CHAPTER 15

FINANCIAL AND COMMERCIAL ANALYSIS

Nullinga Dam and Other Options Preliminary Business Case

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15 FINANCIAL AND COMMERCIAL ANALYSIS

CHAPTER SUMMARY AND CONCLUSIONS

- This chapter sets out financial implications of the shortlisted options.

Option 1: Do minimum (base case)

- This is business as usual and outlines the base line. All financial analysis has been developed as incremental changes to the Base Case. For example, changes in capital and operating costs for Options 3 and 4 are net of changes to the Base Case.

Option 2: Improve MDWSS rules and operation

- This option has no capital costs (capex) as it is reform only. An annual $0.5 million operating costs (opex) budget for two years (total $1 million) is estimated, comprised of government wages and consultant costs.

Option 3: Modernise MDWSS and convert losses

- The risk adjusted capex estimate for this option depends on the cost of works and assumed medium priority (MP) water allocations to be converted from loss allocations.
- At $2,500 per ML upfront contribution for MP water allocations, customers may provide a significant portion of capital funding, depending on the yield and capital costs of the works. Certainty on the capex and yield estimates is subject to further detailed assessment.
- Estimated annual charges are within the expected range consistent with the MDWSS charges in relation to water services and it is expected annual charges will recover ongoing opex.

Option 4: Nullinga Dam for agricultural use

- The central case risk adjusted capex estimate for this option developed for the PBC is $323 million.
- At $2,500 per ML for MP water allocations, customers may provide contributions of 33 to 58 per cent of the capital funding requirements, depending on the capex assumptions and water sales. This leaves a substantial portion of the capital costs which would be required to fund the balance.
- Estimated annual water charges depend on the funding model applied.

Financial Net Present Value

- The Financial Net Present Value (FNPV) of the shortlisted options presented in this chapter is based on assumptions in relation to the pre-sale of new water allocations prior to water availability (creating certainty over demand/recovery of costs from customers; and the transfer of risk from the proponent to the customer) and the application of Australian Government funding. If an alternative model was used the result would be different. However, a FNPV of zero does not mean the cost and revenue of an option is zero e.g. the risk adjusted gross whole of life present value cost for Option 3 is $55.7 million and for Option 4 is $431.2 million.

15.1 Purpose

The purpose of this chapter is to document the financial implications and budgetary impacts by presenting cash flows for each shortlisted option. The analysis incorporates risks associated with the cash flows for each option to explain and quantify financial inputs to decision-making.

15.2 Approach

In summary, this assessment has taken the following approach for each of the shortlisted options:

1. Identified revenues and costs (both capital and operating costs) and modelled over the evaluation period of 30 years.
2. Assumptions have been set out and nominal discount rates have been applied to nominal cash flows.
3. Generated a summary table of the revenues and costs in Present Value (PV) terms with commentary allowing a comparison of the options.
4. Customer capital funding has been considered, as well as potential government funding for analysis purposes, to show the impact of different funding models.
5. A Financial Net Present Value (FNPV) has been calculated, with a risk-adjusted discount rate, and SunWater costs estimates and debt costs provided by the NWILF.
6. FNPVs have been presented based on raw costs and revenues without risk adjustments.
7. FNPVs have been presented based on risk-adjusted revenues and costs to a P50 level of confidence.

15.2.1 Demand Forecasting Approach

A key input to the financial analysis is a robust demand forecast. Demand forecasting for commercial water infrastructure requires consideration of demand for allocations and demand for water use.

The key component of water demand in the context of this PBC is demand for new water allocations. It is critical for water infrastructure projects (e.g. Option 3 and 4) to assess the water users' (e.g. irrigators) willingness to pay for permanent water allocations.

In terms of annual cash flows, water supply and demand for water use are not as critical. Generally, around 90 per cent of costs are fixed and recovered via fixed charges, regardless of water use. Variable (delivery) costs are matched by water use charges reflecting those variable costs (generally around 10 per cent). Combined, this means that regardless of water availability or water use, the annual capital and operating costs are equal to revenue. The only exception is where there may be customer default (non-payment of bills) which is a very low risk historically in SunWater schemes.

15.2.2 Considerations and Sensitivities

Table 1 shows considerations and sensitivities which affect the aspects of each option.

Table 1 Considerations and Sensitivities with Shortlisted Options

	SENSITIVITY	ANALYSIS
	OPTION 2 – IMPROVE MDWSS SCHEME AND OPERATION	
1.	Requirement for government grant or concessional loan funding	Option 2 requires no grant or concessional loan funding.
2.	Establishment costs	One-off operating costs have been identified for Option 2, comprised of government wages and consultant costs.
3.	Ongoing management costs for system operators	An incremental increase in MDWSS staff is not expected as a result of the Option 2 reform process, as there will be no increase in water allocations and no change to infrastructure. If increased staff were required, these costs are expected to be fully recovered through water tariffs.
4.	Costs to irrigators to engage in a more sophisticated scheme	It is expected education will be delivered to irrigators are part of the reform process. This may include: ▪ Describe peak flow entitlements for customer ▪ Train customers in peak flow entitlement trading ▪ Describe carryover modelling to customers ▪ Describe water ordering options for customers. It is assumed government or SunWater will deliver this education and there will be no cost to irrigators.
5.	Affordability	Costs associated with Option 2 will need to be considered within existing departmental and SunWater budgets.
6.	Potential impact of LMA	Many of the proposed reforms are bulk operational matters and are likely to remain with SunWater. However, it is recommended that any implementation of Option 2 involve ongoing consultation with the interim Local Management Arrangements (LMA) Board for the Mareeba-Dimbulah Distribution System to ensure that there is limited potential for any impacts on any separation payment.
	OPTION 3 – MODERNISE MDWSS AND CONVERT LOSSES	
7.	Requirement for government grant or concessional loan funding	Option 3 may require grant or concessional loan funding depending on the capital costs. This requires further detailed assessment.
8.	Commercially neutral FNPV based on the assumption of $2,500 allocation sale price	This issue is addressed in Table 2 below.
9.	Accuracy of loss reduction and cost estimates	The accuracy of loss reduction estimates has been addressed by using a number of variables in the yield analysis. The issue of capital cost estimates has been addressed by using a number of variables in the cost analysis.

	SENSITIVITY	ANALYSIS
	OPTION 4 - NULLINGA DAM FOR AGRICULTURAL USE	
10.	Water sales	A customer funding model where contracts are pre-sold using deposits and binding contracts will provide certainty over the number and price of pre-sold allocations. In comparison, not pre-selling water allocations will mean water sales will depend on market appetite and have less certainty.
11.	Capital costs	The low to high capital costs include a range of detailed sensitivities. It is assumed that charges for the new scheme will be set after the capital costs have been realised.
12.	Timing of take up	A customer funding model with pre-sold water allocations will mean the take up of allocations will immediately follow the availability of water. Customers will not be able to delay entering into contracts until they are ready to receive water. In comparison, not pre-selling water allocations will create a risk for water take-up, as it will be dependent upon water sales being made following water availability.
13.	Affordability to water users	This issue is addressed in the affordability chapter.
14.	Discount rate of 4%	The NWILF loans have a term of 15 years (half of the 30-year assessment period). SunWater's bulk and distribution prices are recalibrated periodically to account for changes in conditions, including the cost of debt and the cost of equity. The current period is 7 years, due to a two-year extension. However, typically annual charges will be updated to accommodate changes in costs every five years. The FNPV over the life of the asset will still be neutral if the annual discount rates are chained into an annual discount factor. The NPV will also be neutral if a geometric average of the annual discount factors is used. There may be some changes in the cost of debt and equity during the pricing period. The discount rate is likely to rise from the current low, reducing charges below full cost recovery (NPV neutral). However, there will likely be instances where the discount rate falls during the pricing period increasing charges above full cost recovery. This has been the case in the current pricing period, where actual costs of capital have fallen while prices have been set using higher capital costs. The impact of an increasing discount rate is an increase in water charges. However, increasing capital costs generally indicates improving economic conditions, typically resulting in a higher capacity to pay for water allocations by customers.

15.2.3 Assessment of Customer Willingness to Pay

The table below shows the range of customer willingness to pay using four different methods. $2,500 is within the range of all of these estimates and has been used in the benchmark for allocation prices.

Table 2 Customer Willingness to Pay

METHOD	LOW ($)	CENTRAL ($)	HIGH ($)
2015 and 2016 maximum permanent water trading	2,000	2,400	2,800
SunWater estimate	2,000	2,600	2,800
MJA Demand Report	2,000	2,500	3,000
Jacobs consultation	2,000	2,500	3,000

15.3 Financial Net Present Value (FNPV)

This section presents the unadjusted FNPV as the output of the PBC's financial model, which projects cash-flows (revenues and costs) from each of the three shortlisted options over a 30-year time horizon. Options 3 and 4 are the main focus of this chapter, as Option 2 is a reform process and does not require a detailed financial analysis.

The financial model (which provides inputs into the economic model) includes revenues generated by the project, capital costs, operating costs and residual values (in the last year of the NPV analysis). Net cash-flow balances have been calculated in each year and discounted at an appropriate nominal discount rate.

A FNPV has been produced for Options 3 and 4. The FNPV reflects the modelled net financial impact to the Queensland Government through SunWater as a government-owned corporation (the assumed proponent for the purposes of the analysis), in present dollars from an internal financing perspective.

The unadjusted FNPV does not take into account the risk profiles of the cash flows. This should be taken into account when considering the FNPVs.

15.3.1 Pricing Method

The National Water Initiative (NWI) advances the principles of:

- User pays infrastructure – the users who directly use the benefit of the infrastructure are charged for its use
- Cost reflective prices – the charges users pay reflect the infrastructure's costs, including:
  - Operating and maintenance expenditure
  - Capital expenditure.

Historically, SunWater does not usually recover all the costs of past capital expenditure through its prices. QCA estimated prices for SunWater's irrigation users in 2012 reflecting:

- Operating and maintenance costs, including interest on loans (fixed and variable)
- Renewals annuity, which collects funds for future capital costs (fixed)[1].

[1] http://www.qca.org.au/getattachment/5fad8dc9-2101-4097-bdc8-d90d25fbfbbb/SunWater-Irrigation-Price-Review-2012-17-Volum-(1).aspx, p. xxxii

This approach is known as lower bound pricing. SunWater's lower bound pricing for irrigators reflects the past funding decisions of governments. These past governments may have intended on fully recovering capital costs through economic benefits rather than charges to direct users. A new piece of infrastructure using the lower bound prices method would have a negative FNPV.

Upper bound pricing reflects all the costs related to the construction of new infrastructure, including the cost of capital. New infrastructure, using the upper bound pricing approach, would have a neutral FNPV.

Upper bound prices have been used in the financial analysis in this PBC. Upper bound pricing may be implemented through modifying SunWater's lower bound pricing, by adding a rate of return (Weighted Average Cost of Capital (WACC) multiplied by the Regulatory Asset Base (RAB)).

The RAB is a measure of a regulated utility's assets on which it is allowed to earn a return. The generally adopted measure of a RAB for regulated utilities in Australia is the Depreciated Optimised Replacement Cost (DORC). With this method depreciation of assets is removed from the RAB annually. SunWater's current preference is the Optimised Replacement Cost (ORC), which does not feature depreciation.

Upper bound pricing is implemented using a building block approach. Most regulated urban water utilities use this approach. The upper bound building blocks include:

- Operating and maintenance expenditure (fixed and variable)
- Return of capital, or depreciation, which recovers the principal of the capital expenditure (fixed)
- Return on capital, which recovers the cost of raising the funds for capital expenditure (fixed).

Under this approach, prices are based on recovering past capital expenditure, rather than a forecast of future capital expenditure, such as SunWater's ORC and renewals annuity approach.

15.3.2 Approach

NWI pricing principles have been adopted in this analysis, as well as the regulatory economics building blocks approach to develop annual charges using:

- Return on capital (WACC multiplied by the RAB)
- Return of capital (depreciation as a proxy for a SunWater renewals annuity)
- Operating expenditure (opex) including estimates of labour, insurance and other opex items.

Temporary trading water market data from SunWater and anecdotal permanent trading data from representatives from large irrigators has been considered to establish willingness to pay. On this basis it is assumed that MP allocations are likely to trade in the range $2,000 to $3000 per ML with a central scenario assumption of $2,500 per ML.

For each option, where data is available, the model developed for this analysis sets out:

- Costs – capex and opex over a 30-year time horizon for each option in nominal terms
- Demand in ML per annum
- Upfront payments by customers for water allocations (e.g. $2,500 per ML as above)
- Annual charges ($ per ML) and revenue in nominal terms ($ per annum)
- A nominal WACC has been applied using the QCA's 2012 view of SunWater's regulated irrigation WACC
- Escalation rates used to achieve nominal cash flows are set out in the model and summarised below.

15.3.3 Discount Rate

The cost of capital will be influenced by parameters relevant to the proponent. Some key WACC inputs are constant in the analysis while others are varied to generate a range of WACCs for sensitivity analysis.

1. Constant parameters
   a. Market risk premium (6.5 per cent)
   b. Risk free rate (2.3 per cent)
2. Variable parameters
   a. Equity beta—the equity beta is varied between SunWater's QCA regulated equity beta (0.55) and its unregulated equity beta (0.74).
   b. Cost of debt:
      i. National Water Infrastructure Loan Facility cost of debt (2.22 per cent)
      ii. Queensland Government entity estimated cost of debt (3.0 per cent).

15.3.4 National Water Infrastructure Loan Facility

To enable an understanding of different funding options, use of the Australian Government NWILF has been considered in the analysis. The NWILF provides access to up to $2 billion of concessional loans for governments to co-fund the construction of water infrastructure. Access to loans is restricted to state and territory governments and subject to eligibility criteria, including that these governments and project partners can demonstrate that the proposed water infrastructure is economically viable and water resources are managed in accordance with the principles of the National Water Initiative.

15.3.4.1 Funding Contributions

Australian Government funding is contingent on the following conditions:

1. Non-Commonwealth parties, such as proponents and customers, must provide cash contributions of at least 51 per cent of total capital costs.
2. Commonwealth contributions for water infrastructure from all sources will not exceed 49 per cent.
3. Non-Commonwealth cash contributions may be sourced from proponents and private investors/customers.
4. In-kind contributions cannot form part of the non-Commonwealth contribution.

15.3.4.2 Features of National Water Infrastructure Loan Facility

Loans from the NWILF have the following features:

1. The minimum loan from the NWILF is $50 million. There is no upper limit, however, funding is subject to availability.
2. Loan funding is available from 2017 to 2026 but must be fully repaid within 15 years of the loan being taken (latest possible repayment year is 2040–41).
3. Loans can be structured as a:
   a. Maximum of up to five years for the construction period, where repayments can be interest-only.
   b. Further maximum of up to 10 years to repay the loan principal and additional interest.

c. A variable interest rate, based on an average of the daily 10-year Commonwealth bond rate over a specified six month period and the cost of administering water loans, will apply. The interest rate will be reviewed every six months in accordance with the Loan Agreement.

15.3.4.3 Summary – Assumed Cost of Debt

On 23 February 2017, DAWR advised that the current interest rate is 2.22 per cent. The sensitivity analysis assumes a low rate of 2 per cent and a high rate of 3 per cent. Assuming the above range of parameters, the WACCs applied for the commercial analysis section of the financial model, which are not commercial in confidence (commercial in confidence input includes market risk premium, equity beta, risk free cost of debt, and proponent's cost of equity and debt), are outlined in Table 3. The financial analysis applies a nominal WACC of 4.0 per cent.

Table 3 Summary of Assumed Cost of Debt

INPUT TO WACC FOR PRICING PURPOSES	ADOPTED WACC INPUTS	LOW WACC	CENTRAL WACC	HIGH WACC
Capital structure				
Level of risk capital provided (equity)	51%	51%	51%	51%
Level of borrowings (debt)	49%	49%	49%	49%
WACC for pricing purposes	4.0%	3.9%	4.0%	5.1%

Notes: # Sourced from QCA 2012, QCA 2016 and SunWater 2017. ^ Sourced from NWI Loan Facility (February 2017).

15.3.5 Other Assumptions

Key assumptions excluding WACC, capex and opex are as follows. These are common to all shortlisted options.

Table 4 Key Assumptions—Financial Year

	YEARS
Financial year that costs and prices are presented in:	2016-17
Written as	2017

Table 5 Key Assumptions—Asset Lifespan

COST ITEM	NULLINGA DAM - ASSET LIVES (YEARS)	DISTRIBUTION INFRASTRUCTURE - ASSET LIVES (YEARS)
Dams and weirs	100	100
Pipelines	60	60
Mechanical	25	25
Electrical	15	15
Weighted average life (for depreciation)	97	61

Table 6 Key Assumptions—Cost Escalation

COST ESCALATION	LOW	CENTRAL	HIGH	SOURCE
Past capex (up to 2017)	2.50%	3.00%	3.50%	3%, the geometric average of the above index from June 2007 to June 2014 before the fall in the growth of the index resulting from the end of the mining boom, reflecting historically high prices. A range of +-0.5% has been used.
Future capex (2017 onwards)	1.80%	2.00%	2.50%	1.80%, the 8-year geometric average from December 2008 to December 2016 captures the recent fall in the growth of the index. The lower bound of the RBA inflation band has been used as the midpoint and 2.5% as the high inflation point.
Fixed opex	2.00%	2.50%	3.00%	The RBA inflation target range of 2-3%, with the midpoint of 2.5%
Variable opex (e.g. electricity)	2.00%	2.50%	3.00%	The RBA inflation target range of 2-3%, with the midpoint of 2.5%

Table 7 Key Assumptions—Annual Water Charges Escalation

ANNUAL WATER CHARGES ESCALATION	LOW	CENTRAL	HIGH	SOURCE
Fixed	2.00%	2.50%	3.00%	The RBA inflation target range of 2-3%, with the midpoint of 2.5%
Variable	2.00%	2.50%	3.00%	The RBA inflation target range of 2-3%, with the midpoint of 2.5%

The Australian Department of Infrastructure and Regional Development is currently developing Cost Estimation Guidance, which includes a note on escalation to develop outturn costs. This guidance is being developed for the Department’s note on Administration and Land Transport Infrastructure Projects and is currently in a consultation phase.

15.3.5.1 National Water Initiatives Pricing Principles—Capital Contributions by Government

The National Water Initiative (NWI) pricing principles state that government grants (and any other contributions including from customers) should be excluded from the regulated asset base (RAB) for pricing i.e. prices should not include a return on or of this capital.

However, the cost of the grant could be recovered from customers if there was clear intent that charges be set to recover the full costs i.e. if the contributor intended there should be a return on this from customers this contribution should then be included in the RAB.

It has been assumed that capital contributions from customers and capital grants from government would be excluded from the RAB for pricing purposes.

15.3.6 Water Allocations

15.3.6.1 Option 1

Option 1 involves the continuing use of the existing yield in the MDWSS. The MDWSS has a total of 192,149 ML of HP and MP water allocations. However, distribution losses account for 45,000 ML, reducing HP and MP allocations available for use to 147,149 ML.

15.3.6.2 Options 2, 3 and 4

For the purposes of analysis, the following yields have been assumed for Options 2 to 4. Option 2 involves better use of existing allocations and produces no new yield.

Table 8 Assumed Yields for Options

YIELD (MP ML)	LOW	CENTRAL	HIGH
Option 2	N/A	N/A	N/A
Option 3	8,300	12,900	15,000
Option 4	55,398	55,398	55,398

Source: SunWater

15.3.7 Capital Costs

15.3.7.1 Option 1

Option 1 includes the current renewal and replacement capex of the MDWSS. SunWater's forecast for 2017 is:

- $0.5 million of bulk capex (non-routine expenditure in SunWater's Network Service Plan)
- $1.1 million of distribution capex
- $1.6 million of MDWSS total capex.

15.3.7.2 Option 2

Option 2 involves reforms and requires no incremental capex relative to Option 1.

15.3.7.3 Option 3

The assumed capex for Option 3 in the model is as follows.

Table 9 Capital Costs—Option 3

SCENARIO	TOTAL MP ALLOCATIONS TO BE CONVERTED FROM LOSSES	CAPEX ($2017 MILLION)
Low	8,300	29.71
Central	12,900	39.36
High	15,000	50.84

Source: SunWater 2017 and Jacobs

15.3.7.4 Option 4

The assumed capex for Option 4 in the financial model is as follows.

Table 10 Capital Costs—Option 4

ASSUMED CAPEX IN BUSINESS CASE - SMALL YIELD	INDEXED CAPEX ($2017 MILLION)	CHANGE FROM CENTRAL CAPEX
Low	227	30%
Central	323	0%
High	397	23%

Source: Jacobs modified risk adjustment and contingency adjustment (2017).

15.3.8 Initial One-off Operating Costs (Start-up Opex)

15.3.8.1 Option 1

The MDWSS is already operational and requires no one-off operating costs.

15.3.8.2 Option 2

The following costs are assumed to be incurred annually for two years for Option 2.

Table 11 Estimated Operating Costs (Government)—Option 2

OPTION 2 - SALARIES	ANNUAL FULL-TIME EQUIVALENTS (FTES) FOR THE PROJECT	ANNUAL COST OF FTE FOR THE PROJECT ($)
DNRM	1.4	140,000
SunWater	1.4	140,000
DEWS	0.3	30,000
Building Queensland	0.2	20,000
Premiers	0.1	10,000
Treasury	0.1	10,000
Sub-total	**3.5**	**350,000**

In addition, there is an allowance for external advice of $150,000 per year for two years. The total budget is $500,000 annually or $1 million establishment opex over a two-year program.

15.3.8.3 Option 3

There will be no one-off operating costs for Option 3 because all operating costs during construction will be capitalised.

15.3.8.4 Option 4

There will be no one-off operating costs for Option 4 because all operating costs during construction will be capitalised.

15.3.9 Ongoing Costs (Ongoing Opex)

15.3.9.1 Option 1

Opex costs for Option 1 is the opex for the MDWSS. SunWater's forecast for 2017 is:

- $1.2 million of bulk opex (routine expenditure in SunWater's Network Service Plan)
- $5.0 million of distribution opex
- $6.1 million of total MDWSS opex.

15.3.9.2 Option 2

Incremental ongoing costs are not applicable once Option 2 reforms are established. Option 2 creates no new water allocations and requires no capex or fixed opex. Variable MDWSS operating costs resulting from increased water use will be recovered from all customers via the QCA price setting process or equivalent (e.g. if LMA proceeds and is not regulated).

15.3.9.3 Option 3

Based on preliminary advice from SunWater (2017), the estimated ongoing opex for Option 3 is as follows.

Table 12 Estimated Ongoing Opex—Option 3

SCENARIO	INDEXED OPEX ($2017 MILLION PA)
Low	0.56
Central	0.65
High	0.75

The ongoing opex for Option 3 is comprised of the following:

- For opex 50 per cent of the meter depreciation budget has been removed as SunWater's capex planning makes allowance for customer meter replacement.
- While there will be potential efficiency gains to scheme operation (and unspecified cost savings are possible), the estimate of opex has been developed in consultation with SunWater at a high level.

The central case for the total annual opex is $0.65 million and it has been assumed this occurs every year from completion of works and, prior to that, increases in constant increments as works are completed over a three-year period.

The costs are indicative only (i.e. plus or minus 50 per cent in accuracy) which is considered suitable for the PBC stage. However, further options assessment, preliminary engineering design and costing work would be needed in any subsequent further assessment of Option 3.

15.3.9.4 Option 4

Based on the previous estimate of opex for the mixed use urban and agricultural dam, it has been estimated that the ongoing opex for Option 4 would be as follows.

Table 13 Estimated Ongoing Opex—Option 4

CATEGORY	LOW ($M)	CENTRAL ($M)	HIGH ($M)
Maintenance	1.5	2.1	2.6
Labour	0.1	0.2	0.3
Insurance	0.2	0.2	0.2
Contingency	0.4	0.5	1.5
Fixed opex ($ pa)	**2.2**	**2.9**	**4.6**
Variable opex ($ pa)	**0.6**	**0.6**	**0.9**
Total opex ($ pa)	**2.8**	**3.6**	**5.4**

15.3.10 Residual Values

Residual values ensure all options (which have different lifetimes) fit within the 30-year time horizon analysis for both the economic and financial/commercial analysis.

In this analysis, residual values are applied to increase the value of revenues (or benefits) at the end of the 30-year assessment term, to match the expected remaining life of each asset type.

The residual value will be applied as a lump sum revenue (or benefit) in Year 30. Straight line depreciation will be used to determine the residual value of each asset type.

15.3.11 Value Capture

The opportunity for value capture has been considered in the analysis.

The approach used recognises that value capture involves extracting funding contributions from those that derive a benefit (other than users) from infrastructure. Most commonly, value-capture mechanisms are targeted at capturing a portion of the uplift in land values attributable to infrastructure investment.

It is noted that appropriately designed value-capture mechanisms can assist in funding infrastructure projects and, in some circumstances, have efficiency and equity advantages relative to government contributions.

The value-capture assessment followed the following steps.

15.3.11.1 Identify Benefits and Beneficiaries

Value uplift may consist of:

- Increased land values
- Environment and safety improvements
- Improved access to other infrastructure
- Economic development and population growth.

Benefits of Options 2 to 4 will include:

- Increased land values for farmers

- Environment and safety improvements (Option 3 due to modernisation)
- Economic development and population growth.

The benefits of the shortlisted options include increased direct and indirect employment, and increased direct and indirect payments to capital (or profit increases) experienced by agricultural and supporting businesses.

As the direct benefits, safety improvements and land value increases accrue to customers, value creation pertains to the indirect jobs and indirect (off-farm) profit, other increases in land value, environmental improvements (if any) and economic development.

The strongest of these – economic development and property value increases – will be captured via taxation laws and the real-estate market.

15.3.11.2 Estimate Value Uplift

Value capture funding methods refer to private sector contribution to the cost of public sector infrastructure based on the value uplift that the infrastructure provides to the community.

The value uplift in the area relates primarily to increased value of production and conversion of unirrigated cropping land to irrigation. This value will be captured in the property market and generally be captured by farmers (customers) through funding construction for Option 3 and Option 4.

15.3.11.3 Identify Relevant Value-Capture Mechanisms

Value capture methods are typically used in conjunction with other financing mechanisms (e.g. PPP, Project Finance, Grants, etc.) to help fund infrastructure projects. The Australian Water Association (2016) prepared a presentation of the application of value capture to the Australian Water Industry including:

- Increase supply to expand irrigation – these are covered by water prices (not value capture)
- Water storages reducing urban water treatment costs downstream – this may be worth consultation with Mareeba Shire Council.

In summary, value capture is unlikely to apply to the shortlisted options.

15.3.11.4 Evaluate Mechanisms

Where value uplift is identified, the evaluation of mechanisms that could be employed to capture that uplift must be guided by the following established principles:

- Efficiency (economic and taxation efficiency)
- Equity and fairness (horizontal equity)
- Materiality and sustainability (stability and reliability).

Stakeholder consultation and support would be critical to successful use of value-capture mechanisms.

A theoretical option is a funding method that applies to sharing the benefits of increased land values and densities that are driven by infrastructure projects. A tax, levy or charge is applied over a specified period of time for properties, people or communities that specifically benefit from the infrastructure.

This would be challenging to implement in the Tablelands region, as it is complex, may be viewed as an additional tax and would undermine community support for additional water supply, meeting with strong stakeholder opposition. The prevailing view is that government should invest in regional economic development and not increase taxes.

15.3.11.5 Conclusion

Beyond customers funding capex and opex of Options 3 and 4, a viable opportunity cannot be seen to capture additional funds from the private sector's indirect beneficiaries, beyond the current income and corporation tax regimes, and (via the property market) through status quo stamp duties payable to the Queensland Government.

15.3.12 Revenues

15.3.12.1 Option 1

SunWater collects revenues to recover the costs of owning and running the MDWSS bulk and distribution systems. The QCA determines the maximum tariffs SunWater can charge irrigation users for holding and using each megalitre allocation of scheme water.

SunWater's tariffs are separated into parts reflecting the costs they are developed to recover. The following table shows SunWater's existing tariff components for 2017.

Table 14 SunWater Existing Tariffs

TARIFF	MEASUREMENT	RANGE OF TARIFFS ($2017/ML)	ASSOCIATED COST TO RECOVER
Part A	$/ML of bulk allocation	14.73	Fixed costs of bulk, including capital costs
Part B	$/ML of bulk water use	0.55	Bulk costs which vary with water use
Part C	$/ML of distribution allocation	10.21-36.61	Fixed costs of distribution, including capital costs
Part D	$/ML of distribution water use	4.39-80.67	Distribution costs which vary with water use

The following tables show the types of revenues identified for assessing the shortlisted options.

15.3.12.2 Option 2

Table 15 Types of Revenues for Assessing Option 2

REVENUE	MEASUREMENT	SOURCE	COMMENT
Fixed water charges	$/ML of nominal allocation	NWI pricing principles Demand forecast	MDWSS charges will continue to be applied
Variable water charges	$/ML of water use	NWI pricing principles Demand forecast	MDWSS charges will continue to be applied
Value capture	To be investigated	To be investigated	Not applicable

Changes in opex will be reflected in future irrigation prices, which are outside the scope of this PBC.

15.3.12.3 Option 3

Table 16 Types of Revenues for Assessing Option 3

REVENUE	MEASUREMENT	SOURCE	COMMENT
One off sale of water allocations	$/ML of new water allocation	Water market data	At $2,500 per ML upfront contribution for MP water allocations, customers may provide a significant portion of capital funding depending on the capex applied.
Fixed water charges	$/ML of nominal allocation	NWI pricing principles Demand forecast	Fixed costs will be recovered via fixed Part A and Part C annual charges regardless of supply and demand
Variable water charges	$/ML of water use	NWI pricing principles Demand forecast	Costs that vary with water use will be 100 per cent recovered via Part B and Part D charges applied to metered water use regardless of supply and demand.
Value capture	To be investigated	To be investigated	Not applicable

Changes in capital costs and opex will be reflected in future irrigation prices, which are outside the scope of this PBC. However, the annual charges for incremental users have been estimated in the table below. The annual charges absent any government funding, with all capital costs paid by customers, will be the same as the annual charges with government grant funding. This is because capital costs are not proposed to be recovered through annual charges with customer funded capex and with government grant funded capex.

Table 17 Estimated Impacts on Annual Charges—Option 3

MP ANNUAL WATER CHARGE	LOW COST ($2017/ML PER ANNUM)	CENTRAL COST ($2017/ML PER ANNUM)	HIGH COST ($2017/ML PER ANNUM)
Government contribution is *low interest loan*	63	94	154
Government contribution is a *capital grant*	63	89	118
No government contribution	63	89	118

15.3.12.4 Option 4

Table 18 Types of Revenues for Assessing Option 4

REVENUE	MEASUREMENT	SOURCE	COMMENT
One off sale of water allocations	$/ML of new water allocation	Water market data	Option 4 may be 33-58 per cent funded by customers at $2,500/ML, depending on capex and water sales.
Fixed water charges	$/ML of nominal allocation	NWI pricing principles Demand forecast	Bulk costs will be recovered via fixed Part A annual charges regardless of supply and demand.

Variable water charges	$/ML of water use	NWI pricing principles Demand forecast	Costs that vary with water use will be 100 per cent recovered via Part B charges applied to metered water use regardless of supply and demand.
Value capture	To be investigated	To be investigated	Not applicable

Nullinga Dam capital costs and opex will be reflected in future irrigation annual water charges. It is recommended that new annual charges be set separately to the MDWSS to reflect the costs of the new scheme.

Charges for Nullinga Dam water will likely be different to MDWSS and have been estimated as follows. Again, annual charges absent any government funding, with all capital costs paid by customers, will be the same as the annual charges with government grant funding because capital costs are not proposed to be recovered through annual charges with customer funded capex and with government grant funded capex.

Table 19 Estimated Annual Water Charges—Option 4

MP ANNUAL WATER CHARGE	LOW COST ($2017/ML PER ANNUM)	CENTRAL COST ($2017/ML PER ANNUM)	HIGH COST ($2017/ML PER ANNUM)
Government contribution is *low interest loan*	121	226	310
Government contribution is a *capital grant*	48	79	106
No government contribution	48	79	106

15.4 Risk Unadjusted Financial NPVs—Summary

This section provides a summary of the financial outputs without risk adjustments.

15.4.1 Financial NPVs (Not Adjusted for Risk)

Table 20 Summary of Financial NPVs for Options (Not Adjusted for Risk)

FINANCIAL (RISK UNADJUSTED) NPVS ($2017 MILLIONS)	LOW	CENTRAL	HIGH
WACC	3.9%	4.0%	5.1%
Option 2 ($million, 2017 prices)	N/A	N/A	N/A
Option 3 ($million, 2017 prices)	0.0	0.0	0.0
Option 4 ($million, 2017 prices)	2.3	0.0	-23.0

15.4.2 Commercial—Capex Funding and Annual Charges (Not Adjusted for Risk)

15.4.2.1 Option 3

Table 21 Capex Funding and Annual Charges (Not Adjusted for Risk)—Option 3

ITEM	LOW COST	CENTRAL COST	HIGH COST
CAPEX FUNDING			

Capex ($million, 2017 prices)	30	39	51
Capex per new MP allocation ($2017/ML)	3,579	3,058	3,389
Price of MP allocation paid by customers (one-off permanent trade) - customer capital contribution (2017 dollars/ML)	2,500	2,500	2,500
Portion of capex funded by customers (%)	70	82	74
Capex funding shortfall (%)	30	18	26
ANNUAL CHARGES			
MP annual water charge (2017 dollars/ML pa) * - Government contribution is low interest loan	63	94	154
MP annual water charge (2017 dollars/ML pa) * - Government contribution is a capital grant	63	89	118
MP annual water charge (2017 dollars/ML pa) * - No government contribution	63	89	118

** Note: Charges for Option 3 are likely to be those scheme charges recommended by the QCA and approved by the Queensland Government.*

15.4.2.2 Option 4

Table 22 Capex Funding and Annual Charges (Not Adjusted for Risk)—Option 4

ITEM	LOW COST	CENTRAL COST	HIGH COST
CAPEX FUNDING			
Capex ($million, 2017 prices)	227	323	397
Capex per new MP allocation 2017 dollars /ML)	4,309	6,123	7,531
Price of MP allocation paid by customers (one-off permanent trade) - customer capital contribution 2017 dollars /ML)	2,500	2,500	2,500
Portion of capex funded by customers (%)	58	41	33
Capex funding shortfall (%)	42	59	67
ANNUAL CHARGES			
MP annual water charge (2017 dollars/ML pa)* - Government contribution is *low interest loan*	121	226	310
MP annual water charge (2017 dollars/ML pa)* - Government contribution is *capital grant*	48	79	106
MP annual water charge (2017 dollars/ML pa)* - No government contribution	48	79	106

* Note: Charges for Option 4 are likely to be those scheme charges recommended by the QCA and approved by the Queensland Government.

15.4.3 Conclusions

1. Based on the financial outputs without risk adjustments the conclusions for Option 3 include that:
   a. At $2,500 per ML for MP water allocations customers will provide capital contributions of 82 per cent of capex under the central case

   b. Estimated annual charges fall within the expected range consistent with MDWSS charges, except with high capex and loan government funding.

2. Based on the financial outputs without risk adjustments the conclusions for Option 4 include that:
   a. At $2,500 per ML for MP water allocations, customers will provide capital contributions of 41 per cent under the central case
   b. Estimated annual water charges range from $48 to $310 per ML depending on the funding model applied.

15.5 Risk-adjusted Financial NPVs—Method

15.5.1 Modified DEWS Risk Matrix

The DEWS risk matrix was applied for risk adjustments. A modification was made to quantify the definition of consequence in dollar terms for Option 3 and 4. The Option 3 and Option 4 quantitative (dollar term) guidelines for capex and opex consequence are as follows.

Table 23 Quantitative Guidelines for Capex and Opex Consequences for Option 3

CONSEQUENCE – OPTION 3	CAPITAL ($)	RECURRENT ($)	TIME
Catastrophic	11,808,231	237,600	12 months +
Major	7,872,154	158,400	6 – 12 months
Moderate	3,936,077	79,200	3 – 6 months
Minor	1,968,039	39,600	1 – 3 months
Insignificant	984,019	19,800	Less than 1 month

Table 24 Quantitative Guidelines for Capex and Opex Consequences for Option 4

CONSEQUENCE – OPTION 4	CAPITAL ($ MILLION)	RECURRENT ($ MILLION)	TIME
Catastrophic	68,104,557	650,506	12 months +
Major	45,403,038	433,671	6 – 12 months
Moderate	22,701,519	216,835	3 – 6 months
Minor	11,350,759	108,418	1 – 3 months
Insignificant	5,675,380	54,209	Less than 1 month

Using this and the risk framework (provided by DEWS), the financial and economic costs were risk adjusted.

15.5.2 Risk categories for each option

The risk categories for Options 2 to 4 were considered in workshops and analysis with key stakeholders and are summarised in the following table.

Table 25 Risk Categories for Options 2 to 4

RISK CATEGORIES	RISK CATEGORIES
Social/stakeholder risk	Water sales contractual risk (or auction risks)
Environmental risk	Default risk for annual charges (Part A)
Demand assessment risk	Site risk
Design risk (e.g. peak flows)	Construction risk
Capital cost risk	Operating risk - intended operations and maintenance costs
Operating cost risk	Operating risk - Supply and distribution contract risk
Funding risk (water allocation pricing risk)	Health and safety risk
Annual charges/ongoing revenue risk	Native Title and Cultural Heritage risk

15.5.3 Risk Allocation via Delivery Model

Internal and key stakeholder delivery model workshops considered a range of delivery and procurement options for Option 4. Discussion relevant to the financial analysis is presented below.

1. ***Design and Construct (D&C)***—A D&C approach is preferred because preliminary designs are prepared in advance, with specifications on performance. This allows the successful D&C contractor to innovate and prepare a detailed design that meets these performance specifications, enhancing value for money and profitability.

   At times, this approach requires proponents to have an in-house design engineering team with strong design capability. This is likely to be the most appropriate model, particularly in a competitive market.

   In a less competitive market, this approach can, in limited circumstances, initially deliver a design and construction price that does not represent value for money (or a sufficiently low capex). However, in most cases (even when the market is highly competitive) this delivery model does yield bids that represent value for money.

   Occasionally the winning cost can still be too high. To mitigate this risk consider advising the winning contractor that their bid exceeded the budget, and then work with them to bring the capex down to a level that allows the project to proceed.

2. ***Early Contractor Involvement (ECI)***—ECI can ensure a higher quality of bid/design by paying contractors to invest in designing and estimating the bid upfront and limiting the number of contractors (typically to three) who are eligible or are in a strong position to win the construction role. This delivery model would minimise the cost of design and construction in a market that has insufficient work.

   This delivery model may be recommended in certain circumstances (e.g. where the proponent does not have an in-house design engineering team with strong design capability).

3. ***Construct only***—Experience indicates that the risk with this approach is that it costs the proponent a premium for each change in their design. The proponent will also pay for any latent conditions (e.g. unexpected/unidentified geotechnical conditions). For conditions not accounted for in the design provided to the contractor, the risk and cost is with the proponent (and the cost is in practice determined by the contractor), often resulting in costs exceeding budget. By contrast the D&C model transfers this risk to the contractor via a fixed price.

The choice of model informed the assessment of the extent to which the State retains or transfers risks considered.

15.6 Application of Risk Findings

Identified risks were applied to the financial and economic model using the following process.

Figure 1 Process Used for Identifying Risks

15.7 Risk-adjusted NPVs

15.7.1 Option 1

Option 1 was not considered suitable for risk adjustments for the purposes of this PBC. SunWater's capex and opex for the MDWSS is developed using operating experience of the expected risks of operating and maintaining the scheme. These costs are business as usual.

15.7.2 Option 2

Option 2 is not considered suitable for a risk adjusted financial NPV calculation as it is a reform process requiring a portion of government wages and some external consultancy costs. This option is subject to government reform risk analysis.

Option 2 does not consist of incremental capex or fixed opex costs relative to Option 1. Variable opex for Option 2 will be the same as variable opex for Option1, and has been developed by SunWater using operational experience of the expected risks of operating and maintaining the MDWSS.

15.7.3 Option 3—NPVs (Risk-adjusted) Outputs

The high-level detail for Option 3 is as follows for a WACC of 4.0 per cent.

Table 26 Risk-adjusted NPV Outputs for Option 3

KEY OUTPUTS	$ (2017 PRICES)	$ MILLION (2017 PRICES)
NPV of revenue	55,240,637	55.24
NPV of residual value	420,062	0.42
PV of revenue - Option 3	55,660,699	55.66
NPV of capex	39,665,731	39.67
NPV of opex	15,994,968	15.99
PV of totex (capex + opex) – Option 3	55,660,699	55.66
FNPV – Option 3	0	0.00

Figures 2 and 3 show the Monte Carlo output for Option 3 present value (PV) of revenue and costs.

Figure 2 Monte Carlo Revenue Output for Option 3

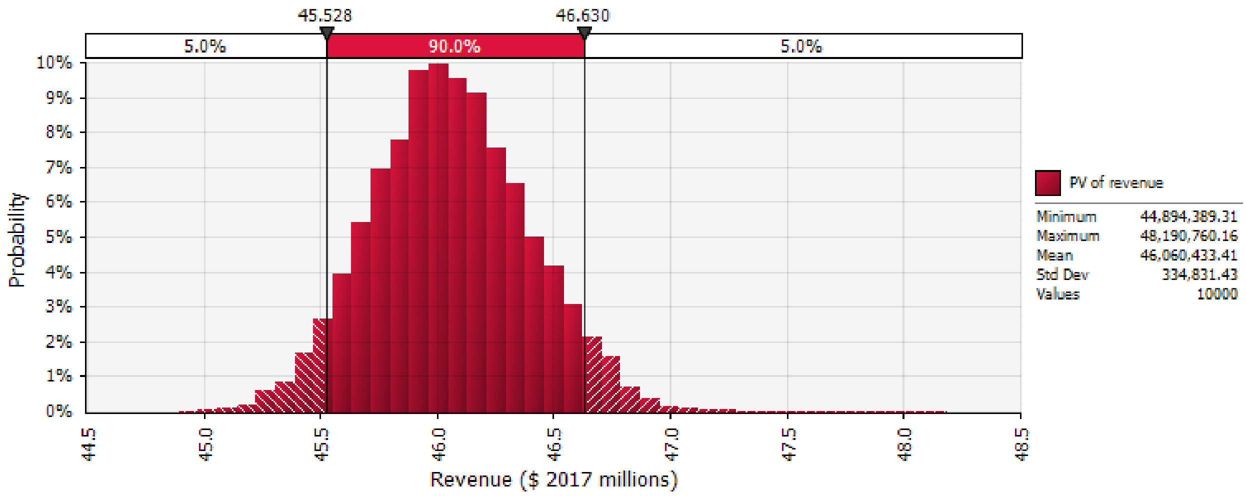


Figure 3 Monte Carlo Totex Output for Option 3

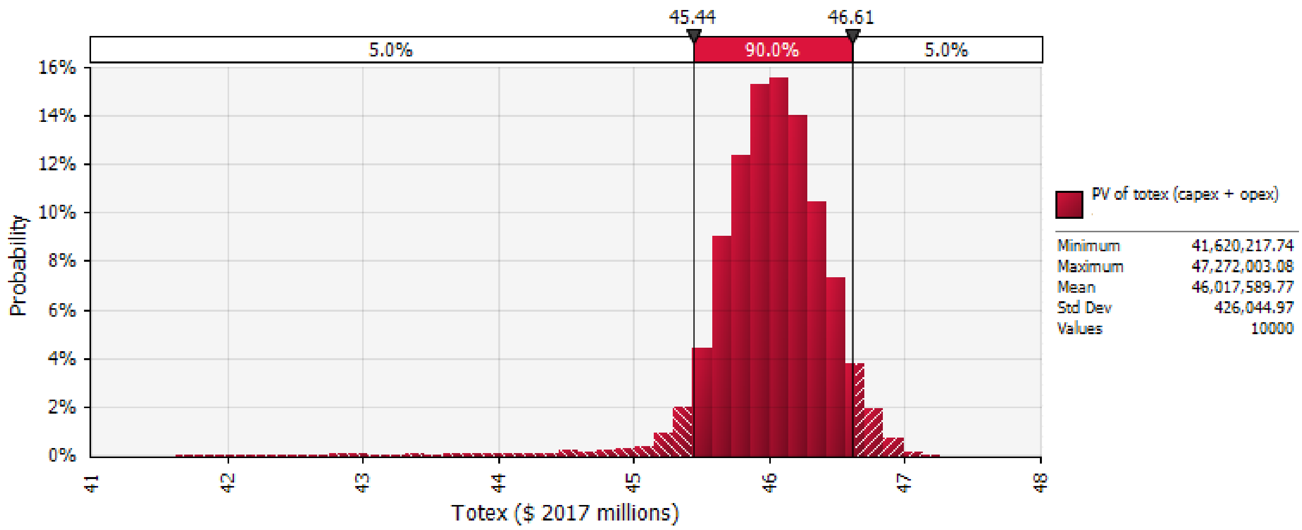


Table 27 shows the risk adjustments to Option 3.

Table 27 Risk Adjustments for Option 3

RISK ADJUSTMENT	$(2017 PRICES)	$ MILLION (2017 PRICES)
NPV of revenue	22,943,778	22.94
NPV of residual value	420,062	0.42
PV of revenue – Option 3	23,363,840	23.36
NPV of capex	20,840,174	20.84
NPV of opex	2,523,666	2.52
PV of totex (capex + opex) – Option 3	23,363,840	23.36
FNPV – Option 3	0	0.00

15.7.4 Option 4—NPVs (Risk-adjusted) Outputs

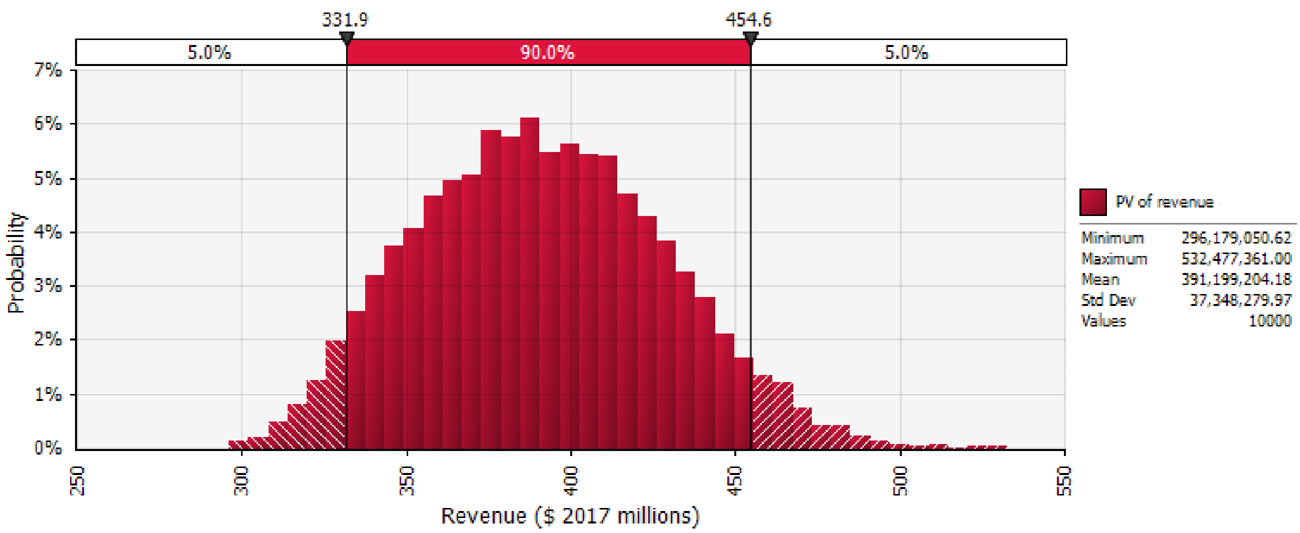
The high-level detail for Option 4 is as follows for a WACC of 4.0 per cent.

Table 28 Risk-adjusted NPV Outputs for Option 4

KEY OUTPUTS	$ (2017 PRICES)	$ MILLION (2017 PRICES)
NPV of revenue	338,553,081	338.55
NPV of residual value	44,926,260	44.93
PV of revenue – Option 4	383,479,341	383.48
NPV of capex	322,564,297	322.56
NPV of opex	108,632,930	108.63
PV of totex (capex + opex) – Option 4	431,197,228	431.20
FNPV – Option 4	-47,717,887	-47.72

Figures 4 to 6 show the Monte Carlo output for Option 4 present value (PV) of revenue, capex and totex (capex and opex).

Figure 4 Monte Carlo Revenue Output for Option 4



The PV totex (Figure 5) has a long right tail because of the numerous catastrophic risks that were included in its risk assessment, being mindful of precedents such as the Paradise Dam spillway replacement.

Figure 5 Monte Carlo Totex Output for Option 4

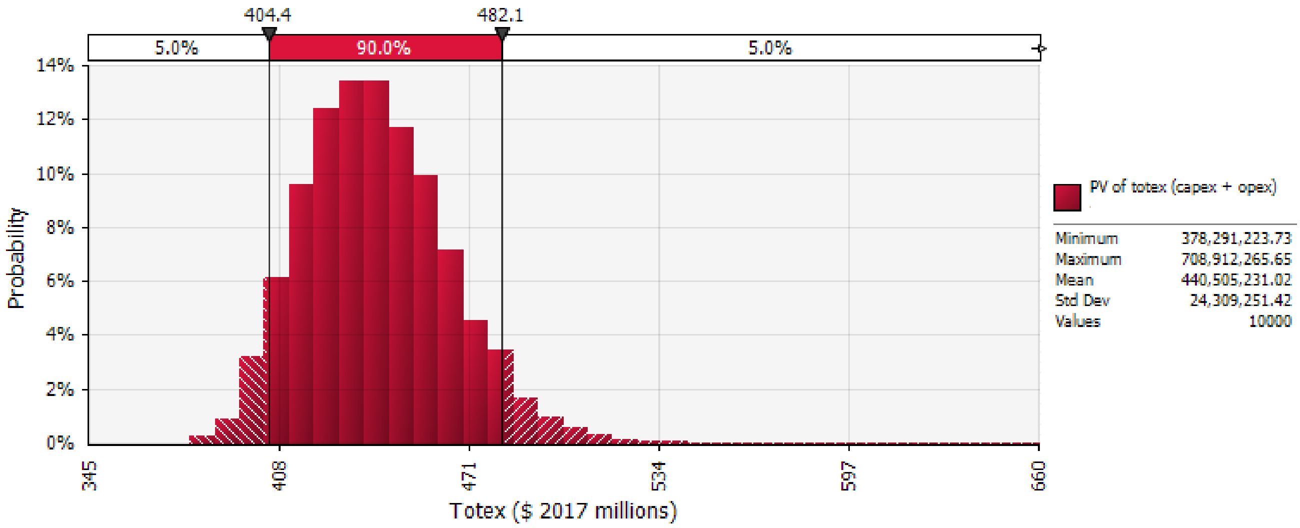


Figure 6 Monte Carlo Total Capex Output for Option 4

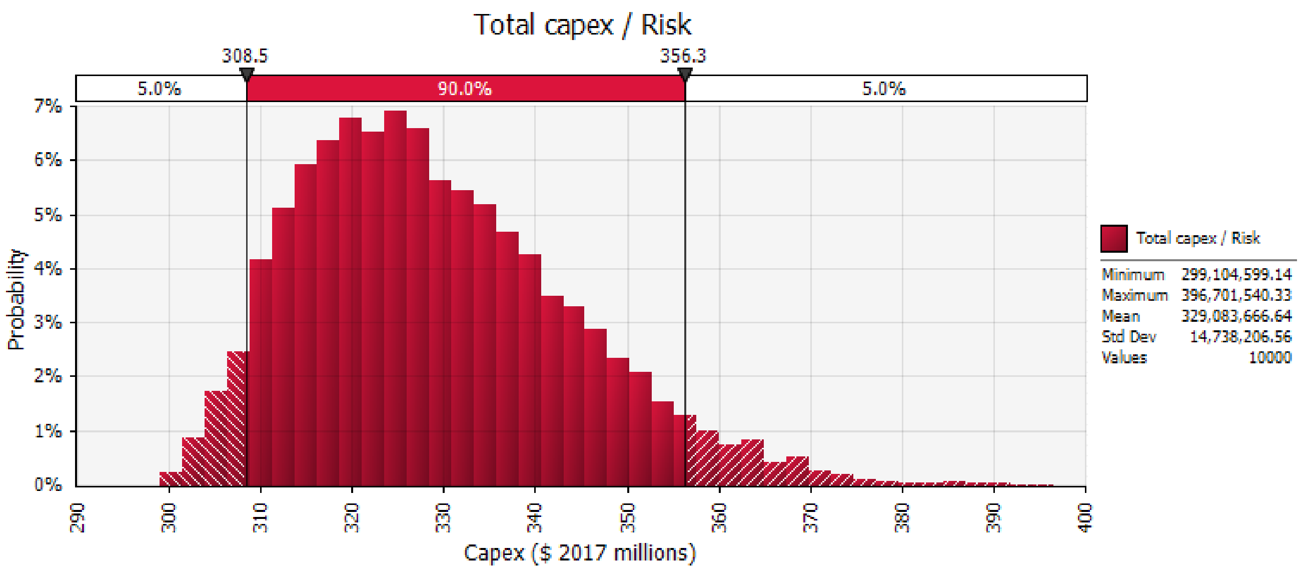


Table 29 shows the risk adjustments to Option 4.

Table 29 Risk adjustments to Option 4

RISK ADJUSTMENT	$ (2017 PRICES)	$ MILLION (2017 PRICES)
NPV of revenue	30,565,996	30.57
NPV of residual value	-15,407,176	-15.41
PV of revenue - Option 4	15,158,820	15.16
NPV of capex	62,692,099	62.69
NPV of opex	184,608	0.18
PV of totex (capex + opex) - Option 4	62,876,707	62.88
FNPV - Option 4	-47,717,887	-47.72

15.7.5 Analysis Summary

This section provides a summary of key outputs.

Table 30 Financial Risk-adjusted NPVs

FINANCIAL (RISK ADJUSTED) NPVS ($ MILLION (2017 PRICES))	UNADJUSTED NPV	RISK ADJUSTMENT	RISK ADJUSTED NPV
Option 2 ($2017 million)	N/A	N/A	N/A
Option 3 ($million – 2017 prices)	0	-0	-0
Option 4 ($ million – 2017 prices)	0	-48	-48

The financial risk adjusted NPVs have the following features:

- Option 3 – No change from unadjusted risk – risk adjusted NPV is zero
- Option 4 – Negative $48 million change from unadjusted risk – risk adjusted NPV is minus $48 million.

This has occurred because the capital and operating costs are covered by customer capital contributions and government funding (water allocation pricing and government support) and annual water charges.

If the government funding is a low interest loan, as has been assumed for the risk unadjusted Option 4, customers pay the full capital cost of the option over time via annual charges. That is, annual charges are modelled to recover all principal and interest payments for the loan, plus ongoing operations and maintenance costs.

As shown in the risk adjusted outputs for Option 3 and Option 4, the FNPV of zero or close to zero does not mean the costs and revenues of the options are zero. Indeed, this PBC has determined a risk adjusted gross whole of life PV cost for Option 3 is $55.7 million and for Option 4 is $431.2 million.

Prices and revenues have been developed to match these expected whole of life costs, including the expected cost of risk. Although prices are not rigid, prices will not be able to perfectly match changes from expected costs. This is reflected in the distribution of the FNPV. The ability of prices to change to match changes from expected costs is greater for Option 3 than for Option 4, where the possible risks of Option 3 have smaller monetary consequences. Prices are expected to generally be adjusted to account for cost changes.

For analysis purposes, a level of State grant funding was introduced for the risk adjustment of Option 4. This results in a negative financial NPV for the State, as these costs are not recovered through annual charges as with low interest loan funding.

15.7.6 Limitation

Modelling does not yet incorporate the limited (15 year) life of the NWILF low interest loan. The interest rate will need to increase from Year 16 in subsequent analysis. This will not impact NPVs but may increase annual charges for Option 4.

15.7.7 Summary by Option

15.7.7.1 Option 2

Option 2 has zero incremental financial costs (although in the economic assessment, public service wages are included as the opex cost - there are no capex items for Option 2). Moreover, there are no revenues directly linked to Option 2 as it is a reform process designed to increase confidence in the use of existing MDWSS water allocations, for which the annual charging regime should not alter. Accordingly, financial NPVs have not been generated for this option.

15.7.7.2 Option 3

With risk adjustment, Option 3 maintains at least a zero risk adjusted NPV. However, the risk register for Option 3 highlights the need for further option consideration (design and costings) to be conducted. With a willingness to pay of between $2,000 per ML and $3,000 per ML, customers can potentially fund a significant portion of the capex required for this option. Ongoing MDWSS annual charges will recover opex and any future capital costs.

15.7.7.3 Option 4

The unadjusted Option 4 also generates a zero NPV. This is because NWI Pricing Principles have been used to develop prices. NWI Pricing Principles emphasise a neutral ($0.00) NPV over the life of the water asset. Charges are based on actual capital costs, which include a revealed contingency and risk adjustment above forecast costs.

However, this conclusion is based on an important assumption that charges are developed using pre-sold volumes, creating certainty over demand. This means risk is transferred from the proponent to customers. The risk adjusted NPV has a $62.9 million contingency and risk adjustment for both capex and opex. If an alternative model was used, then the result would be different.

However, with risk adjustment, for analysis purposes an assumption has been made of a level of State grant funding, which leads to a -$48 million NPV for the State. This is because under the NWI Pricing Principles grant funding is not recovered through prices. If there is no grant funding, or all grant funding is from Australian Government funds, it is expected the risk adjusted NPV will remain zero for the State.

15.7.8 Option 3 Risk-adjusted Capex Story

A risk adjusted cost estimate was developed for an expected yield of 8,300 ML.

Table 31 Cost Estimate for Option 3 (8,300 ML)

ESTIMATE FOR 8,300ML (NO AMENDMENTS)	DOLLARS ($2017)	PORTION OF BASE ESTIMATE
Part 1		
Preliminaries and General	3,000,839	18%
Part 2 - Construction Works		
Pipeline system	1,407,769	8%
Automation and balancing storages	11,363,241	66%
Sub-total	**12,771,010**	**75%**
Construction Value (Parts 1 + 2)	**15,771,849**	**92%**
Part 3		
Principal's Costs	1,352,336	8%
Base estimate (Parts 1 + 2 + 3)	**17,124,185**	**100%**
Contingency and Risk	3,424,837	20%
Total (incl. base and contingency)	**20,549,022**	**120%**

A linear relationship was used to convert the capex estimate to an Option 3 with an expected yield of 15,000 ML. In making the conversion, consideration was given to the reduction of the expected yield from 10,375 ML to 8,300 ML. These two yields were scaled to 15,000 ML.

A contingency and risk allowance of 20 per cent, similar to that used for Option 4, is considered for the purposes of analysis in the PBC.

Table 32 shows the capex estimate for Option 3 prepared for the PBC.

Table 32 Capital Cost Estimation for Option 3

CONVERSION TO WHOLE PROJECT	LOW	CENTRAL	HIGH – SUNWATER ESTIMATE
Base Estimate	7,124,185	8,234,926	19,345,667
Contingency	20%	33%	45%
Contingency ($2017)	3,424,837	5,964,659	8,786,834
Total capex (incl. contingency) - Partial Project (Yield 8,300 ML)	**20,549,022**	**24,199,585**	**28,132,501**
Ratios	145%	163%	181%
Total capex (incl. contingency) - Whole Project (15,000ML Yield)	**29,709,429**	**39,360,771**	**50,841,869**

15.7.9 Option 4 Risk-adjusted Capex Story

The risk adjusted capex for Option 4 is based on a previously developed capex estimate for Nullinga Dam. However, as a result of the risk workshop processes in the development of this PBC and advice from stakeholders with recent experience estimating and constructing dams, a lower risk adjustment and lower contingency has been proposed.

In summary, in 2017 dollars, the central capex for the small yielding Nullinga Dam (bulk only capex) is outlined in the following table.

Table 33 Central Capex for a Small Yielding Nullinga Dam

ITEM	CAPITAL COST ($ MILLION – 2017 PRICES)	CAPEX PER ML ($PER ML – 2017 PRICES)
Raw capex ^	259.9	4,692
Risk adjustment	20.4	368
30% contingency	77.9	1,406
Total capex	358.2	6,466

Note ^ includes an alliance fee of $26.1 million in 2017 dollars, which will not apply under a D&C (or ECI) delivery model.

In summary, in 2017 dollars, the central capex for small yielding Nullinga Dam (bulk only capex) is:

- Raw capex of $259.8 million (includes an alliance fee of $26.1 million in 2017 dollars, which would not apply under a different delivery model such as a D&C (or ECI))
- Risk adjustment of $20.4 million (including a number of material items ascribed an 80 per cent probability of occurring, which appears to reflect the pre-GFC environment)
- 30 per cent contingency of $77.9 million (this is compared to a contingency of up to 20 per cent, developed under commercial conditions, which some stakeholders have used recently to deliver irrigation schemes and gain funding approval for further schemes)
- Total capex of $358.2 million for Option 4: Nullinga Dam (approximately 55,000 ML MP yield).

In summary, the amended version of the central capex for small Nullinga Dam (bulk only capex), which drives the Option 4 financial modelling in this PBC is provided in the table below.

Table 34 Alternative Central Capex for a Small Yielding Nullinga Dam

ITEM	CAPITAL COST ($MILLION – 2017 PRICES)	CAPEX PER ML ($PER ML – 2017 PRICES)
Raw capex	259.9	4,725
Risk adjustment	10.7	195
20% contingency for unknown design items and latent conditions (e.g. geotechnical and other risks)	52.0	945
Total capex	322.6	5,865

In summary, in 2017 dollars, the alternative version of the central capex for small yielding Nullinga Dam (bulk only capex) is:

- Raw capex of $260 million (including an alliance fee of $26 million in 2017 dollars)
- Risk adjustment of $11 million
- Contingency of 20 per cent (applied to raw capex) for unknown/latent risks (e.g. if at construction it is discovered that the early geotechnical surveys did not reveal the full extent of the geotechnical challenges faced by the construction entity) of $52 million
- Total capex of $323 million.

While the capex estimate was appropriate for the time and purposes it was developed, it is considered for the purposes of analysis that there was benefit in giving consideration to updating the risk and contingency components to reflect 2016-17 market conditions. There have been changes in the market since that time. For example, the cost estimates were developed during the height of the mining boom in 2007, prior to the Global Financial Crisis (GFC). Since that time, construction market conditions have altered. It was therefore considered suitable for the purposes of analysis to reduce some of the previously developed risk adjustments – although many were retained.

Moreover, for the purposes of analysis, the 30 per cent contingency was interrogated in light of recent experience nationally constructing dams and irrigation schemes, in Tasmania and Western Australia, which has demonstrated that a contingency of 10 to 20 per cent for unknown risks at this PBC design stage may be appropriate. The lower required contingency is driven by the design and construct business model, where contractors are incentivised to find efficiencies and savings in the initial design model during tendering and during the construction of the dam. This incentive is not present in an alliance model.

The risk and contingency allowance ranges from a low of 12 per cent to a high of 53 per cent.

As a sense check, the risk and contingency adjusted dam costs have been benchmarked against the costs of a dam of similar roller compacted concrete design to the proposed Nullinga Dam. Meander Dam, built in Tasmania through design and construct delivery model, has a capacity of 85,000m^3, 3.89 times less than the proposed Nullinga Dam design capacity.

The post construction realised cost benchmark of Meander Dam (which includes an additional contingency on top of the realised cost) is 13 per cent lower than the unadjusted base costs, and 30 per cent lower than the risk adjusted capex. The benchmark of the Meander Dam shows the cost efficiencies that may be delivered by a design and construct delivery model.

Total capex results in an estimated capital cost of $5,865 per ML of MP allocations to a P50 confidence level.

15.7.9.1 Limitation

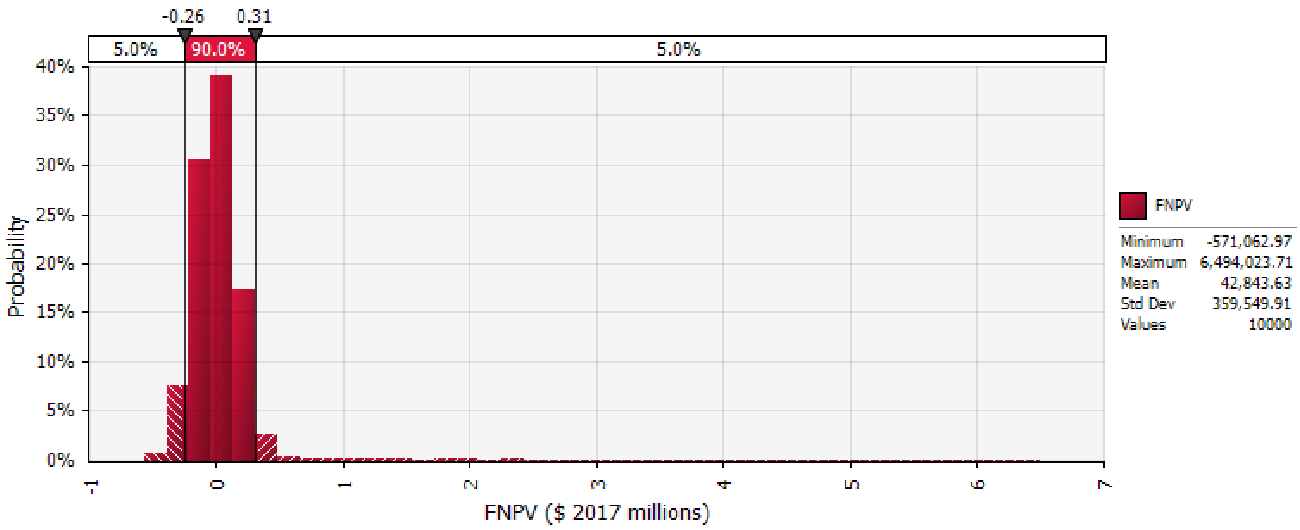
The risk assessment for Option 4 was considered appropriate for a PBC but would warrant review by a dam engineer in any further assessment.

Further assessment of delivery models for Option 4 may also result in the removal of the $26 million alliance fee from the raw cost estimate on the basis that an alliance fee would not be payable under a different delivery model. This cost remains in the raw capex estimate for the PBC.

15.7.10 Monte Carlo Output for Option 3 Financial NPV

Figure 7 presents Option 3 financial NPV (net revenue).

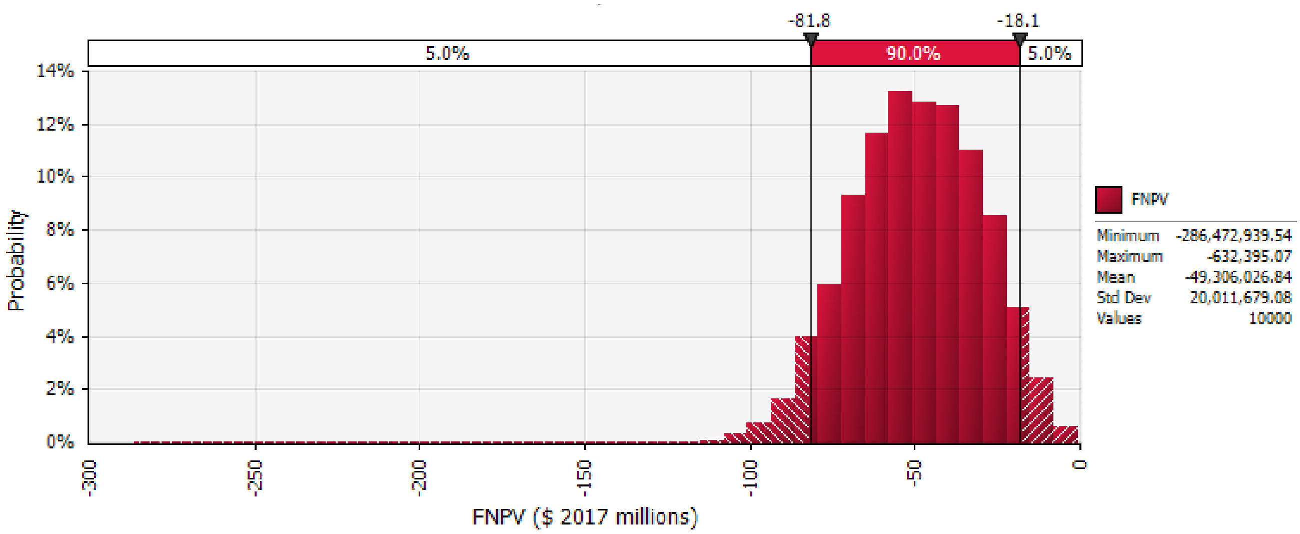
Figure 7 Financial NPV (Net Revenue) for Option 3



15.7.11 Monte Carlo Output for Option 4 Financial NPV

Figure 8 presents Option 4's financial NPV (net revenue).

Figure 8 Financial NPV (Net Revenue) for Option 4



15.7.12 Conclusions

Initial findings include that the financial and commercial analysis for Options 3 and 4 generally generates NPVs of zero on the basis of assumptions in relation to the recovery of costs from customers and the application of Australian Government funding, except for the risk adjusted Option 4 where some State government grant funding for the purposes of analysis.

The risk adjusted FNPV of zero does not mean the project has a gross cost of zero. Option 3 has a whole of life PV cost of $55.7 million and Option 4 has a whole of life PV cost of $431.2 million.

The prices and revenues for Option 3 and Option 4 have been developed using the NWI pricing principles and using the expected yield and capital costs of each project on the basis of available information.

While there is a degree of funding risk for opex, particularly for Option 4, the standard water supply contracts in Queensland require payment of 90 per cent or more of operating costs as fixed charge in advance of each quarter of the water year. Variable costs are paid based on metered water use, but if there is zero water use, these costs are not incurred. Annual charging and supply contracting arrangements mitigate opex recovery risk substantially.

Moreover, under the NWI pricing principles, opex costs are fully recovered from customers. However, there are a number of catastrophic risks associated with a dam which result in costs difficult to translate into prices without unsustainable bill shock. An example of such a catastrophic risk is the failure of the slipway, requiring the rebuilding of the dam and a potential doubling of prices to recover losses.

This effect is shown not in the expected FNPV, which remains zero net of funding, but the distribution of the FNPV around zero. This effect is shown in Figure 8 above.