

## Project business case evaluation summary

# Stage 2 Haughton Pipeline Project

### Location

Townsville, Queensland



### Geography

Smaller cities and regional centres

### Category

Resilience

### Capital cost

\$285 million (P50, nominal, undiscounted)

### Indicative timeframe

September 2019 – December 2021

### Proponent

Australian Government Department of Infrastructure, Transport, Regional Development and Communications

### Evaluation date

20 February 2020



## 1. Evaluation Summary

Townsville's growing population is putting pressure on existing water infrastructure. The Stage 1 Haughton Pipeline project, which is currently being delivered, is expected to address this demand and provide enough water capacity for Townsville for at least the next 50 years.

While undertaking the Stage 2 works at the same time as Stage 1 could reduce the overall capital costs, this cost saving does not justify the overall investment. The business case submitted to Infrastructure Australia demonstrates that the Stage 2 pipeline would cost significantly more than its expected benefits.

The proponent's business case found that constructing the Stage 2 works would not provide additional water security to Townsville. Furthermore, residential water bills could increase by up to 8% per year and non-residential customer bills by up to 9% per year to help fund the project.

Infrastructure Australia agrees with the findings in the proponent's business case and has **not included the Stage 2 Haughton pipeline project on the Infrastructure Priority List at this time.**

The population of Townsville, in north Queensland, is forecast to grow by 46% to 2041 (from 193,000 to 282,000 people). This population growth will increase demand for water, and additional water supply and security have been identified as key outcomes for the Townsville City Deal. A package of 'Stage 1' works is currently underway to deliver this water supply and security. They involve constructing a new pipeline and upgrading a pump station, and are expected to be completed by the end of 2021.

The proponent has prepared a business case for the proposed 'Stage 2' works, which include constructing a new pipeline between the Burdekin River at Clare and the Stage 1 pipeline at Haughton Balancing Storage, and constructing a new pump station at the Burdekin River. While undertaking this work concurrently with Stage 1 could result in up to \$55 million capital cost

savings, the business case shows that the project does not have a strong strategic case, as it does not provide additional water security to Townsville beyond that provided by the Stage 1 works.

If the Stage 2 works are undertaken with Stage 1, the business case estimates this project to have a net present value (NPV) of negative \$220.1 million, with a benefit-cost ratio (BCR) of 0.3 when using a 7% discount rate and P50 costs. The analysis undertaken by the proponent aligns with the Infrastructure Australia Assessment Framework and we concur with the proponent's finding that the costs of the project outweigh its economic, social and environmental benefits. The business case concludes that the most appropriate arrangement for Stage 2 delivery is a construction-only delivery model, which was also adopted for the Stage 1 works. However, these works are still underway and it is not yet clear how effective this delivery model would be, if the project proceeds.

## 2. Context

The average annual water consumption in Townsville has been approximately 52,000 megalitres (ML) over recent years. However, for most of the past three years, Level 3 water restrictions have been in place. It is likely that water demand without these restrictions would have been higher.

Townsville's water supply is drawn from three sources: the Mount Spec water system, the Ross River Dam and Sunwater's Burdekin Haughton Water Sharing Scheme. Townsville City Council currently holds water entitlements from the first two sources, which total 96,571 ML per year. However, these entitlements are subject to water availability at the Mount Spec water system and Ross River Dam. This means that, occasionally, additional water is required from Townsville's third water source – the Burdekin Haughton Water Sharing Scheme. The council currently has a high-priority water allocation of 10,000 ML per year from this scheme, as well as an agreement with Sunwater until June 2020 for an additional 110,000 ML per year of medium-priority water.

The need to invest in Townsville's future water security was recognised in the Townsville City Deal – a 15-year commitment between the Australian Government, Queensland Government and Townsville City Council to deliver a collective program of planning, reform and investment to Townsville. As part of the City Deal, a Townsville Water Security Taskforce was formed to identify what options the council could pursue to improve Townsville's water supply and security, and therefore address the current and future supply shortfalls. The taskforce was also required to consider investments in water supply infrastructure and demand management.

The taskforce recommended a range of short (within 3 years), medium (within 15 years) and long-term options (beyond 15 years) to address Townsville's water security issues. The key short-term recommendation was the Stage 1 works, which involves constructing new pipeline infrastructure and upgrading pump infrastructure between Haughton Balancing Storage and the Ross River Dam. According to the proponent, these works increase the potential water supply available to Townsville to over 216,000 ML per year (depending on whether Townsville City Council is also able to negotiate additional capacity from Sunwater).

In the medium term, the taskforce recommended the Stage 2 Haughton pipeline works, which include constructing a pipeline between the Burdekin River and Haughton Balancing Storage. The taskforce also indicated that, if funding is available, the Stage 2 works should be undertaken concurrently with the Stage 1 works to reduce capital costs.

## 3. Problem description

Townsville's existing water supply system cannot reliably meet its current water demand. However, the business case states that this supply issue will be addressed by the Stage 1 works. The supply issue is also being addressed because of the taskforce's short-term recommendations to reduce potable water consumption, which the Townsville City Council is currently implementing. Examples of this include installing bulk water meters to detect leaks and a 'Smart Water Package' for rainwater tanks, targeting outdoor water use efficiency and more.

These recommendations are expected to reduce consumption to 110 ML/day (or just over 40,000 ML per year) in the short term. By 2067, and with the council undertaking these measures, the business case projects that Townsville's water consumption will be between 65,000 ML and 105,000 ML per year, depending on population growth rates. Meanwhile, the Stage 1 works are estimated to enable total water supply of about 216,000 ML per year, and therefore, the proponent's business case expects Townsville's water supply to meet all of the forecast water consumption scenarios for at least the next 50 years.

There is some community concern about the use of the Haughton main channel as a source of urban water supply. The channel is subject to weed management using the chemical acrolein, which is a standard approach to aquatic weed management for Australian waterways. However, the business case notes that acrolein has the potential to adversely impact human health, such as from the direct inhalation of vapour. The business case states *“Acrolein is a volatile substance that needs to be applied with great care. A suitable period must be observed between its application and water extraction re-commencing—typically two to four days. The very low risk of acrolein can be managed.”* Nevertheless, these concerns were raised by the community during the proponent’s stakeholder engagement process and Infrastructure Australia recommends ongoing consideration of the water treatment procedures.

The channel is currently subject to annual two-week shutdown periods for maintenance, which can disrupt water supply to Townsville if water is required from the channel. There is also some concern around water demand management, as the channel is shared with irrigators, and demand management regimes for irrigation and urban water are different.

#### 4. Options identification and assessment

In 2017, the Townsville Water Security Taskforce considered a range of short, medium and long-term options to address the water security and supply problems. This was based on a literature review of related historical and technical reports, and a review of public submissions on potential water security issues and options. The taskforce identified 30 short to medium-term options which formed the longlist of options considered in the business case.

Of the 30 options, the business case found that 10 are being implemented, 15 are no longer relevant (e.g. alternatives to Stage 1 works) and five remain relevant. Of these five options, three were similar infrastructure options involving the Stage 2 works, and the other two were water pricing reform options. The proponent combined these options to arrive at the following shortlist:

- Option 1 – undertake the Stage 2 pipeline works concurrently with the Stage 1 works, avoiding the need to upgrade the Haughton main channel as part of the Stage 1 works and the Haughton pumping station in 2034.
- Option 2 – undertake the Stage 2 pipeline works in 15 years’ time, requiring upgrade to the Haughton main channel as part of the Stage 1 works and the Haughton pumping station in 2034.
- Option 3 – Townsville Water to move to a two-part tariff i.e. fixed and variable components for residential customers to send ‘user pays’ signals to their customers (industrial customers already have a two-part tariff in the base case).

Our review found that the proponent did not investigate any new options compared to what the taskforce identified, which was in 2017 and prior to the Stage 1 works commencing delivery. The proponent also did not investigate the 21 long-term options that the taskforce identified, and may still be relevant. These options mainly relate to upgrading Ross River Dam, constructing new water storage facilities and alternate water sources, such as a desalination plant.

The proponent undertook cost-benefit analysis on all three options. The proponent estimated the NPV for undertaking the Stage 2 works now (Option 1) as -\$220.1 million, compared with an estimated NPV of -\$62.2 million for undertaking the same works in 15 years’ time (Option 2). The proponent’s results suggest there is no immediate or longer-term need for the pipeline.

Only Option 3 was estimated by the proponent to have more benefits than costs, with an NPV of \$1.5 million. While the business case recognises the importance of demand management, it states that this option would not meet the community’s desired social and economic outcomes.

In July 2019, the Australian Government committed to providing funding for Option 1 on the basis of increased water security and employment benefits during the construction period.

#### 5. Proposal

The following table sets out the scope of the Stage 1 works, which are currently underway, and the Stage 2 works that are the subject of this business case evaluation:

## Summary of project scope

Stage of works	Scope
Stage 1	<ul style="list-style-type: none"> <li>• Duplicate pipeline between Haughton pump station and Ross River Dam with increased capacity of 234 ML/day now (with the option to increase to 364 ML/day in the future if additional supply is needed)</li> <li>• Upgrade the pump station at Haughton Balancing Storage and the Haughton main channel to cater for the new pipeline</li> </ul>
Stage 2	<ul style="list-style-type: none"> <li>• Construct new pipeline from Burdekin River to Stage 1 Haughton pipeline with 364 ML/day capacity</li> <li>• Construct new pump station at Burdekin River with 364 ML/day capacity</li> <li>• Transfer Townsville water entitlement in Haughton main channel to irrigators</li> </ul>

Townsville City Council would no longer require its entitlement to the Haughton main channel once the Stage 2 pipeline has been constructed. This entitlement could be transferred to irrigators, providing them with greater water supply and alleviating some of the water demand management issues that currently exist in relation to the Haughton main channel.

The Stage 2 works potentially avoid up to \$55 million in capital expenditure as a result of not needing to upgrade to the Haughton main channel (as part of the Stage 1 works) and avoiding the need to upgrade the Haughton pumping station in 2034. However, the proponent's business case found that the maximum savings of \$55 million could be achieved only if a decision to undertake the Stage 2 works was made before Stage 1 construction was procured. As the Stage 1 works are nearing completion, it is not clear how much of these savings can actually be realised.

The Stage 2 pipeline would also avoid the need for Townsville City Council to draw water from the Haughton main channel, enabling greater supply to irrigators and potential agricultural benefits.

## 6. Strategic fit

The Stage 1 and Stage 2 pipeline construction works are generally consistent with Australian Government and Queensland Government strategic plans and policy for the management of water infrastructure, including the *National Water Security Plan for Cities and Towns*. Specifically, the proponent states that the pipeline works align with the objectives and aims of the Townsville City Deal, the National Water Initiative, the *Australian Infrastructure Plan 2016*, the Queensland bulk water opportunities statement, the *State Infrastructure Plan (Queensland)*, the *Advancing North Queensland* plan and the *Townsville City Council Water Demand Management Strategy 2015-2025*.

The Stage 1 works strongly align to these plans, as they are expected to address the current and forecast water security issues faced by Townsville. However, there is no clear service need for the Stage 2 works. This is reflected in the proponent's cost-benefit analysis of the project, which found no direct water security benefits to Townsville residents. Irrigators within the Burdekin Haughton Water Supply Scheme would benefit from an increase in their water entitlement along the Haughton main channel, but this only accounts for 16% of the project benefits.

## 7. Economic, social and environmental value

The proponent's stated NPV for constructing the Stage 2 pipeline concurrently with Stage 1 works is -\$220.1 million, with a BCR of 0.3 using a 7% real discount rate and P50 cost estimate. The total estimated benefit for these works is estimated by the proponent as \$98.9 million, compared with a total estimated cost of \$319.0 million (both in present value terms).

The majority of the proponent's estimated benefits from the project are capital and operating cost savings (\$80.1 million in present value terms) from the avoided upgrades discussed in Section 5. The proponent also estimates a \$16.2 million agricultural benefit from providing greater access to irrigators via the Haughton main channel. The proponent identified the following other benefits of the project:

- better supply chain management and reliability from Townsville City Council owning the city's entire water transmission infrastructure between the Burdekin River and Ross River Dam

- improved reliability of water supply from using a pipeline instead of the Haughton main channel, which currently has maintenance shutdowns for at least two weeks per year
- improved management of water quality as the pipeline would not require the treatment of weeds using acrolein.

Although the proponent did not include the direct impact of these benefits in their analysis, we expect them to be relatively small compared with the cost of the project. Infrastructure Australia strongly recommends that proponents not only identify, but also quantify as many project benefits and costs as possible to better inform decision makers and the community.

We consider the proponent's methodology and assumptions for the cost-benefit analysis complies with the Infrastructure Australia Assessment Framework, including an appropriately defined 'do minimum' base case. We also consider that the cost estimates for the Stage 2 pipeline have been prepared on a reasonable basis, given the current maturity of the project.

Our evaluation did identify that the agricultural benefits in the business case may be a 'best-case scenario', as the proponent has assumed that 100% of the additional capacity in the Haughton main channel made available to irrigators will be used across a 150-day peak. However, there is little evidence that existing capacity is being fully utilised, and there is a risk that irrigators do not use 100% of the additional capacity if the project were to proceed.

The proponent's analysis included a wide range of sensitivity tests, which considered changes in discount rate, capital costs, population growth, water consumption, water demand and more. Under all scenarios, the costs of the project materially outweigh its benefits.

Infrastructure Australia concurs with the evidence presented in the business case that the cost of constructing the Stage 2 pipeline outweighs the expected benefits.

The business case did find that the water pricing reform (Option 3) is likely to have economic, social and environmental merit. We recommend considering this option further, particularly as the two-part tariff would be consistent with the National Water Initiative and would provide a water pricing structure for Townsville that is similar to other comparable Australian jurisdictions. The table below presents a breakdown of the proponent's stated benefits and costs for Option 1.

#### Benefits and costs breakdown for Option 1

Proponent's stated benefits and costs	Present value (\$m, 2018/19) @ 7% real discount rate	% of total	
<b>Benefits</b>			
Avoided costs (both capital and operating expenditure)	\$80.1		81.0%
Agricultural benefits	\$16.2		16.4%
Residual value of assets	\$2.7		2.7%
<b>Total Benefits<sup>1</sup></b>	<b>\$98.9</b>	<b>(A)</b>	<b>100%</b>
Capital costs (P50)	\$275.0		86.2%
Operating and maintenance costs	\$43.9		13.8%
<b>Total Costs<sup>1</sup></b>	<b>\$319.0</b>	<b>(B)</b>	<b>100%</b>
<b>Net benefits - net present value (NPV)<sup>2</sup></b>	<b>-\$220.1</b>	<b>(C)</b>	n/a
<b>Benefit-cost ratio (BCR)<sup>3</sup></b>	<b>0.3</b>	<b>(D)</b>	n/a

Sources: Proponent's business case

(1) Totals may not sum due to rounding.

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

(3) The benefit–cost ratio (D) is calculated as the present value of total benefits divided by the present value of total costs (A ÷ B).

A breakdown of the proponent's reported capital costs and funding is presented in the table below.



## Capital costs and funding for Option 1

Capital costs and funding	
Total capital cost	\$285 million (P50, nominal, undiscounted) \$310 million (P90, nominal, undiscounted) Note: This excludes the Stage 1 avoided cost
Proponent's proposed Australian Government funding contribution (P50, outturn)	\$195 million
Other funding (nominal, undiscounted)	The remaining capital and operating costs will be covered through water customer bills.

## 8. Deliverability

The proponent considered ten different contracting models for the project, if it were to proceed. The models were assessed using a multi-criteria analysis against the following criteria:

- local contractor appetite, capability and competition
- risk management
- stakeholder and scope management
- quality of design, consideration of whole-of-life design and maintenance
- cost minimisation.

The proponent concluded that a 'Construct-only' delivery model would be most appropriate to deliver the Stage 2 works. The business case suggests that it is appropriate for Townsville City Council to bear the construction risks and the benefits of splitting the works into smaller packages which facilitates tier two and three contractors bidding on the work. While this approach is also being used for the Stage 1 works, it is difficult to determine the success of the delivery model until the works are completed and a delivery review has been undertaken. The business case recognises the need to carefully evaluate the effectiveness of the model used for Stage 1 while it is still underway, but it is not clear how this was factored into the assessment.

Furthermore, the business case contained limited transparency on the rationale for scoring delivery models against each criteria. For example, 'design and construct', a common delivery model for water projects, scored very poorly against the criteria of risk management and stakeholder and scope management without a clear justification.

The proponent has undertaken a risk analysis for the Stage 2 works. The key risk is that the \$55 million cost synergy with progressing Stage 2 concurrently with Stage 1 is not realised. This is highlighted in the business case but not in the risk analysis. The risk analysis does include an 'extreme' residual risk for additional water security benefits not being realised in spite of capital expenditure.

There is also a risk of higher bill increases to Townsville water consumers. The proponent states that any shortfall in funding resulting from costs that are not covered by the Australian Government will need to be recovered through an increase in water tariff rates. The business case investigates the billing implications of receiving \$195 million in Australian Government funding and estimates average bill increases of 8% per year for residential customers and 9% for non-residential customers to recover the unfunded costs. No evidence is presented of customers' willingness to pay for the Stage 2 works and this risk was not included in the risk analysis in the business case.

The proponent has developed a benefits register which includes baseline values and target values for a number of benefits across the options considered in the business case. The benefits considered are both quantitative and qualitative and include avoided cost, increased irrigation value and agricultural employment.

If the project proceeds, Infrastructure Australia encourages the proponent to undertake and publish a Post Completion Review of the project to assess the extent to which the expected benefits and costs have been realised. This will help to inform future projects and should assess project costs and outcomes for users, against the expectations set out in the final business case.