



## CHAPTER 19

### CONCLUSIONS

Nullinga Dam and Other Options Preliminary Business Case



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## 19 CONCLUSIONS

### CHAPTER SUMMARY AND CONCLUSIONS

- The following conclusions are made on the basis of the analysis undertaken in this PBC:
  - There is no Cairns urban water supply problem to be addressed in the next 30 years by a regional bulk water supply source such as Nullinga Dam.
  - There are three key agricultural demand drivers in the region: dry conditions and water security; changes in crop profile to higher value permanent plantings; and industry growth.
  - There is opportunity to expand agricultural production on the Atherton Tablelands and surrounding region by increasing the availability of supplemented water allocations.
  - As the service need is an opportunity (rather than a problem), it is considered there is no base case in which any sector will run out of water supply catastrophically.
  - Addressing the service need is anticipated to result in a number of regional benefits.
  - Following an options analysis, four options were shortlisted for further consideration:
    - Option 1: Do minimum (base case)—continuation of water trading and on-farm efficiency measures in the MDWSS
    - Option 2: Improve MDWSS rules and operations to increase operational performance and reduce current constraints
    - Option 3: Modernise the MDWSS distribution system via infrastructure works to reduce system losses and convert certain loss allocations into new water allocations for sale
    - Option 4: Design and build Nullinga Dam for agricultural use.
  - Option 2 and Option 3 are recommended to progress to further evaluation.
  - Option 2 will be implemented by DNRM and SunWater.
  - Option 3 will be implemented by SunWater.
  - The Nullinga Dam option is not recommended to be progressed to a Detailed Business Case at this time. Nullinga Dam (via a ‘swap’ arrangement of existing water allocations from Tinaroo Falls Dam) is not needed for Cairns urban water supply for at least the next 30 years and assessment has revealed limited certainty of information in relation to Nullinga Dam for agricultural use.
  - **The trigger for any further consideration of the progression of Nullinga Dam for agricultural use is recommended to be a satisfactory level of certainty about the demand for new water allocations at a nominated volume and a nominated price (e.g. a significantly large proportion of the dam yield at an appropriate price). This certainty may be developed via an approach from industry to government, or via government commissioning a detailed demand assessment for new water allocations in the region.**



## 19.1 Purpose

The purpose of this chapter is to set out the key conclusions in the PBC on the basis of the analysis undertaken. These conclusions support the recommendations made in the PBC.

## 19.2 Nullinga Dam

- The proposed Nullinga Dam is less effective than the existing Tinaroo Falls Dam due to yield and hydrology inefficiency. Tinaroo Falls Dam has a full storage capacity of 438,900 ML and a yield of 211,834 ML per annum. In a comparison, the 'large size' proposed Nullinga Dam has a full storage capacity of 491,000 ML and a yield of between 65,000 and 90,000 ML per annum, depending on the hydrological model used. This inefficiency is expected as the original decision was to build Tinaroo Falls Dam because of its more favourable features.
- The Nullinga Dam site suffers from inefficiency issues for irrigation purposes as it can only deliver water to a limited number of existing farms via current delivery infrastructure.
- It is not possible for Cairns to efficiently receive water from the proposed Nullinga Dam. Cairns would need to receive water from Tinaroo Falls Dam via additional releases down the Barron River. This would require MDWSS irrigation water allocation holders to 'swap' existing Tinaroo Falls Dam water allocations to Nullinga Dam water allocations. Irrigators are likely to have significant concerns with this: water from the proposed Nullinga Dam may have different price, quality and reliability characteristics.

## 19.3 Service Need

- There is currently no Cairns urban water supply problem to be addressed by an external water supply such as Nullinga Dam.
- Under current population and demand forecasts, CRC has an implementation plan of Council owned and operated demand and supply measures recognised within existing water resource planning frameworks to meet its future demand for at least the next 30 years. CRC does not have an identified need for water from a regional source (such as Nullinga Dam) until the very long-term. The measures include implementation of a demand management strategy and using currently held reserves in the Mulgrave and Barron Rivers through development of water supply and treatment infrastructure. Beneficial water trading opportunities have also been identified in the Mulgrave catchment.
- There are three key agricultural demand drivers in the region: dry conditions and water security; changes in crop profile to higher value permanent plantings; and industry growth.
- There is opportunity to expand agricultural production on the Atherton Tablelands and surrounding region by increasing the availability of supplemented water. In addressing this opportunity there are two key issues:
  - Agricultural production and growth is constrained when irrigators exceed their preferred 'scarcity buffer' (e.g. irrigation is constrained to 70 to 80 per cent water use as a portion of available water allocations to protect longevity of crops at dry times).
  - Water cannot be moved to certain agricultural production areas within the Atherton Tablelands and surrounding region because of constraints in the distribution system (e.g. in parts of the east and west MDWSS) and a lack of infrastructure in greenfield areas.



## 19.4 Base Case

- As the service need is an opportunity (rather than a problem), it is considered there is no base case in which any sector will run out of water supply catastrophically.
- However, as water allocations in the MDWSS are full allocated, it was concluded the base case is likely to feature:
  - Little or no increase in water deliveries to the extent that capacity has, or is close to being, reached (when available, data from 2016-17 will assist to establish if this is the case).
  - Increased moves by the irrigation sector towards on-farm water efficiency and higher value production (to the extent that high-value producers have not already reached optimal water use – trickle irrigation is widely used on tree crops).
  - Water trading at high values towards high value crops on the most fertile soils within the scheme – leading to an expansion of high value horticulture within the region.
  - Static or potentially modest expansion of sugarcane production by industry resulting from increased yields due to improvements in on-farm water use efficiency. Given the current water constraints, the base case is unlikely to see expansion of sugar cane without a new source/supply of water allocations.

## 19.5 Anticipated Benefits

- Addressing the service need is anticipated to provide the following key benefits:
  - Enhanced usage of water delivery infrastructure for agricultural production
  - Increase in regional employment from enhanced agricultural productivity
  - Improved use of existing resources through changing water business practices
  - Change in land use to higher value per hectare crops in suitable areas
  - Enhanced confidence to invest in long term business operations and succession opportunities
  - Increase in value and flexibility of existing water allocations
  - Reinforce importance of agriculture to the study area (character and identity).

## 19.6 Options Analysis

- The options analysis produced a long list of options to address the service need through consideration of the SIP policy approach and categories for options assessment, analysis of previous assessments, work undertaken for the PBC and the outcomes of stakeholder consultation. This is summarised in the following table. Four shortlisted options were selected for further consideration.



Table 1 Options Analysis Outcomes

LONG LIST OF OPTIONS	SHORTLISTED OPTION
Do nothing	No
<b>REFORM</b>	
Improve MDWSS rules and operation	Yes—Option 2
Increase on farm water use efficiency	Yes—Option 1
<b>IMPROVE EXISTING / BETTER USE</b>	
Modernise MDWSS distribution infrastructure and convert losses to new water allocations for sale	Yes—Option 3
Improve water trading	Yes—Option 1
Utilise (private) Quaid Dam/Mitchell Dam and build a pipeline	No
<b>BUILD NEW</b>	
Build Nullinga Dam for agricultural use – bulk supply to Walsh River delivery only (no distribution infrastructure)	Yes—Option 4
Build Nullinga Dam for agricultural use - limited interaction with western MDWSS	No
Build Nullinga Dam for mixed use - Cairns urban and agricultural water supply	No
Build Nullinga Weir for agricultural use	No
Raise Tinaroo Falls Dam	No
Harvest water from the Johnstone River and build a pipeline	No

### 19.6.1 Option 1: Do Minimum (Base Case)

- Analysis of the current situation concluded:
  - The majority of irrigators in the MDWSS have adopted on-farm water efficiency measures to maintain or improve crop yield per ML of water applied and improvements in water efficiency can free up water allocations to support additional production.
  - The MDWSS is moving towards an efficient market for water, with temporary and permanent trading of water promoting ‘highest and best use’.
  - Recent dry conditions have increased water trading activity to address scarcity.
- Option 1 is considered a viable option as it provides for incremental expansion of agricultural production on the Atherton Tableland via existing mechanisms. However, other options if progressed would provide for additional water availability and have a greater capacity to meet the identified service need.
- The Queensland Government and Australian Government commitment to assess the feasibility of the proposed Nullinga Dam has raised expectations in the region for the possibility of a new water supply option to increase agricultural expansion and provide regional economic development. The PBC has been focused on a variety of options, not just Nullinga Dam.



### 19.6.2 Option 2: Improve MDWSS Rules and Operation

- Option 2 comprises a review of the MDWSS operating rules against the changed cropping and water use practices of the modern scheme to increase operational performance and reduce current constraints.
- The improvements are intended to increase water use within the MDWSS without undermining the current supply or reliability of supply, or creating new water allocations.
- Key potential opportunities include reviewing the water year to match the current demand patterns, improving carryover provisions to enable greater flexibility and use of this water, improving water ordering to address underperformance, and educating users about peak flow entitlements (ML per day) as the MDWSS moves to maximum use.

### 19.6.3 Option 3: Modernise MDWSS and Convert Losses

- It is estimated that current operational losses from the MDWSS are around 30,000 ML per annum.
- Option 3 involves a targeted modernisation of the MDWSS distribution infrastructure to reduce operational losses and increase the amount of water allocations available in the MDWSS.
- The key elements of Option 3 are:
  - Modernise parts of the MDWSS distribution system via a range of infrastructure improvements. The scope of these works and the amount/yield of loss allocations potentially able to be converted would be determined as part of further detailed investigation and may be done in stages. DNRM in-principle support for the conversion of loss allocations would also be sought prior to works commencing.
  - Following completion of the works, apply to DNRM to convert a specified amount of distribution loss allocations<sup>1</sup> to new tradeable medium priority water allocations (created by the savings from infrastructure improvements). The amount/yield of loss allocations able to be converted would be determined as part of any further detailed investigation.
  - Sell the new medium priority water allocations on the market.
- In March 2017, the Queensland Government and SunWater submitted an Expression of Interest application to the NWIDF seeking a capital contribution towards several of the sub-projects in Option 3 to modernise the existing MDWSS distribution system.

### 19.6.4 Option 4: Nullinga Dam for Agricultural Use

- Option 4 comprises the development of Nullinga Dam as a bulk water source for the expansion of irrigated agriculture in the region.
- The scope of inclusions and exclusions for Option 4 are:
  - Design and build a Nullinga Dam for primarily medium priority water allocations open to all customers and in particular for agricultural users. This would initially be for delivery of water to Walsh River customers within and potentially downstream of the MDWSS area, but with the flexibility for commercial distribution systems to evolve.
  - No distribution infrastructure for delivery of water from the dam to the MDWSS or elsewhere is included. Future connection to the MDWSS would be subject to the result of a process that identifies clear cost effective opportunities for new or augmented distribution infrastructure.

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<sup>1</sup> SunWater has estimated the amount of loss allocations able to be saved could be 8,000 to 15,000 megalitres, depending on the works conducted.



- A ‘bulk only, river delivery’ Nullinga Dam simplifies design, costing, water pricing, stakeholder engagement, water planning and scheme operation. It also supports the continued functioning of MDWSS by not interfering with the current irrigation scheme and distribution system.
- Previous assessments of Nullinga Dam have provided for small, medium and large sizes. Option 4 has assessed Nullinga Dam on the basis of the ‘small size’ used in previous assessments to allow for analysis against the other shortlisted options. It is recommended the size of Nullinga Dam in any future evaluation be determined by further demand assessment, and the dam be designed (and resized) to match the volume of credible demand.

### 19.7 Preferred Options for Further Evaluation—Option 2 and Option 3

- Option 2: Improve MDWSS Rules and Operation and Option 3: Modernise MDWSS and Convert Losses are recommended to progress to further evaluation.
- Option 2 primarily involves changes to bulk storage rules and operation. It is low cost, has stakeholder support and projected economic benefits. A key focus of further evaluation will be modelling to ensure that the proposed rule and operational changes will make a difference to water availability for irrigators. Given its potential to impact on MDWSS operations overall it is recommended implementation involve ongoing consultation with the existing local management entity.
- Option 2 will be implemented by the DNRM and SunWater, as the responsible entities for the relevant water instruments in accordance with usual government and business practices. The nature of the further evaluation will be subject to resourcing and budgetary constraints within those organisations.
- Option 3: Modernise MDWSS and Convert Losses represents improving existing infrastructure, will produce new water allocations, is scalable and can be implemented in stages. Key focus of further evaluation should include the capital cost of works and potential yield of new allocations and the potential implications of the transition of the MDWSS distribution infrastructure business, assets and liabilities to a new local management entity.
- As the estimated capital costs of Option 3 are under \$100 million, SunWater, as the owner and operator of the MDWSS, will undertake the further evaluation of Option 3, with assistance from Building Queensland in accordance with the *Building Queensland Act 2015*.
- The implementation of Option 3 will be subject to resourcing and budgetary constraints within SunWater and dependent upon funding decisions of SunWater.
- Key success factors for the implementation of Option 2 and Option 3 are outlined in the table below.

**Table 2** Option 2 and Option 3—Key Dependencies for Success and Risks

OPTION 2 - DEPENDENCY	OPTION 2 - RISKS	OPTION 3 – DEPENDENCY	OPTION 3 – RISKS
Modelling showing that the implementation of rule and operational changes will make a difference to water availability for irrigators in the MDWSS	Modelling does not show any difference negating benefits from reforms	Deliverability and cost of the infrastructure improvements to the distribution infrastructure	Works exceed cost estimates and financial risk exposure to meet shortfall in funding



OPTION 2 - DEPENDENCY	OPTION 2 - RISKS	OPTION 3 – DEPENDENCY	OPTION 3 – RISKS
Ability of government and SunWater to implement improvements and reforms to scheme rules and operation	Appetite from government and SunWater to implement reforms	Ability for SunWater to convert a suitable yield of loss allocations to new water allocations for sale	Water savings are lower than estimated and return on investment lower with less achieved from the sale of the water
Change in water use practices by irrigators in response to the improvements, and associated increase in agricultural production	Stakeholder risk as changes to rules and operation not accepted Economic risk as benefits not realised	Purchase of the new water allocations by irrigators within a suitable timeframe and associated increase in agricultural production	Financial risk as return does not meet capital expenditure Economic risk as benefits not realised
Local management considerations – a change in management of the MDWSS distribution infrastructure may affect the operation of the scheme	Transition to local management entity results in non-acceptance by new entity of changes to bulk supply rules and operation Ongoing close consultation with the local management entity is recommended during implementation	Limited negative impacts on the existing scheme and owners of existing allocations from the implementation of the option	Impacts on stakeholders

### 19.8 Option 4—Recommendation

The Nullinga Dam option is not recommended to progress to a Detailed Business Case at this time. Nullinga Dam (via a ‘swap’ arrangement of existing water allocations from Tinaroo Falls Dam) is not needed for Cairns urban water supply for at least the next 30 years and assessment has revealed limited certainty of information in relation to Nullinga Dam for agricultural use.

On this basis, it is recommended the trigger for any further consideration of Option 4: Nullinga Dam for Agricultural Use is a satisfactory level of certainty about the demand for new water allocations at a nominated volume and a nominated price (e.g. a significantly large proportion of the dam yield at an appropriate price). This certainty may be developed via an approach from industry to government, or via government commissioning a detailed demand assessment for new water allocations in the region.

In addition, it is recommended:

1. Any further assessment of Option 4: Nullinga Dam for Agricultural Use include the following key considerations:
  - a. Development of a robust agricultural economic profile for the sale and use of new water allocations (e.g. crop types and take-up by irrigators).
  - b. Development of the size of the dam, and the location of any distribution infrastructure, to meet market needs.
  - c. The potential to use a pre-commitment process for the sale of water allocations to water users prior to any procurement or construction activities being undertaken.
2. That, given the complexities associated with the use of Nullinga Dam as a water supply for Cairns due to the requirement for:



- a. existing Mareeba-Dimbulah Water Supply Scheme water allocation holders to 'swap' their existing water allocations for new water allocations from Nullinga Dam
  - b. Cairns Regional Council to obtain the 'swapped' Mareeba-Dimbulah Water Supply Scheme water allocations to allow for releases from Tinaroo Falls Dam down the Barron River,
- any further assessment of Nullinga Dam for Cairns urban water supply in the future include, in addition to relevant matters above, development of a better understanding of the options for the delivery of water from a bulk water supply in the Atherton Tablelands region to Cairns.