken by RRC and TMR. On this basis, they were excluded from the package assumed for the delivery model assessment.

Broadly speaking, the procurement plan will involve the following stages:

- EOI
- request for proposals
- negotiations and completion.

Respondents may be eliminated from subsequent stages depending on the capability assessed in the responses provided to each step.

A major factor during procurement will be to maintain competitive tension in the market place. It is anticipated that a fee to reimburse unsuccessful bidder(s) will be a key tool to encourage market participation, and this has been factored into the procurement costs.

The proponent will prepare detailed requirements, specifications, implementation and commercial documents to be studied by the market respondents. At the same time the procurement team will have developed pre-defined evaluation criteria in readiness for evaluating responses.

The procurement plan will consist of key major work streams including a core project management stream, responsible for project planning, ongoing project management and managing stakeholder relations.

The key work streams will be outlined in the Organisational Structure:

- requirements and implementation stream
- technical streams
- financial and commercial stream
- project management and governance stream.

Each work stream will conduct workshops and meetings to prepare, evaluate and report findings during the procurement process. It is envisaged that shortlisted proponents may also attend one or more of these workshops to assist the procurement team with the evaluation process.

19.5.3 Procurement Budget

In parallel with the development of the DBC, an early works program has also been undertaken by the proponents in order to support the development of the Rookwood Weir should the DBC confirm that that the development and construction of the weir proceed.

19.5.4 Timeframe

The DBC recommendations (refer Chapter 21) contain various conditions precedent including the recommendation that the proponent obtain commitments-in-principle with various agricultural producers for a minimum threshold amount, prior to agreement of Commonwealth funding.

Subject to ministerial approvals and compliance with conditions precedent, award of the construction contract is required by November of any year, allowing for mobilisation of the contractor, with site based construction activities are scheduled to start in March. Allowing for wet weather periods, construction is expected to extend over two dry seasons. Subject to commencement of any “bring forward” or early works, the project has a minimum overall duration including development works of three years and six months.



We have assumed that in addition to satisfactory completion of other conditions precedent, the preparation of commercial documentation, identification, discussion and in principle agreement with agricultural producers could result in a period of approximately 12 to 18 months, post CBRC consideration. Subject to the proponent's progress with satisfactory completion of conditions precedent, the early construction contract award dates range from a November 2018 to a November 2019, with a November 2019 construction award date considered most likely, refer Figure 19-2 below.

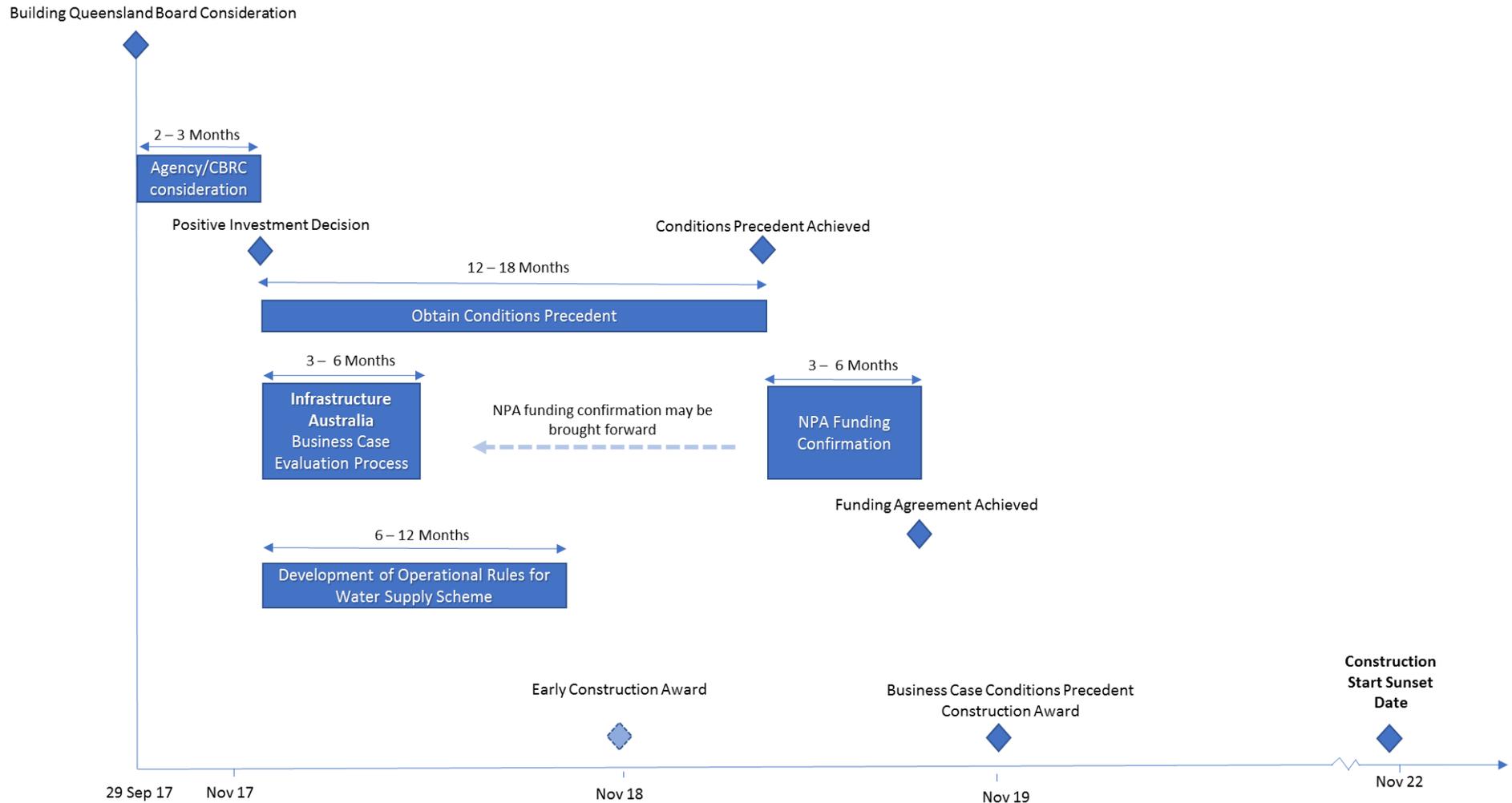
Under the Australian Government Guidelines for the NWIDF Capital Component, the relevant projects must be completed by 30 June 2025, and allowing for a minimum two-year construction period, plus any associated activities, this requires that the construction contract is to be awarded no later than November 2022. Construction award start dates, later than a November 2018 construction award date increase the risk profile of the project by potentially losing key project personnel due to lack of continuity and increasing risk of availability of Commonwealth funding

Detailed schedules will be created in the Primavera P6 software suite at the start of the implementation plan with a work breakdown provided based on the phases of the Project. The schedule will be reviewed and updated throughout the implementation process.



IMPLEMENTATION PLAN

Figure 19-2 Post LFRIP DBC timeline





19.5.5 Milestones

The milestones provided in Table 19-1 are subject to satisfactory completion of conditions precedent set out as part of the recommendations (refer Chapter 21).

Table 19-1 Key implementation milestones

ACTIVITY	START	FINISH
Key event		
Project Approval		October Year 1
Preparatory Works (concurrent to DBC)		
Site surveying and land access activities	April Year 1	October Year 2
Early procurement activities	August Year 1	October Year 2
Preliminaries (including some preparatory work)		
Land access and acquisition	April Year 1	November Year 4
Permits and Approvals	July Year 1	October Year 4
Design	July Year 1	July Year 2
Procure	August Year 1	March Year 3
Construction		
Construction Award		November Year 2
Early Works (including prep work by proponent)	July Year 2	February Year 3
Weir Construction	November Year 2	February Year 5
Weir Construction Cranage	July Year 1	February Year 5
Weir Construction Indirect Resources	November Year 2	February Year 5
Hanrahan's Crossing	July Year 3	October Year 3
Riverslea Bridge and Approaches	April Year 3	September Year 3
Foleyvale Bridge and Approaches	April Year 3	November Year 3
Commissioning		
In river works complete		January Year 5
Dry commissioning complete		January Year 5
Construction complete, commence weir impoundment filing		February Year 5
Wet commissioning commences		February Year 5

The Project Director will be responsible for developing, communicating and managing a detailed schedule of all implementation activities.

19.5.6 Post Implementation and handover

Post implementation, the JV will operate under existing approved processes and guidelines and have ongoing reporting obligations to the state. The Project Director will be responsible for oversight of the commissioning activities and handover activities to the nominated operations manager.



19.6 Change Management

While neither GAWB nor SunWater have built new large dams in recent years, both have experience with construction of associated water infrastructure assets, and GAWB and SunWater will build upon their experience in incorporating new infrastructure into their respective water storage and supply portfolios. The major change management consideration involves the development and delivery of a new greenfield water storage asset, which will require access to construction delivery and support expertise and project management support systems

Other key change management considerations include:

- resourcing owners team
- obtaining of suitable construction approvals
- acquisition of land
- procurement of constructor(s)
- construction of new greenfield water storage asset
- construction of associated transport infrastructure
- community liaison and management
- provision of suitable contract administration and project management system support.

During project implementation, a Change Management Plan will need to be developed to document the impacted stakeholders, roles and responsibilities, strategies for communication and change, training tools, risks, mitigations and proposed means of monitoring the change process. The development of a robust Change Management Plan is critical to the success of operationalising the Reference Project.

19.7 Risks and Risk Management

The procurement and implementation plans and all associated projects will undertake risk management in accordance with the Australian Standard for Risk Management (AS/NZS 31000:2009) and the Queensland Government Program and Project Management Methodologies.

Risks will be maintained in registers and a summary of the high-level program risks will be presented regularly to the PCG in a monthly report.

19.8 Conclusion

The DBC has been developed on the basis that the proponent is a JV between GAWB and SunWater. SunWater and GAWB are currently joint proponents for the Rookwood Weir, and the proponenty agreement extends to the completion of the business case. Both proponents have demonstrated they have the capacity and capability to undertake the proponenty role in the LFRIP as the both entities have a strong record as developers, owners, operators and water rights marketer.

In order to progress the Project, Ministerial direction will be required on the preferred proponenty model.

As part of the DBC development, the proponents have developed robust programs and management plans, and have developed schedules with great detail for activities during the implementation phase. An early works program has also been undertaken by the proponents in order to support the development of the Rookwood Weir should the DBC confirm that that the development and construction of Rookwood Weir proceed. The implementation phase of the Project includes: 1) Preparatory Works (Early Works) and, 2) Construction Phase. The market will be approached in a multi-phased procurement process.



While neither GAWB nor SunWater have built new large dams in recent years, both have experience with construction of associated water infrastructure assets, and GAWB and SunWater will build upon their experience in incorporating new infrastructure into their respective water storage and supply portfolios.

The DBC recommendations contain various conditions precedent recommendations including the proponent to obtain commitments-in-principle with various agricultural producers for a minimum threshold amount, prior to agreement of Commonwealth funding. Subject to ministerial approvals and compliance with conditions precedent, award of the construction contract is required by November of any year, allowing for mobilisation of the contractor, with site based construction activities are scheduled to start in March. Allowing for wet weather periods, construction is expected to extend over two dry seasons. Subject to commencement of any “bring forward” or early works, the Project has a minimum overall duration including development works of 3 ½ years. Subject to the proponent’s progress with satisfactory completion of conditions precedent, the early construction contract award dates range from a November 2018 to a November 2019, with a November 2019 construction award date considered most likely.



LFRIP

PART E – RECOMMENDATIONS



20 CONCLUSIONS

This Chapter summarises the findings from the economic and financial analysis, and clearly states the conclusions, having regard to the net funding gap under the scenarios and the risks and opportunities for the Queensland Government.

Investment in the 76,000 ML Rookwood Weir, without addressing the current known uncertainties, particularly as pertains to agricultural users, would expose the Proponent and the State Government to capital and operating costs that may not be recouped through potential water users.

To mitigate the demand risks, the LFRIP requires sufficient commitments (or signed memorandums of understanding) from agricultural customers to allow the Project to proceed with an acceptable level of risk to the Proponents and ultimately the State. To support such a condition precedent, an economic 'hurdle' can be adopted (i.e. what will it take to ensure the benefits for the people of Queensland exceed the costs from investment in Rookwood Weir). The economic analysis has concluded that 23,200 ML per annum of water allocations towards productive agricultural developments would be required to achieve the required economic hurdle. This volume may consist of either high priority or medium priority allocations, or a combination of the two, as the volume of water supporting productive agricultural development is the primary driver of economic benefits from the Project.

The net funding gap could be reduced further should high agricultural demand be realised and the Proponent and/or relevant State Government agencies pursue the opportunities identified in Section 20.2.3, namely:

- engage with the Commonwealth Government on the funding commitment
- undertake further value management / engineering activities to identify any cost savings that may be achievable
- consider the the best timing for commencement of construction activities if additional time is required to identify and achieve commercial commitments with customers
- continue consultation with DNRM to agree on the process, calculation and conversion of high priority water allocation into a medium priority water product
- continue consultation with DEWS and RRC on the potential for RRC to access a contingent supply from Rookwood Weir.

20.1 Purpose

This Chapter summarises the findings from the economic and financial analysis, and clearly states the conclusions, under the scenarios and the risks and opportunities for the Queensland Government.

20.2 The Analysis

The economic, financial and affordability analysis (refer Chapter 13, 16 and 18 respectively) considered the Reference Project with a central case 'Best Estimate' demand scenario, along with a range of demand and pricing scenarios, particularly as relates to agricultural users. Figure 20-1 provides a summary of the findings from the economic analysis. Under all scenarios, it is assumed and accepted that:

- GAWB will pay for 30,000 ML per annum (as per GAWBs entitlement under the ROP)

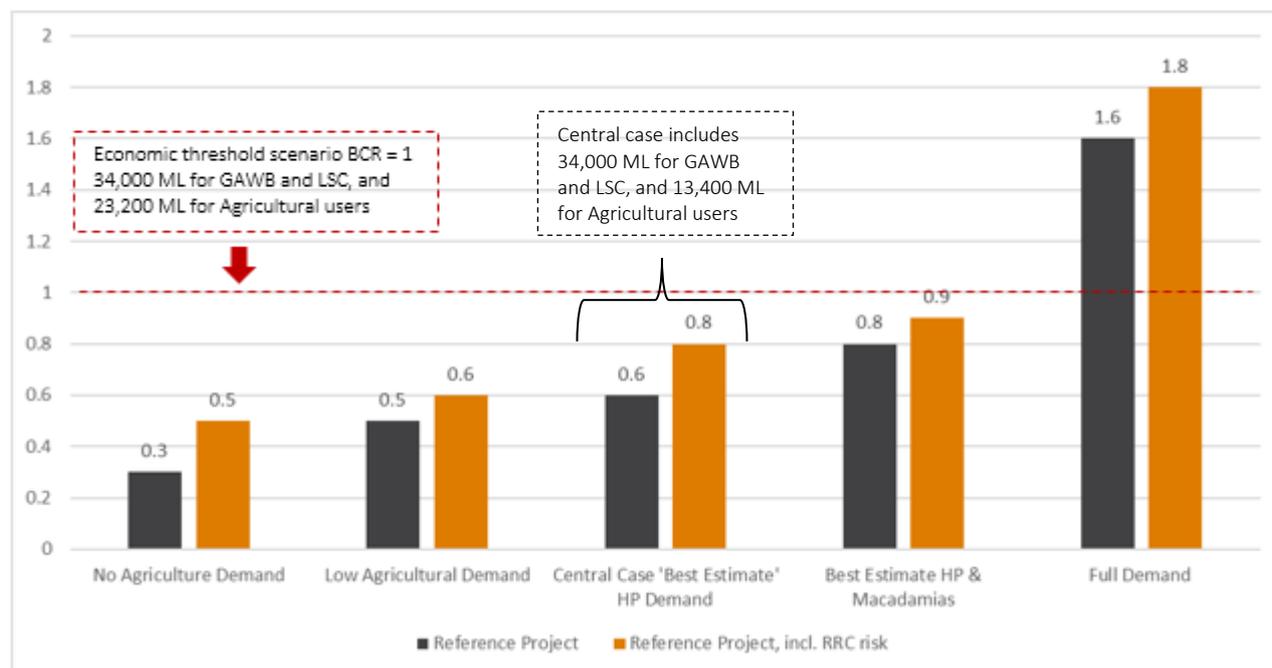


CONCLUSIONS

- LSC will pay for 4,000 ML per annum (as per the Capricorn Coast entitlement under the ROP).

Determination of the likely agricultural demand is more uncertain, and as such, Figure 20-1 presents the findings from a range of key demand scenarios and includes BCRs with and without the recognised forgone risk exposure for Rockhampton (i.e. the risks associated with a failed ‘wet season’ requiring RRC to source emergency supply from another supply source).

Figure 20-1 BCRs for different agricultural demand scenarios



The central case ‘Best Estimate’ high priority demand shown above is based on the feedback from respondents to the RFI (refer Section 5.4). It is recognised that there are constraints and uncertainties based on the demand. One way to alleviate this risk would be to adopt an ‘economic’ threshold approach, i.e. ensure the proponent can deliver approximately 23,200 ML for agricultural use (based on an assumed proportional increase in volume of water to users as recognised under the ‘Best Estimate’ high priority and macadamia scenario).

Even taking into consideration the committed funding from the Commonwealth Government, a large number of demand scenarios result in a net funding gap for the LFRIP.

The combined economic and financial analysis highlights the associated funding and water demand risks associated with the LFRIP. These risks, identified throughout the DBC are further summarised and discussed below, along with the opportunities available to the op153erator of the Rookwood Weir.

20.2.1 Agricultural Demand Risk

There are a range of risks associated with the agricultural water demand under the LFRIP. As identified in Chapter 5:

- Understanding agricultural producer’s willingness and capacity to pay and whether there is a preference for high priority water or medium priority water, should it meet their required price and reliability needs.
- Existing agricultural water allocations in the Fitzroy River are significantly underutilised, averaging 5,000 ML per annum in the last few years from allocations of approximately 14,000 ML per annum. Potential



agricultural customers may elect to purchase a portion of these allocations instead of an allocation from the Reference Project, noting this limitation does not apply upstream of Eden Bann Weir.

Taking into consideration the findings from the water demand study, comparative analysis of adjacent WSS and assessment, the capacity of producers to pay various prices for water and current agricultural use across the Lower Fitzroy River region, it is evident that full take-up demand is highly unlikely, particularly with pricing that may not meet the needs of current or new agricultural producers.

While the EIS was predicated on only high priority allocations being issued under the LFRIP, in the development of the DBC it has become evident that the LFRIP will need to be able to cater for both high priority and medium priority allocations to support agricultural users. To develop a medium priority product, it is recognised that:

- The strategic reserve identified in the WSP allows a maximum of 76,000 ML per annum of water to be released should infrastructure be developed in the Lower Fitzroy. This reserve is agnostic to the priority of the water products to be made available. Should the proponent wish to pursue the release of a medium priority product directly from DNRM, the 76,000 ML strategic reserve still applies, and no additional volume of water will be made available to reduce the price of the medium priority product.
- Following the release of the strategic reserve, the ROP identifies the process for the conversion of high priority water to medium priority water. This process is not restricted by the 76,000 ML per annum cap imposed by the strategic reserve. The proponent could use this process to make an additional volume of water available from Rookwood Weir, subject to the following considerations:

The ROP specifies a minimum and maximum volume of high priority water available from each of the five zones. These volumes are currently highly restricted in the ROP (Zone C – Eden Bann Weir has a minimum high priority volume of 25,200 ML per annum and a maximum high priority volume of 25,800 ML per annum). DNRM would need to consider the volumes be for Zone D (Rookwood Weir's location) when the ROP is reviewed (and disaggregated) to allow for Rookwood Weir. This decision would be at the discretion of DNRM.

The rules regarding the announced allocation regime and the medium priority cut-off level to be applied would need to be developed by DNRM. These operational arrangements would impact on the conversion factor identified.

The conversion factor in the ROP is only applicable to the existing infrastructure in the Lower Fitzroy and would need to be reassessed (via hydrologic modelling) to allow for Rookwood Weir. The higher the conversion factor, the greater the volume of medium priority water made available per ML of high priority water converted. The conversion factor specified in the revised ROP would be at the discretion of DNRM with input from DSITI.

The conversion of high priority to medium priority water is at the discretion of the chief executive of DNRM, allowing for the possibility that an application that meets the criteria may still be unsuccessful.

Any potential customer may elect to pursue another alternative due to the uncertainty of the process, the lack of specificity of the product to be made available and the significant length of time the process is likely to take.

Table 20-1 summarises some other impediments to agricultural production.



Table 20-1 Other impediments to agricultural production

Issue	Risk / Concern
New agricultural producers	Majority of agricultural customers identified through the RFI process are not currently established in the region. It is acknowledged that these customers face significant costs to develop new enterprises. This includes land and infrastructure costs, both on-site and local
Establishment costs for on-farm infrastructure	These costs are significantly lower for established enterprises within existing water schemes. This impacts on the water price potential customers may be willing to pay for an allocation from the Project
Water trading	There are a limited number of trades of permanent water allocations in the region. The state of the water trading market creates a barrier to the take up of existing underutilised water entitlements and potentially limits the attractiveness of water allocations from the Reference Project
Commercial framework	Potential customers may not accept the final commercial framework, impacting on the take up of allocations from the Reference Project
Regulatory requirements	Regulatory requirements could affect new agricultural producer’s business development and planning, e.g. requirements for aquaculture
Land availability, suitability and size	There is uncertainty associated with potential customers acquiring a sufficient area of land suitable to supporting their operations, due to the fragmented nature of current land holdings and the mosaic nature of the landscape. The mosaic nature of landscape has been identified as a key concern by relevant agencies and many stakeholders. In addition to the availability of water a number of other determinants including the soil types, disaggregated nature of current holdings, and the need to construct on-farm infrastructure will be key determinants of the final demand for water and its timing
Customer Interest	There is a potential for customers identified by the demand analysis to reconsider their interest in purchasing water from the Reference Project, should development not proceed in a transparent and timely manner

While the EIS was predicated on only high priority allocations being issued under the LFRIP, in the development of the DBC it has become evident that the LFRIP will need to be able to cater for both high priority and medium priority allocations to support agricultural users.

20.2.2 Revenue and Funding Risk

The total funding gap required for the LFRIP is based the estimated revenue and funding already received / committed. The risks to pricing and current funding is further discussed below.

20.2.2.1 Queensland Competition Authority

The QCA is required to make a determination on GAWB’s pricing every five years, as part of GAWB’s pricing practices. For the LFRIP, GAWB will need to demonstrate to the satisfaction of the QCA that the purchase of the 30,000 ML per annum represented a prudent and efficient expenditure for GAWB and its customers to mitigate its identified water security risks. The QCA would need to allow GAWB to pass on the associated costs to its customers for its investment to be financially viable. Should the QCA not allow GAWB to pass on these costs, the financial liability would remain with GAWB, and potentially with the state if GAWB is unable to cover the cost exposure.



CONCLUSIONS

20.2.2.2 Commonwealth Government Funding

As identified in Section 18.6, the Commonwealth committed \$2 million to the development of this DBC. In addition, the Commonwealth Government announced as an election commitment the provision of up to \$130 million for the construction of the Rookwood Weir, provided this DBC demonstrates that the weir is economically viable and the proponent acquires the required environmental approvals.

20.2.3 Opportunities

There are a number of opportunities that have been identified throughout the development of the DBC that could have a material impact on the funding requirement and the pricing of water allocations from the LFRIP. A summary of these opportunities is provided below.

Commonwealth Government Contribution
Commonwealth funding reduces the water price through offsetting the capital costs required to be recouped through water charges. It also reduces the net funding gap, should fixed pricing points be adopted for various user groups (such as agricultural producers). The Commonwealth Government has committed up to \$130 million for the LFRIP. Based on the updated capital cost estimate of \$352 million on nominal terms, 50 per cent of the total capital cost is approximately \$176 million, in nominal terms.
Value Engineering
The detailed design and construction program developed for the Reference Project by the proponents is robust, efficient and meets industry best practice. Despite this, there remains a potential opportunity to identify and integrate further cost saving measures into the Reference Project. Further cost savings would improve the BCR, reduce the total costs to potential customers and reduce the financial liability faced by the state government.
Deferral of the design and/or construction phase
<p>Under the NWIDF capital component Expression of Interest guidelines, construction must be completed by 30 June 2025. As a consequence, the design and construction phase of the Reference Project may be deferred until financial year 2021–22 and still enter the commissioning and operations phase prior to the 30 June 2025 deadline. This may be achieved in one of two ways:</p> <ul style="list-style-type: none">▪ The NWIDF capital component EOI guidelines requires the Project to be construction ready within six months before an EOI application may be lodged. Successful applications would see funding released as per the bilateral schedule between the state and Commonwealth governments. The state may apply for capital funding from The NWIDF – capital component for the Reference Project and negotiate delayed milestones within the bilateral schedule. The risk with this approach is that the Commonwealth Government may not accept any delay to milestones within the bilateral schedule.▪ The proponent may elect to delay entering the D&C phase of the Reference Project. This avoids the risk associated with the above approach but risks the Commonwealth Government Funding Commitment being withdrawn prior to the signing of the bilateral schedule by the state and Commonwealth Governments. <p>Under both proposed approaches for deferral of the Reference Project, there is an opportunity for the additional time to be used to identify and achieve commercial commitments with additional customers.</p>
Conversion of high priority to medium priority water allocation
<p>As identified previously, a number of respondents to the RFI process indicated a preference for a medium priority product from the Reference Project.</p> <p>Should the proponent, in consultation with DNRM, DSITI and DEWS, succeed with the conversion of a volume of high priority allocations into medium priority water allocations, an additional volume of water, over and above the 76,000 ML per annum of high priority water allocations, would be made available for purchase by potential customers. The medium priority water allocations would be available at a reduced price, as a larger volume would be available for the same capital cost. Both the additional volume made available and the extent to which the allocation price would be lower would be governed by the revised conversion factor adopted by DNRM. The trade-off is that medium priority water allocations are less reliable than high priority allocations and are subject to announced allocation rules.</p>



Water Security for the RRC

Rockhampton is reliant on annual inflows to meet its water requirements and is susceptible to supply security risk, particularly in the event of a 'failed' wet season. RRC have indicated to Building Queensland that they are in the process of developing a comprehensive water supply strategy for Rockhampton. Accessing a contingent supply from Rookwood Weir is one option RRC are considering.

Should RRC elect to purchase an allocation from Rookwood Weir to mitigate their water security risks, the economic and financial analysis for the Reference Project would improve.

20.3 Summary of Conclusions

Investment in the Reference Project, without addressing the current known uncertainties, particularly as pertains to agricultural users, would expose the proponent and the state government to capital and operating costs that may not be recouped through potential water users.

To mitigate the demand risks, the LFRIP requires sufficient commitments (or signed memorandums of understanding) from agricultural customers to allow the Project to proceed with an acceptable level of risk to the proponents and ultimately the state. To support such a condition precedent, an economic 'hurdle' can be adopted (e.g. what will it take to ensure the benefits for the people of Queensland exceed the costs from investment in Rookwood Weir). The economic analysis has concluded that 23,200 ML per annum of water allocations towards productive agricultural developments would be required to achieve the required economic hurdle. This volume may consist of either high priority or medium priority allocations, or a combination of the two, as the volume of water supporting productive agricultural development is the primary driver of economic benefits from the Project.



21 RECOMMENDATIONS

It is the recommendation of this DBC that investment proceed with the Reference Project only where the identified risks are understood, noting the government may wish to impose conditions on the Proponent as identified in this chapter.

The DBC and associated recommendations are prefaced on the assumption that a capital funding contribution of at least \$130 million will be made by the Commonwealth Government and finalised through the National Partnership Agreement.

21.1 Key Findings

21.1.1 Service Need

Rockhampton is reliant on annual inflows to meet its water requirements and is susceptible to supply security risk, after just one failed wet season. The Reference Project will:

- provide RRC with an option to meet its water supply security risks
- allow LSC to meet its stated immediate need to manage its own water supply and security risks
- allow GAWB to avoid the costs associated with the future development and operation of a weir on the Lower Fitzroy River
- provide additional water for new or expanded agricultural production adjacent to the Fitzroy River.

21.1.2 Reference Project Costs

The total upfront nominal capital cost of the Reference Project is \$322.9 million (\$352.2 million minus \$29.3 million expended), comprising \$83.3 million in preparatory costs, \$229.0 million in construction costs and \$10.6 million in implementation costs. In addition, there are \$103.1 million in operations and maintenance costs over 40 years of operations.

This is in addition to \$29.3 million spent as of 30 June 2017.

21.1.3 Reference Project Demand

The water demand adopted under the central case 'Best Estimate' high priority demand attributes:

- 30,000 ML per annum high priority allocation to GAWB
- 4,000 ML per annum high priority allocation to LSC
- 13,400 ML per annum of high priority allocations to agricultural customers. An additional annual growth rate of 1.5 per cent has been adopted for agricultural customers.

A range of demand scenarios were considered, including an 'economic threshold' scenario, i.e. a demand profile that would result in a BCR of 1. To meet the economic threshold, the demand attributable to agricultural customers would need to, at a minimum, reach 23,200 ML per annum.



CONCLUSIONS

21.1.4 Benefit Cost Ratios

The Reference Project under the central case 'Best Estimate' high priority demand profile has a BCR of 0.6. Recognising the forgone risk exposure of Rockhampton to ongoing water security risk increases the BCR to 0.8.

21.1.5 Net Funding Gap

Assuming \$130 million in capital funding from the Commonwealth Government is received for the LFRIP, any net funding gap under the central case 'Best Estimate' high priority demand for the Reference Project or under the economic threshold scenario will need to be subsidised.

21.2 Key Risks

The key risks for the LFRIP include:

- Commonwealth Government funding is predicated on meeting the terms and conditions outlined in the NWIDF capital component EOI guidelines and is contingent upon the business case findings and subsequent Infrastructure Australia review
- the GFP will need to be delivered in order to deliver the water to Gladstone. The GFP is subject to a separate DBC process
- in addition to the net funding gap for the LFRIP, the Queensland Government is also subject to an additional financial exposure associated with GAWB's upfront payment to access the 30,000 ML per annum high priority allocation
- it is uncertain, at the time of this DBC, what specific measures will be adopted by the water supply strategy under development by RRC. The measures adopted will impact on the water security risks faced by Rockhampton and, consequentially, the benefits associated with the development of Rookwood Weir
- there is uncertainty with regards to the likely agricultural demand that can be attributed to the Reference Project. The water demand analysis report indicates there is limited demand for high priority water at a price that would deliver full cost recovery for the Project. The Project would require sufficient commercial commitments from agricultural customers to allow the project to proceed with an acceptable level of risk to the proponent and, ultimately, the state.

21.3 Recommendations

With consideration to the findings, opportunities and risks identified in the DBC, the following recommendations can be made.

▪ **RECOMMENDATION 1**

A final proponent be decided by the Queensland Government.

▪ **RECOMMENDATION 2 (following completion of Recommendation 1)**

The proponent proceed with the Reference Project only when the identified risks are understood, and appropriately mitigated and it is further recognised that the LFRIP is likely to require additional government funding to achieve marketable water prices. In addition, it is recommended the Queensland Government consider imposing the following conditions on the proponent prior to proceeding with the Reference Project.

▪ **CONDITION A**



CONCLUSIONS

Prior to preparatory works commencing and to achieve, at a minimum, the economic threshold as identified in the DBC, establish a memorandum of understanding (or commitments-in-principle) addressing volume and price between:

- the proponent, GAWB, LSC and agricultural producers to achieve an economic threshold outcome of 57,200ML high priority or equivalent, comprising 30,000ML for GAWB, 4,000ML for LSC and a minimum of 23,200ML for agricultural producers.
- Contributions to be payable upon construction, completion and commissioning of the Rookwood Weir.
- GAWB will be subject to appropriate due diligence activities by the proponent and will require Ministerial approval to make this commitment

[NB should the proponent meet Condition B, this Condition would no longer be necessary]

▪ CONDITION B

Prior to construction works commencing and to achieve, at a minimum, the economic threshold as identified in the DBC, establish binding commitments or contracts addressing volume and price between:

- the proponent, GAWB, LSC and agricultural producers to achieve an economic threshold outcome of 57,200ML high priority or equivalent, comprising 30,000ML for GAWB, 4,000ML for LSC and a minimum of 23,200ML for agricultural producers.
- Contributions to be payable upon construction, completion and commissioning of the Rookwood Weir.
- GAWB will be subject to appropriate due diligence activities by the proponent and will require Ministerial approval to make this commitment

In addition to the recommendations and associated conditions, it is recognised that relevant Queensland Government agencies, including Queensland Treasury, in conjunction with the proponent will need to continue discussion with:

- the Commonwealth Government on the funding commitment
- DNRM to develop the process, calculation and conversion of high priority water allocation into a medium priority water product
- DEWS and RRC on the potential for RRC to access a contingent supply from Rookwood Weir

It is also recognised that the proponent, in conjunction with relevant Queensland Government agencies including Queensland Treasury, will undertake further work in consultation with:

- DNRM to develop operational rules that meet the Fitzroy Basin Water Plan, including WASO and EFO
- QCA to seek to understand on the potential customer pricing implications and balance sheet treatment of the LFRIP (outside of the pricing determination cycle)