Australian Government Infrastructure

Business case evaluation summary

Darwin Region Water Supply



Construction Start: 2024-25* Project completion: 2027-28*

Proponent

Northern Territory Government

Evaluation date 18 February 2022

1. Evaluation Summary

Infrastructure Australia has evaluated the business case for **Darwin Region Water Supply** in accordance with our current Statement of Expectations, which requires us to evaluate project proposals that are nationally significant or where Australian Government funding of \$250 million or more is sought.

Darwin Region Water Supply is a nationally significant problem that is currently identified on the *Infrastructure Priority List*. The Darwin Region Water Supply business case evaluates potential water supply augmentations and interventions that respond to this water supply issue, with the preferred option being a staged approach firstly involving the Manton Dam Return to Service (RTS) and then the Adelaide River Off-Stream Water Storage (AROWS) project as the second stage.

Based on our review of the business case, the **proposal has been updated on the** *Infrastructure Priority List* to an Investment-ready (Stage 3) proposal. We are confident that returning Manton Dam to service will deliver net benefits in the near term. However, recognising the scale and importance of the AROWS component of the proposal, further analysis is required prior to progressing this stage to:

- mitigate risk that forecast agricultural and industrial demand, and revenue estimates are not realised
- ensure that environmental impacts and related costs and benefits are fully accounted for in the economic modelling

• ensure that demand management and water efficiency programs are implemented.

The Darwin region's water supply is insufficient to support forecast population growth in urban areas and is constraining industrial growth. There is also an opportunity for water to support high-value agricultural and horticultural production. For this growth potential to be realised, the Darwin region needs a safe, secure, reliable and sustainable water supply. Darwin's current water source cannot support this growth with current use patterns.

The Manton Dam RTS involves recommissioning of an existing, out of service dam to provide additional water supply for the short term (2025-27), while the AROWS component is a new reservoir which would provide a step change in water supply for the Darwin region in the medium term (2028 and beyond).

The proponent's business case reports that the net present value (NPV) of the preferred option is \$44.05 million with a benefit-cost ratio (BCR) of 1.04¹. The key driver of benefits for the preferred option is long-term industrial user benefits, followed by agricultural user and urban user benefits.

The business case risk register identifies uncertainty around agricultural and industrial demand as key risks. Reducing this demand uncertainty is required for the preferred option to be economically viable. Infrastructure Australia endorses the proposed delivery staging, noting there is greater risk associated with delivery of the AROWS component.

2. Context

The greater Darwin region has a population of approximately 150,000 people, accounting for 60% of the Northern Territory's (NT) population. The region's location is strategically important due to its proximity to South East Asia, meaning it can foster continued integration into Asian markets and strengthen trade ties with a number of Asian countries. The NT Government is focusing on increasing the recent low average annual growth in population of 0.5% per annum from 2015-2020 to return to the historical long run average growth of 1.4%. As a result, there is potential for the Darwin region (and the broader NT) to play an important role in the nation's recovery from the economic impacts of Covid-19. This potential growth is expected to be driven by expanding opportunities in gas-based industrial development and the potential for additional high-value horticulture and agriculture in the Darwin region.

Currently, the majority of Darwin's water is sourced from the Darwin River dam, which is currently operating at its sustainable yield.² The Darwin Dam was developed in 1972 as a replacement for Manton Dam. In 1988, Manton Dam was placed into care and maintenance by Power and Water Corporation (the NT's provider of water and sewerage services). Manton Dam is not currently used as part of the water supply system given inadequate infrastructure and water quality challenges.

Water from the Darwin River Dam is supplemented through groundwater resources which are currently over allocated (demand exceeds sustainable supply of groundwater). This supply issue will be further exacerbated through the expected impacts of climate change. As such, the Darwin region's current water supply cannot support forecast population growth or anticipated growth in industrial and agricultural water demand.

The proponent has identified that without intervention to increase water supply, the Darwin region cannot achieve its potential for economic growth and realise strategic goals. As such, the proponent's business case assesses the justification and viability of proceeding with the planning and delivery of a preferred Darwin region water supply solution from an NT Government perspective.

3. Problem description

The proponent has identified that, based on their current understanding of climate change, population growth and long-term economic growth opportunities, the demand for water will be 20 gigalitres (GL) per annum (p.a.) above the sustainable yield of the greater Darwin region's water supply by 2031, and around 59 GL p.a. by 2050.

¹ Using a 7% real discount rate and P50 capital cost estimate in 2021 prices.

² The sustainable yield is the amount of water that can be provided on an ongoing basis without impacting on the long-term ability to provide water.

The business case identifies the following six problems:

- Darwin water supply over the medium term (5+ years) is not sufficient to provide the current level of service that Power and Water Corporation offer, or to support increased population growth in urban areas.
- Regional reliance on one primary water source increases the exposure of the water supply to
 environmental and seasonal factors, and climate change, which poses water security risks due
 to a lack of redundancy.
- The groundwater in the Darwin rural region is oversubscribed, creating water reliability, security and environmental risk and inhibiting further strategic land development.
- Potential industrial growth, specifically in the Middle Arm Precinct, is constrained by current water availability in the greater Darwin region.
- Inefficient water consumption by urban, industrial, agricultural and horticultural, and government water users results in higher water consumption impacting water viability for potential new users.
- Potential efficiencies gained in water consumption may be offset by the impacts of climate change on increased water usage, leading to a lack of resilience in the greater Darwin region water supply.

And the following opportunity:

 The strategic positioning and development of additional cost effective and efficient water supply can enable increased high-value agricultural and horticultural production in the greater Darwin region.

The business case used investment logic mapping with a range of stakeholders during the Preliminary Assessment phase to assist in identifying problems and opportunities and potential response options. While Infrastructure Australia recognises that this is a good process to follow, the breadth of problems/opportunities and benefits identified in the investment logic map make it challenging for a solution to be developed to respond to all these issues.

4. Options identification and assessment

The proponent developed a range of strategic responses that considered supply, demand and policy options. This was used to inform the development of a long list of options which included non-infrastructure and infrastructure options based around reform, better use, augmentation and new options. Infrastructure Australia considers the approach used to identifying the broad range of strategic interventions and a longlist of options is appropriate.

The long list of options were tested using a multi-criteria analysis (MCA). This included criteria around deliverability, economic impact, strategic alignment, cost, environmental and social impacts, and adaptability. The MCA used scoring on a scale of 0-5. Furthermore, the paired comparison approach to weighting criteria was taken which is a good approach. The use of an MCA to assess the long list of options is transparent with score and rationale provided for each option and criterion. The approach taken is consistent with Infrastructure Australia's Guide to multi-criteria analysis.

Following the MCA, the proponent conducted a rapid cost-benefit analysis (CBA) of five options:

- Manton Dam return to service (RTS) and Adelaide River Off-stream Water Storage (AROWS) 3 (the largest possible AROWS development)
- Manton Dam RTS and AROWS 1c (the initial stage of development of the AROWS project)
- AROWS 3 only
- Do-minimum and disaggregated supply
- In-stream dams

Conducting a rapid CBA on these five options is a sound approach to creating the shortlisted options. It is noted that these shortlisted options focus on infrastructure options and do not clearly respond to the problems identified around efficiency of water consumption. However, the business case does state that demand management and water efficiency programs will form a key

component of managing the water supply and demand balance in the greater Darwin region. Specifically, the NT Government is currently developing a Northern Territory Strategic Water Plan to look at these issues.

Following the rapid CBA, the proponent determined that the Manton Dam RTS & AROWS 3 option, and a do-minimum & disaggregated supply option go forward to the detailed analysis in the business case. Manton Dam RTS & AROWS 3 had the highest BCR of the options assessed, while the do-minimum & disaggregated supply option had the best NPV.

An appropriate detailed assessment (including CBA) was provided in the business case of the two shortlisted options, comparing them to a base case. It is noted that in this detailed assessment, the do-minimum and disaggregated supply option only provides benefits to industrial users. Given that it does not provide benefits to urban and agricultural users it is unclear that this option adequately responds to the problems defined in the business case. The business case would have been strengthened by having a detailed assessment of a second option which better aligns to the problems identified.

5. Proposal

The preferred option involves two key components/stages. The first being the return of Manton Dam to service to provide an additional water supply for the short term (from 2025-27). This will need to be supported by associated infrastructure. Manton Dam construction and commissioning is scheduled to occur in 2022-25, with a yield capacity of 7.3 gigalitres (GL) per annum (p.a.)

The second stage of the proposal is a longer-term solution involving the Adelaide River Off-stream Water Storage (AROWS) scheme. This is an off-stream storage reservoir that has the potential to hold around 300 GL. It is planned that this water is transferred to the new Strauss Water Treatment and Storage Facility for treatment and distribution. This stage will require significant water system pipelines and pump stations to support the new infrastructure. AROWS is expected to be constructed from 2025-2028 (including commissioning and filling) with a yield capacity of 60 GL p.a.

This two-stage solution is expected to deliver three key objectives:

- Enable industrial activities at the Middle Arm Precinct
- Enable an agricultural precinct at Lambells Lagoon
- Ensure long term water security for the greater Darwin region

This solution responds to the key problems identified around supporting population growth and growth in industrial and agricultural water demand. We support the staged approach outlined in the business case, with Manton Dam RTS providing additional water supply in the shorter term and then AROWS occurring after Manton Dam RTS has been completed.

Given that the AROWS scheme is scheduled to provide for agricultural and industrial demand in 2027-28, it is important that the proponent seek demand certainty prior to constructing AROWS to ensure that the intended benefits will be realised. It is recommended that the proponent reassess the AROWS project prior to commencing construction.

More broadly, it is important that the solution is responsive to broader policy changes around water efficiency through the Northern Territory Strategic Water Plan which may change demand forecasts and impact on the value proposition for the Manton Dam RTS and AROWS solution.

6. Strategic fit

There is a focus from all levels of government to provide a secure and reliable water supply to the greater Darwin region to enable sustainable long-term economic growth and development. The business case highlights that this proposal aligns with a range of local, state and commonwealth government strategies, policies and priorities. These include:

- Territory Economic Reconstruction Commission: Final Report 2020, NT Government
- Northern Territory 10 Year Infrastructure Plan 2019-2028, NT Government Department of Infrastructure, Planning and Logistics
- The National Water Grid: Investing in Australia's water future 2020, National Water Grid Authority

- Our North, Our Future: White Paper on Developing Northern Australia 2015, Australian Government
- The Australian Infrastructure Audit 2019, Infrastructure Australia
- Unlocking the Beetaloo: The Beetaloo Strategic Basin Plan 2021, Australian Government
- Delivering Ag2030, Australian Government
- Gas-fired recovery (part of the Australian Government's JobMaker plan)

Alignment with Power and Water Corporation's vision and priorities:

- Darwin Region Water Supply Strategy 2013
- Statement of Corporate Intent 2020-21

The proposal delivers key benefits to agricultural and horticultural users through providing a secure water supply for long term agricultural certainty, increased reliability of water entitlements, and as a result of increased agricultural output. The proposal is expected to deliver benefits to industry through improved access to water contributing to an ability to attract onshore oil and gas investment. Furthermore, this project is expected to deliver a secure water supply to the urban and rural populations.

Infrastructure Australia agrees that there is a clear strategic case for this proposal.

7. Social, economic and environmental value

The approach to the cost benefit analysis (CBA) is satisfactory, although our evaluation identified some limitations. The business case presents the results of a CBA undertaken for two options (Manton Dam RTS & AROWS 3, and the do-minimum and disaggregated supply option) compared to a base case. The CBA adopts a 50-year appraisal period and results are detailed for a 4 per cent and 7 per cent discount rate, which is in line with the Infrastructure Australia Assessment Framework³. The key findings are that:

- At a 7% discount rate, Manton Dam RTS & AROWS 3 has a NPV of \$44.05m and a BCR of 1.04
- At a 7% discount rate, the do-minimum and disaggregated supply option has a NPV of -\$377.94m and a BCR of 0.47
- At a 4% discount rate, the BCR for Manton Dam RTS & AROWS 3 is 1.67, while the BCR for the do-minimum and disaggregated supply option is 0.59.

The business case includes a number of sensitivities including the use of P90 costs and varying a number of cost and benefit elements $\pm 10\%$. Furthermore, the business case also includes a few scenarios, including core industrial demand and no agricultural development; low industrial demand and core agricultural development; and high industrial demand and core agricultural development. Across these sensitivities, the Manton Dam RTS & AROWS 3 option produced a better BCR than the do-minimum and disaggregated supply option. Notably, the Manton Dam RTS & AROWS 3 has BCRs of 0.70 for the sensitivity scenario with core industrial demand and no agricultural development. This underlines the importance of agricultural and industrial demands for the Manton Dam RTS & AROWS 3 to be a value for money project in practice.

The CBA compares incremental urban, industrial and agricultural user benefits to incremental capital and operating costs. This aligns with the proponent's main problem statements.

The CBA is primarily focussed on private costs and benefits with limited assessment of external costs and benefits. While the CBA does include offset land and some qualitative discussion of social, environmental and tourism impacts, these are high level. Given the size of the investment, a broader consideration of environmental and social impacts would have improved the evidence in the business case. For example, this may have included the value of reduced likelihood of water restrictions for existing users, valuing the opportunity cost of the land that would comprise the AROWS basin, and the impacts of water extraction for the AROWS project on the downstream ecosystem. The absence of this information makes it difficult to understand the impact on the economic appraisal results. Valuation of these impacts is likely to reduce the BCR.

³ www.infrastructureaustralia.gov.au/publications/assessment-framework

Benefits and costs breakdown

Proponent's stated benefits and costs	Present value (\$m,2021/22) @ 7% real discount rate		% of total
Benefits			
Urban user benefits	\$188.77		17.9%
Industrial user benefits	\$482.42		45.8%
Agricultural user benefits	\$381.04		36.2%
Total Benefits ¹	\$1,052.23	(A)	100%
Total capital costs (P50)	\$720.81		71.50%
Operating costs	\$287.37		28.50%
Total Costs ¹	\$1,008.18	(B)	100%
Net benefits - Net present value (NPV) ²	\$44.05		n/a
Benefit-cost ratio (BCR) ³	1.04		n/a

Source: Proponent's business case

(1) Totals may not sum due to rounding.

(2) The net present value is calculated as the present value of total benefits less the present value of total costs (A – B).

(3) The benefit-cost ratio is calculated as the present value of total benefits divided by the present value of total costs ($A \div B$).

The proponent's reported capital costs is presented in the following table.

Capital costs and funding	
Total capital cost	\$1,274.82 million (P50, undiscounted)
	\$1,451.94 million (P90, undiscounted)
Proposed Australian Government funding contribution	ТВС
Other funding	ТВС

Our evaluation identified that the cost estimates include only 18 months of escalation. Given the construction period for the proposal is 2023-2028 (with Manton Dam return to service construction from 2023-25 and AROWs construction 2025-28) there is a risk that this escalation does not accurately reflect the construction period for the proposal and the capital cost estimate may underestimate the cost of the preferred option. The level of escalation should be further considered by the proponent when taking the proposal forward.

8. Deliverability

The proponent's delivery approach recognises that the preferred option is comprised of two stages with different delivery timeframes and different complexities. The Manton Dam RTS stage is a shorter term project where Power and Water Corporation is the asset owner. In line with the shorter timeframes, Power and Water Corporation is already well progressed with planning the return to service. The AROWS stage is an altogether larger scale of project with longer timelines. The business case recognises that the AROWS project represents a step-change in size of water infrastructure project for the NT.

Infrastructure Australia endorses the proposed delivery staging. Power and Water Corporation will lead the development of the Manton Dam RTS project, and the proponent assessed delivery options for the AROWS project. This assessment considered different options for packaging the AROWS project (ranging from delivering as a single work package to delivering in 10-20 small packages) and concluded that delivering in three work packages was the preferred approach.

Following this assessment, a longlist of delivery models was identified and then shortlisted. The shortlisted options were assessed for each package using an MCA with criteria of time, risk transfer, innovation, market capacity and capability, and whole-of-life costs were undertaken for each package. This process identified a delivery partner model as the recommended approach for

each of the three works packages for the AROWS project, while a construct only approach is the preferred option for the Manton Dam RTS project. The delivery partner model for the AROWS project was selected partly due to the ability of this delivery model to leverage the required expertise of industry managing and delivering projects of the scale of the AROWS project, whereas the construct only approach for Manton Dam RTS reflects the expertise that Power and Water Corporation have for this stage.

Infrastructure Australia recommends the proponent undertakes detailed demand modelling before progressing with the AROWS stage of the proposal to mitigate the significant risk that forecast benefits will not be realised. The business case includes a risk assessment and a risk register. The risk register identifies key risks around uncertain or inaccurate demand profiles for agricultural and industrial demand. Other high risks include delivery timeframes, site issues during preparatory investigations, and sacred site protection risk. The demand risks are key and, as stated previously, reducing demand uncertainty should be a key focus for the proponent, particularly with respect to the AROWS project. The business case also identifies challenges around obtaining environmental approvals for the AROWS project, including impacts on threatened species within and near the basin and satisfying regulator and community concerns regarding water extraction from the Adelaide River. This is another key element that the proponent would need to carefully manage in the delivery stage.

Infrastructure Australia recommends that the proponent revisit the revenue estimates when there is greater demand certainty. The business case includes consideration of user pays models which are dependent on forecast demand. This is a scheme to provide more potable water to urban, agricultural and industrial users. The financial and commercial analysis assessment includes a section on user charges which models one off payments to purchase water allocations (applicable to agricultural users), annual fixed charges and variable charges. This analysis estimates the proposal will result in \$2,981m present value of revenues (\$11,668m nominal). To mitigate cost risk if demand is not realised, revenue estimates should be reconsidered when there is greater certainty on forecast agricultural demand.

A Post Completion Review (PCR) Plan has been developed by the proponent. This includes governance arrangements for the PCR and benefits management. Given the different timeframes, the PCR Plan suggests separate reviews of the Manton Dam RTS and AROWS projects, which we agree with. More broadly, the approach in the PCR review aligns with Infrastructure Australia's suggested criteria for PCRs: strategic fit, societal impact and deliverability.

Infrastructure Australia encourages the proponent to publicly release the PCRs to demonstrate the extent to which expected benefits and costs have been realised. This will help to inform future proposals and should assess project costs and outcomes for customers, against the expectations set out in the business case.