



3 METHODOLOGY

CHAPTER SUMMARY AND CONCLUSIONS:

- This DBC has been developed in accordance with the Building Queensland Business Case Development Framework (BCDF) and Queensland Treasury's Project Assurance Framework (PAF)
- The development process utilised to produce the DBC included initiation, development, and analytical activities, delivered concurrently and staged (where appropriate) to meet key project milestones
- Each component of the DBC has utilised a range of assessment and evaluation methodologies, in accordance with current BCDF guidelines and requirements
- Adopted methodologies for ongoing management strategies, including risk and stakeholder management, are in line with requirements under the BCDF and other industry practices (including risk management principles and practices as outlined in ISO 3100:2009)

3.1 Purpose

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

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

3.2 Development process

In late 2017, DNRME requested that Sunwater proceed with the development of a DBC for Nullinga Dam which incorporates the consideration of the Nullinga Dam options as well as the scheme modernisation and operating rules review identified within the Nullinga Dam and Other Options. The purpose of the DBC is to confirm the outcomes of the Nullinga Dam and Other Options PBC (2017), and to demonstrate the merit of justification of Preferred Option(s).

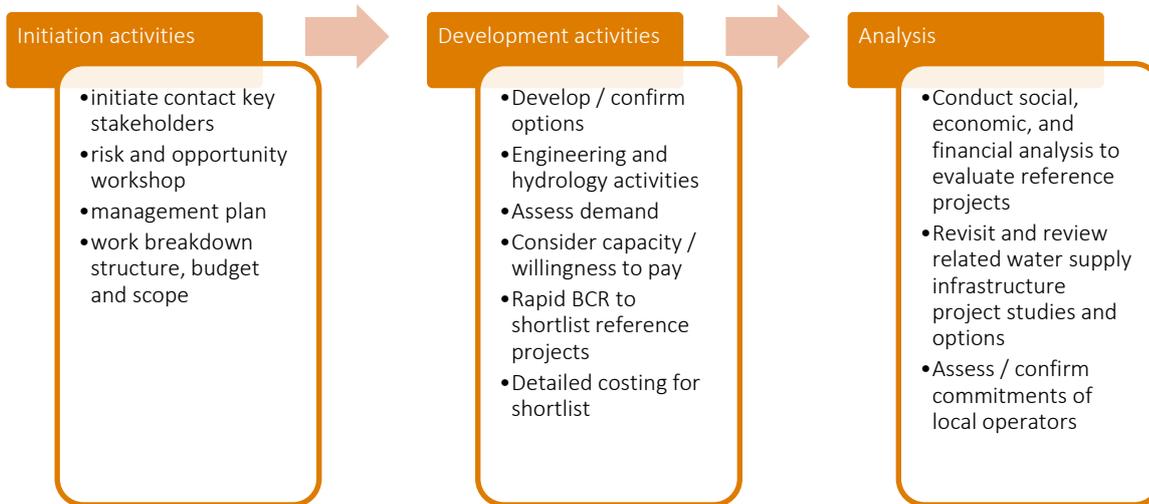
The DBC presents outcomes of various analysis to inform decision making processes by:

- considering the problems/issues, service need/s and demand, and the preferred options
- confirming the Reference Projects' scope, opportunities and benefits through technical investigations, demand assessment, engineering and cost estimation, hydrological analysis
- documenting key environmental, social, legal and regulatory considerations relating to the Reference Projects' delivery and operation
- confirming the Reference Project's P90 capital, operating and whole of life costs
- analysing the economic and financial implications, and delivery considerations.

The development process utilised to produce the DBC, as outlined in Figure 3-1 included initiation, development, and analytical activities, delivered concurrently and staged (where appropriate) to meet key project milestones.



Figure 3-1 DBC development process



During the initiation stage, it was important to engage key stakeholders and identify key risks and opportunities, and strategies to exploit or mitigate these potential events. Building Queensland developed a DBC management plan, capturing required activities, and responsibilities. Activities were assigned to either Building Queensland or Sunwater according to “who is best able to manage respective risks”.

The development stage saw the continued refinement of existing dam options (small, medium and large) to a Class 4 estimate level, confirming available yield and volumes and indicative water price/s. An additional dam solution (extra-large) was also scoped. Demand was further tested through engagement with potential customers, gauging price points and water volumes, an assessment was then undertaken on the capacity to pay of selected customers.

The development (or scoping) stage also saw engagement of DAF in the utilisation of developed soil maps for the study area, providing information on types of crops that could be undertaken by potential customers.

A rapid BCR analysis was utilised to identify the shortlist of reference projects, which were then subsequently refined to enable Class 3 cost estimates to be produced.

Analytical services were engaged to consider the social, economic, financial and commercial implications of the reference projects. The methodologies utilised throughout the DBC report are discussed below.

3.3 Methodologies

Table 3-1 summarises the different methodologies employed in the development of different components of the DBC. Further detail on methodological approaches, particularly relating to analytical activities (economic, financial, social and environmental) undertaken for the DBC has been provided in the relevant Chapters, where deemed appropriate.



Table 3-1 Methodologies utilised throughout the DBC

DBC COMPONENT	APPROACH	OBJECTIVE / AIM
PART A – BACKGROUND AND OVERVIEW		
Proposal Background, Methodology, and Governance Chapters	Research, Inter-agency Agreements	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	Data Analysis, Forecasting, Research, Stakeholder Consultation, Demand Assessment and Modelling, Market Consultation	Examination of current and future needs of customers, 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		
Options Considered	Review, Research and Due Diligence Activities	Summary of options identified in previous studies and recent investigations, findings, updated considerations and assessment, and overview of the shortlisted solutions progressed under this DBC
Base Case and Reference Project	Technical Investigations, Design Activities, Cost Planning, Gap Analysis, Risk Management Activities	Defined scope based on technical investigations and expert advice
Strategic, Legal, Market and Public Interest Considerations	Desktop Analysis, Market Consultation, Legal Advice	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		
Delivery Model Analysis	Market Testing, Financial and Risk Modelling and Analysis	Different staging, contracting and financing strategies where considered against public interest and the value for money proposition
Economic Analysis	Demand Forecasting, Economic Modelling	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.



DBC COMPONENT	APPROACH	OBJECTIVE / AIM
Social Impact Evaluation	Quantitative and Qualitative Analysis	Identification of relevant social impacts of the Reference Project/s, providing a means to compare social impacts and risks across the solutions. Where appropriate, the SIE has identified impacts that can be monetised and included in the Economic Analysis.
Environmental Assessment	Regulatory Review, Technical Investigations, Design Activities	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	Financial Modelling, Price Modelling,	Whole of life financial analysis has been prepared, with key commercial assumptions and inputs identified. This appraisal provides the Net Present Value (NPV) of cashflows, the total estimated investment and pricing scenarios

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

3.4 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 NDMIP, 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 throughout any subsequent delivery phase for the NDMIP.

Further information on the Risk Management approach has been provided below, while additional information on stakeholder engagement is provided in Section 12.2.



3.4.1 Risk framework and approach

The risk management process is embedded into the overall DBC 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 3-2). Throughout the process there is constant communication and consultation with the team and monitoring and reviewing of the risks as understanding is developed.

This DBC was developed in accordance with the current Building Queensland Assurance Framework, which provides a holistic approach to governance, risk and compliance management.

In late 2018, a series of DBC risk workshops were held by Sunwater in conjunction with Building Queensland and nominated business case contributors for the NDMIP. These workshops were used to develop a risk register to capture identified risks, likelihood and consequences of risk events and mitigation and management activities required during the development of the DBC, and throughout subsequent project phases (where appropriate). Additionally, the risk register was used to inform cost planning activities of identified risk management costs and/or required risk cost provisions to cover anticipated risk exposure in the development, delivery and/or future operational phases of the Reference Project/s.

Figure 3-2 Risk management process

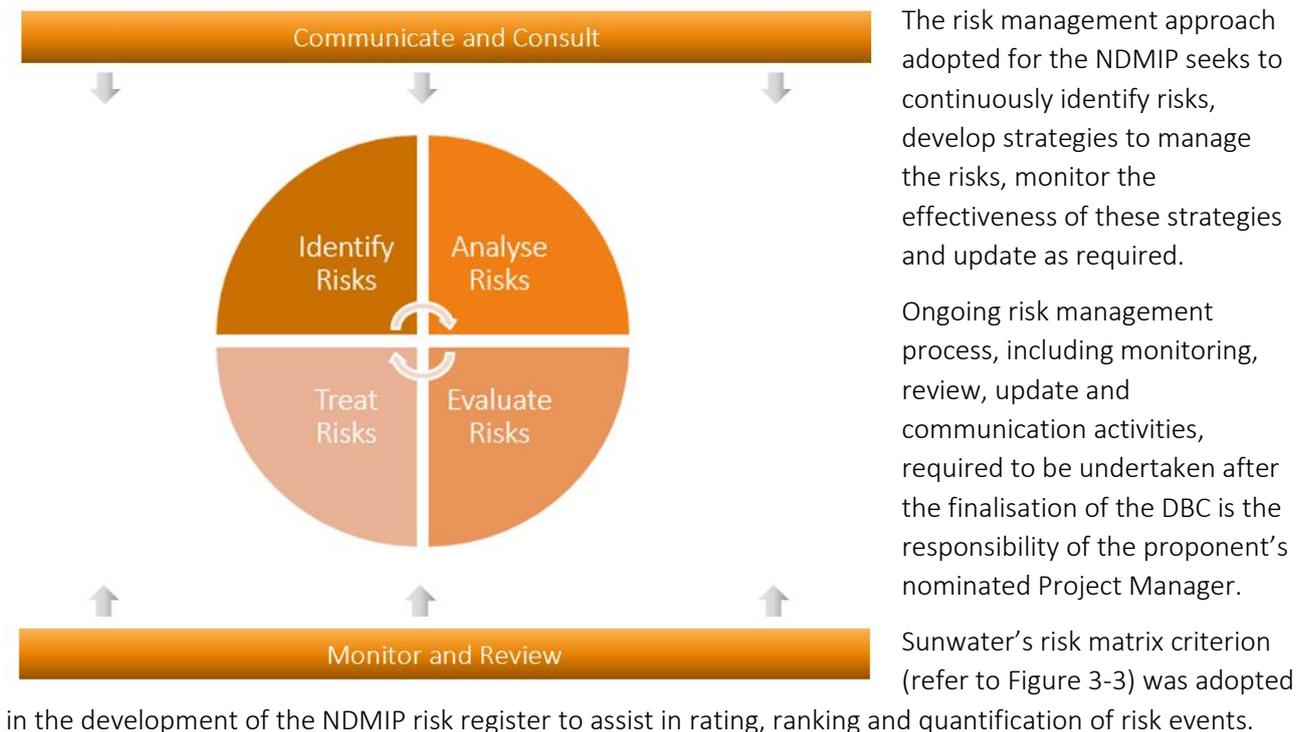


Figure 3-3 Business Case Risk Matrix²⁷

²⁷ Enterprise Risk Management Framework, Sunwater (Oct 2017)



		Consequence				
		1. Negligible	2. Minor	3. Moderate	4. Major	5. Catastrophic
Likelihood	5. Almost Certain	1. Low	2. Medium	3. High	4. Extreme	4. Extreme
	4. Likely	1. Low	2. Medium	3. High	3. High	4. Extreme
	3. Possible	1. Low	2. Medium	2. Medium	3. High	4. Extreme
	2. Unlikely	1. Low	1. Low	2. Medium	2. Medium	3. High
	1. Rare	1. Low	1. Low	2. Medium	2. Medium	3. High

Guidance from Sunwater was initially used to interpret the likelihood of risks and consequences. The likelihood is linked to a probability range which in turn is linked to a probability represented during the statistical analysis (refer to Table 3-2).

Table 3-2 Likelihood rating

LIKELIHOOD	PROBABILITY RANGE	DESCRIPTION
Almost Certain	26-50 %	May occur about once every 5 years
Likely	6 - 25%	May occur about once every 10 to 30 years
Possible	2 – 5 %	Highly unlikely may occur in exceptional circumstances
Unlikely	0.1 - 1%	Very rare, may occur in exceptional circumstances
Rate	<=0.1%	Extremely rare, may occur in exceptional circumstances

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

- governance
- political
- business case
- planning and operations
- land
- environmental and approvals
- design and construction
- financial and commercial
- stakeholders.

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 types of impacts used for each consequence category.



Table 3-3 Consequence categories

CONSEQUENCE	COST	WHS	ENVIRONMENTAL	OPERATIONS	STAKEHOLDER
Catastrophic	\$50 million to 100+ million	Fatality or inability to return to work in any occupation or capacity	Serious env damage req >10-year recovery time and significant \$ and ongoing mgt. Maj non-compliance. Shut down or penalties	Failure of supply with significant prod loss >6 months. Need for alternative supply. Storage failure and major flood, or supply loss >1 year	Loss of reputation 3-5 yrs. Adverse national media. Crisis mgt. Loss of stakeholder confidence for extended period.
Major	\$20 million to \$50 million	Permanently incapacitated and unable ever to return to work in their previous occupation	Env damage - mostly recover with ongoing mgt and mitigation (1-10 years). E.g. Local loss of veg / habit; pest weed spread.	Failure of supply with sig prod loss 3-6 months. Need for alternate supply. Significant storage water loss and damage. Impacts <1yr.	Adverse regional media. Loss of regional stakeholder confidence < 3 yrs. Potential to lose some regional contracts
Moderate	\$5 million to \$20 million	Hospitalisation > over-night stay, longer-term med. treat, and/or some perm. incapacity, but return to previous occupation	Env damage that may not be isolated, but remediation < 1 year. E.g. Oil spill to water, weed spread beyond routine mgt	Failure of industry supply <3 months. Progressive loss of storage with d/s effects. Loss of irrigation 1-2 months.	Some adverse regional media, gen contained by mgt. Loss of local stakeholder confidence <1 yr. Some reputation damage
Minor	\$1 million to \$5 million	Four days + off work and return to work full duties OR req short term med treat after initial consult. May req o/n hospital stay	Temp and locally contained env damage, remediation within 1 month. E.g. Chem spill to land, increased turbidity in watercourse	Partial loss of capacity, won't meet short term industry or irrigator demand. Minor customer std failure. Gradual storage loss.	Adverse local media attention and loss of stakeholder confidence for a short period (few months).
Negligible	< \$1 million	Minor injury or less than four days off work. Provides no ongoing complications after initial first aid or med treatment	Little or no env damage with recovery < 24 hrs. E.g. Poor public percept. from dust emissions, odour release	Minor effect, operator intervention to restore customer supply. Within unplanned shutdown service standards.	Local knowledge of the event only. Minor local loss of confidence. No measurable impact politically



3.4.2 Summary of key risks

The risks considered most extreme, even with treatments undertaken and/or in place, include:

- flooding risks during construction greater than capacity of diversion (Reference Project 1 and 2)
- high capital costs and low yields of the considered Reference Project/s result in an implied water price higher than the willingness and capacity of customers to pay
- an alternative supply option provides a better financial and economic solution to MDWSS demand requirements than the considered Reference Projects.

Additionally, in the absence of detailed environmental studies, there is a continuing risk that a previously unidentified species of National Significance could be adversely impacted by the NDMIP. It is acknowledged that all considered Reference Projects would be subject to an EIS.