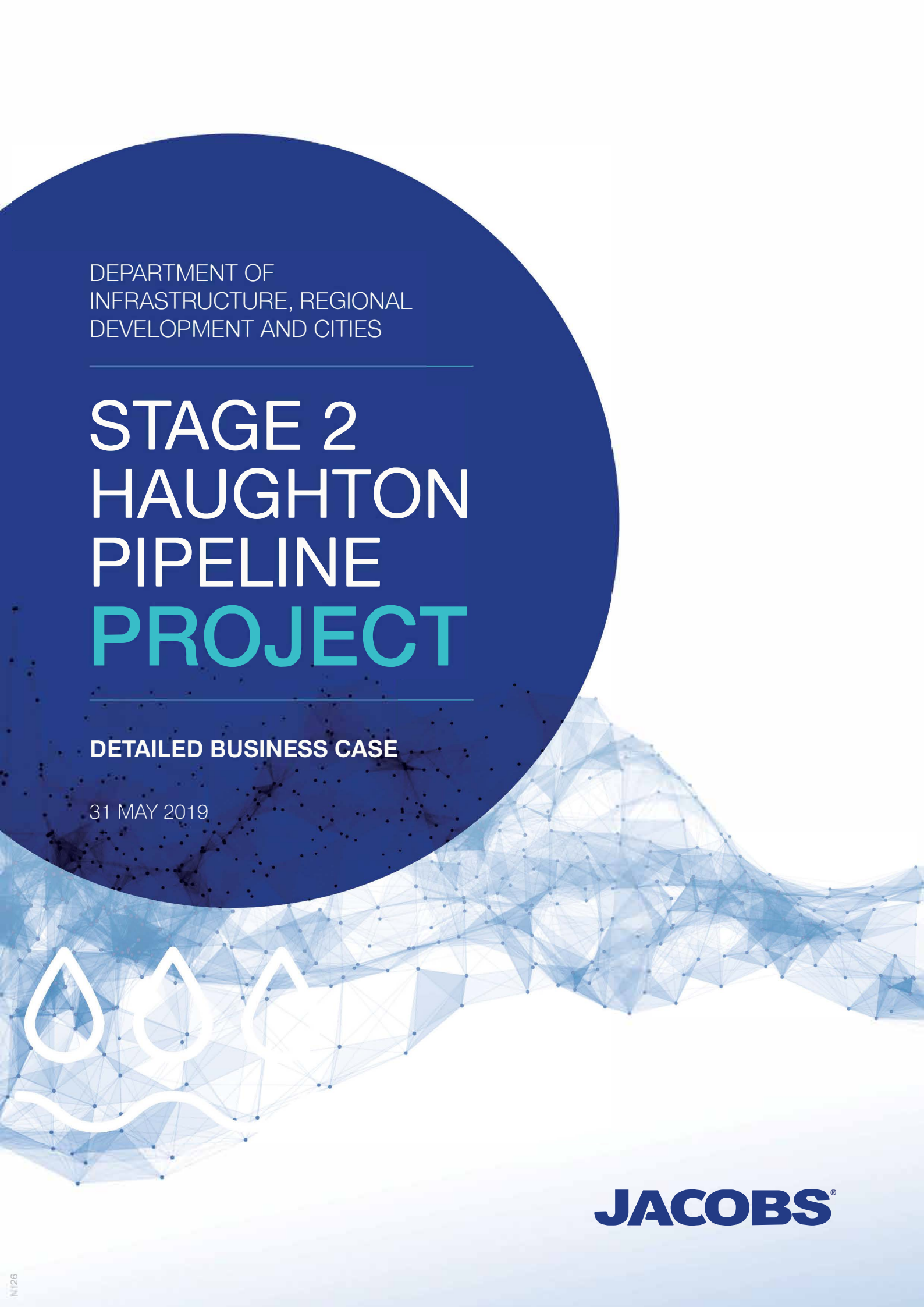
DEPARTMENT OF
INFRASTRUCTURE, REGIONAL
DEVELOPMENT AND CITIES

STAGE 2 HAUGHTON PIPELINE PROJECT

DETAILED BUSINESS CASE

31 MAY 2019



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1. Executive summary

Townsville is the largest city in Northern Australia, with a population of 193,000, which is expected to increase to 282,000 (46%) by 2041. The Townsville City Deal, which is an agreement between the Commonwealth of Australia, the State of Queensland and Townsville City Council signed in 2016, recognised that additional water security was needed for Townville.

The Townsville Water Security Taskforce was formed in 2017 to identify options to increase water security. The Taskforce investigated various options based on existing and new water supplies and demand management. The Taskforce recommended that the construction of the first stage of a new pipeline between the Haughton Balancing Storage and Ross River Dam start immediately, to duplicate an existing aging emergency supply pipeline with limited capacity and decreasing reliability. As part of the Stage 1 project, the existing Sunwater channel would be upgraded to supply water from the Burdekin Haughton Water Supply Scheme (Burdekin River Scheme) to the Haughton Balancing Storage.

The combination of this duplicated pipeline and the upgraded Sunwater channel will allow for 364 ML per day (125,000 ML per annum[1]) to be transported from the Burdekin River to Toonpan, at Ross River Dam. This new infrastructure, which is currently being constructed, will result in very high water security for at least 60 years.

The Taskforce's interim report recommended that the upgraded Sunwater channel be replaced by a Stage 2 pipeline in 15 years' time. However, the Taskforce's final report recommended that, should funding be available, the Stage 2 pipeline be constructed concurrently with Stage 1, in order to avoid incurring capital costs of $55 million to upgrade the channel and associated costs.

This detailed business case considers both these options (build Stage 2 now or build it in 15 years) which would not further improve water security.

A third option considered is the Taskforce's recommendation relating to non-infrastructure approaches to deliver water security for Townsville.

Each of the three options are compared against the base case, in which the Stage 1 pipeline is built and the channel is upgraded. The base case and three options are described below.

Base case

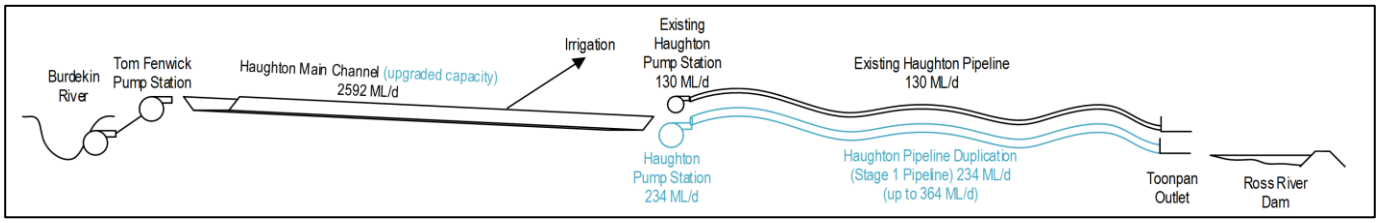
The Queensland Government committed $225 million towards the implementation of water security measures by Townsville City Council that were consistent with the findings of the Taskforce's interim report.[2] As construction of the Stage 1 pipeline is underway, the measures already funded are included in the base case. The base case includes the following:

- **The new Haughton pipeline** (Stage 1) is constructed from Haughton Balancing Storage to Ross River Dam, a distance of 34.5 km, and terminates adjacent to the existing Toonpan outlet at approximately the full supply level of Ross River Dam.
- **The Haughton main channel is upgraded**, and the Haughton pump station will supply approximately 364 ML per day.
- **Investment in bulk water meters** is made within Townsville's reticulated system to allow detection and reduction of water losses within that system.
- **Cleveland Bay recycled water system** commences a non-potable wastewater reuse program to supply industrial users and irrigate Townsville's parks and gardens.
- **A Water Smart Package** is launched to initiate and implement a water use program (including community subsidies for transitioning to water-efficient practices and devices).
- **Townsville's water allocation from the Burdekin River Scheme is increased,** by renegotiating Townsville City Council's water allocation so that the high priority water allocation from Sunwater is raised by 15,000 ML per annum to 25,000 ML per annum.

[1] Accounting for 2 weeks when the channel is shut down.
[2] M Bailey & C O'Rourke, *Budget delivers for Townsville water security*, media statement, Queensland Government, 14 June 2017.

- **Water restrictions** are structured so that level 2 water restrictions apply permanently, level 3 water restrictions apply when Ross River Dam drops to 10 per cent, and level 4 water restrictions apply when Ross River Dam drops to 5 per cent.[1] It is forecast that these restrictions reduce water demand by a further 16, 38 and 44 per cent, beyond savings achieved through the water smart package and water recycling. It is acknowledged that the introduction of the water smart package and water recycling may make the achievement of these savings more difficult; however, the overall results would not be expected to materially change.

Figure 1.1 : Base case schematic



Initially, under Stage 1, the Haughton pump station will be able to pump 234 ML per day, in addition to the 130 ML per day that can be pumped through the existing pipeline. However, when the existing pipeline is decommissioned, the Haughton pump station will be upgraded to allow 364 ML per day to be pumped through the new Stage 1 pipeline. Whenever the council is not using the Sunwater channel capacity, this is generally made available to irrigators.

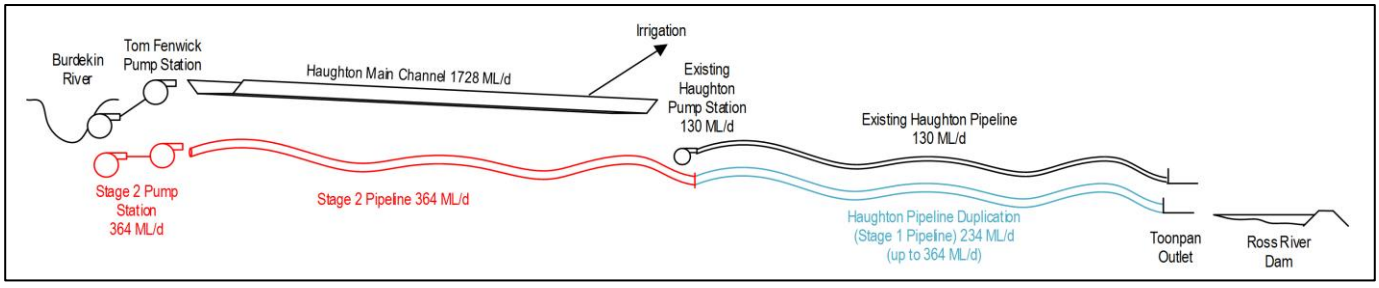
Therefore, once the Stage 1 pipeline and the upgraded Sunwater channel are completed, 364 ML per day can be supplied to the city. This equates to approximately 125,000 ML per annum, compared with current demand of less than 60,000 ML per annum, which is forecast to fall to approximately 40,000 ML after the Council's demand measures are fully implemented.

Option 1: Stage 1 and Stage 2 delivered concurrently

The Stage 2 pipeline would transport supplemented water from the Burdekin River to the start of the Stage 1 pipeline at Haughton. With a Stage 2 pipeline, the Sunwater channel would not be needed for urban supply. As the council would no longer require any channel capacity, this could be made available to irrigators.

The Taskforce's final report recommended that Stage 2 should be constructed concurrently with Stage 1, if funding is available.

Figure 1.2 : Option 1 schematic



Constructing a Stage 2 pipeline now avoids the need to upgrade the Sunwater channel and the Haughton pump station—a total saving of approximately $55 million. Under Option 1, like in the base case, 364 ML per day can be delivered.

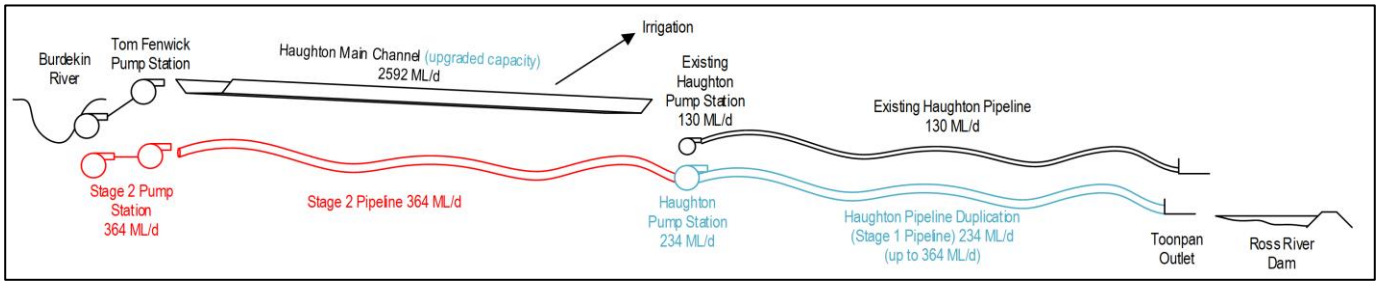
[1] Townsville City Council will consider the arrangements around permanent restrictions once the council's 3-point water security solution is delivered. They may be different from the arrangements shown here.

Option 2: Build Stage 2 in 15 years

If Option 2 is followed, then the Sunwater channel is upgraded and a new Haughton pump station is constructed. Accordingly, the cost savings of Option 1 are foregone under Option 2. However, the present value of the deferred capital expenditure represents a cost saving.

Under Option 2, the Stage 2 pipeline would be constructed in 15 years. The infrastructure requirements for Option 2 are almost identical as for Option 1, but the infrastructure will be built in 15 years' time. This time period aligns with the recommendations in the Taskforce's interim report.

Figure 1.3 : Option 2 schematic



Option 2 provides for supply of 364 ML per day. In the first 15 years, this would be supplied through the upgraded channel. After 15 years, 364 ML per day could be supplied through the pipeline. The capacity left in the channel could then be used by irrigators. As Stage 1 has a capacity of 364 ML per day, the construction of the Stage 2 pipeline does not provide additional capacity when compared with the upgraded Sunwater channel.

Option 3: Non-infrastructure initiatives

Option 3 considered a range of Taskforce-recommended initiatives, such as water leak reduction and recycled water. However, Townsville City Council has commenced implementing all but one of the Taskforce's non-infrastructure recommendations, which is to review the existing water tariff scheme and adjust it as appropriate.

Nearly all Townville's residents (97.5%) pay a fixed charge for potable water, irrespective of their water use, unless their water use is very high. The remaining residents have chosen the Water Watcher Plan (which applies a two-part tariff). Industrial users already have a two-part water tariff.

Option 3 is essentially about the reform of water prices aimed at sending a compulsory 'user pays' signal to customers of Townsville Water. A water usage charge would apply universally for residents and would reflect a user pays approach.

Option 3 investigated the benefits of applying a universal two-part tariff, consistent with the National Water Initiative. Adoption of a two-part tariff would align Townsville's water charges with those of most other Australian jurisdictions of a similar size.

Water security

The base case, Option 1 and Option 2 all provide identical water security outcomes. Townsville's total water supply capacity from the Burdekin River Scheme remains at 364 ML per day. There is no incremental improvement to water reliability for Townsville customers if the Stage 2 pipeline is constructed, whether now or in the future.

Over the past three years, Townsville's water use has averaged approximately 52,000 ML per year. However, over much of this period, level 3 water restrictions were in place. Without these restrictions, demand would be expected to be higher. Also, Townsville's demand currently includes a high residential outdoor use component, which is highly responsive to prevailing conditions (i.e. pronounced high use in extended dry periods, and substantially reduced use in wetter periods). During the last few years there were periods when use was high because of extended dry conditions, followed by periods when use was reduced because of restrictions. Use was also likely reduced during periods of wetter conditions.

To account for the uncertainty in setting a base water demand, as well as for future uncertainty, a range of demand scenarios have been projected in this business case.

Townsville City Council has implemented several water-saving measures recommended by the Taskforce, which are included in the base case. These measures aim to reduce demand for potable water. If they achieve the expected water reductions, annual demand is forecast to reach 60,000 ML in 2045 (medium population growth scenario) and 100,000 ML in 2080.

Under the stochastic modelling, which assumes that water restrictions will continue to be fully effective after the introduction of water smart package and water recycling, Townville will experience very high water security for at least 60 years, under all scenarios—the base case, Option 1, Option 2 and Option 3.[3]

The frequency of restrictions is shown in Table 1.1.

Table 1.1 : Ross River Dam stochastic forecast—frequency of restrictions (years)

Level in Ross River Dam (ML)	Level in Ross River Dam (%)	Frequency that Ross River Dam falls below level (demand 60,000 ML)	Frequency that Ross River Dam falls below level (demand 75,000 ML)	Frequency that Ross River Dam falls below level (demand 100,000 ML)	Water restrictions
Inability to meet restricted demand	n.a.	>10,000	>10,000	2,100	
1,458 ML	0.6%	>10,000	>10,000	1,800	
11,660 ML	5%	6,900	1,600	250	Level 4 restrictions start
23,319 ML	10%	520	190	74	Level 3 restrictions start
46,638 ML	20%	7.4	4.8	3.0	
69,957 ML	30%	4.3	3.2	2.3	

Source: Department of Science, Information Technology and Innovation, Townsville Water Supply Strategy—Hydrologic Analyses, Townsville City Deal, September 2017, Scenario 7-S, 7-M and 7-L.

Under the base case, and Option 1 and Option 2, the probability of level 4 (most severe) water restrictions being imposed upon Townsville is 1 in 6,900 years when demand is 60,000 ML a year (2045 medium population). When demand reaches 100,000 ML a year (2080), level 3 restrictions would be required 1 in 250 years, and level 4 restrictions would be required 1 in 250 years. These probabilities reflect that pumping from the Burdekin River Scheme would need to occur when the level of Ross River Dam reaches 15 per cent and water restrictions are effective in reducing water demand.

Under Option 3, water reliability is the same as the base case, but the need to augment supply can be deferred by 1 year. However, we anticipate that there is no need to augment supply within the next 30 years. This option universally mandates the application of a two-part tariff for residents. A two-part tariff includes a fixed charge per connection and a variable charge per kilolitre for actual usage. The introduction of a variable charge was conservatively forecast to decrease consumption by 2.1 per cent.

Engineering of Option 1 and Option 2

Option 1 involves the construction of a 34.5 km pressurised steel pipeline, with a life of approximately 80 years, as well as a low-lift raw water extraction pump station at Clare Weir and a nearby transfer pump station.

The preferred pipeline route was determined to run parallel to and west of the Haughton main channel. This route was selected after several potential pipeline alignments were considered.

The Stage 2 pipeline would operate independently of the Sunwater Haughton main channel between the Burdekin River and the start of the Stage 1 pipeline.

3 This modelling assumes that water demand grows within the bounds of the tested scenarios, forecast water savings can be achieved and water restrictions reduce water demand by the forecast amount.

The Stage 1 and Stage 2 pipeline would only be activated periodically—it would depend on factors such as the water levels in the Ross River Dam, the season, demand and the status of other water sources. As demand grows, Townsville's reliance on the Burdekin River Scheme would increase.

Modelling indicates that the pipeline will need to operate 1 in 10 years, when annual demand is 60,000 ML, expected to occur in 2045. In years when pumping is needed, the pipeline will operate for an average of 60 days. This modelling assumes that the Townsville City Council would operate the pipeline and implement water restrictions in accordance with the trigger levels in Table 1.1.

When annual demand is 100,000 ML a year, expected to occur in 2089, the pipeline will operate in 29 per cent of years. In years when pumping is needed, the pipeline will operate for an average of 100 days.

The proposed pipeline alignment is the same for Option 1 and Option 2. There is a range of agricultural uses nearby the proposed pipeline, including for sugarcane, beef and other crop production as well as scattered remnant and regrowth vegetation. There will be very minimal impact on these users once construction is complete as the pipeline will be underground.

The engineering conclusion for Option 1 is that the pipeline project is technically feasible.

Option 2 involves an almost identical infrastructure solution, albeit in 15 years' time, also is technically feasible.

Environmental assessment

Under Option 1, the terrain along the proposed alignment comprises lowland flood plains surrounded by hills and ranges. The alignment will intercept one major watercourse and 21 waterways. Pipeline crossing locations were selected to run alongside already highly disturbed and modified areas where possible, to minimise the risk of environmental and cultural impacts. Two nationally important listed wetlands, the Barrattas Channels Aggregation and Haughton Balancing Storage Aggregation, fall within 2 km of the proposed pipeline.

The pipeline would be located within the Brigalow Belt North bioregion, where a mixture of non-remnant, remnant and riparian vegetation occurs. The environmental assessment identified that the alignment passes through an area of Category B (remnant) vegetation and Category R (reef regrowth) vegetation.[4] One endangered regional ecosystem was identified. Four endangered, vulnerable and near-threatened flora species occur within the project area. Fifteen threatened fauna species and 17 migratory species, including two critically endangered, four endangered and nine vulnerable species are found within the project area.

While none of the above are likely to prevent the project, given the extent of the environmental impact of the project, an environmental impact statement will be required. A referral under the *Environment Protection and Biodiversity Conservation Act* also will be required to confirm the status of the construction project as a controlled action.

Option 2 has the same environmental issues. However, it is possible that the environmental issues and their management will change over time. Option 3 has no negative environmental impacts.

Cultural heritage

Under Option 1, a detailed Aboriginal and historical cultural heritage assessment of the project area would be required to ensure compliance with the relevant legislation. Most of the project area is subject to a native title claim by the Bindal People. An agreement would be needed with the relevant Aboriginal parties to address Aboriginal cultural heritage in the project area if the Stage 2 pipeline proceeds. This is consistent with the approach undertaken for the Stage 1 pipeline.

Under Option 2, there would be no immediate need to undertake a detailed Aboriginal and historical cultural heritage assessment until the project becomes more imminent. However, the same process recommended for Option 1 would ultimately apply.

Under Option 3, there are no cultural heritage issues.

[4] Department of Natural Resources, Mines and Energy, *General guide to the vegetation clearing codes: Accepted development vegetation clearing codes*, June 2018.

Capital cost estimates

Under Option 1, the total additional net capital cost is $225.5 million, considering the potential $55 million saving.

Table 1.2 : Total upfront capital costs (P50) of Option 1—Stage 1 and Stage 2 now (concurrent construction)

Capital cost item	P50 risk adjusted cost (2019 dollars, million)
River pump station	24.0
Settling basin/balance tank (ring dam)	4.2
Transfer pump station	21.7
Pipeline	196.0
Haughton pump station connection	4.0
Haughton balance tank (ring dam)	
Design and preliminaries	30.5
Stage 1 avoided costs	–54.9
Total	**225.5**

The Stage 1 avoided cost estimate that the Taskforce had originally identified for building Stage 1 and Stage 2 concurrently was $55.1 million. Jacobs investigated this estimate and made minor adjustments, as the solar array will be constructed elsewhere, and applied a contingency. The total cost saving estimate is estimated to be $54.9 million (including contingency).

Under Option 2, the capital costs are $280 million.

Table 1.3 : Total upfront capital costs (P50) of Option 2 (Stage 2 later as a standalone project)

Capital cost item	P50 risk adjusted cost (2019 dollars, million)
River pump station	24.0
Settling basin/balance tank (ring dam)	4.2
Transfer pump station	21.1
Pipeline	196.0
Haughton pump station connection	4.0
Haughton balance tank (ring dam)	–
Design and preliminaries	30.5
Total	**279.7**

The upfront implementation cost of Option 3 is estimated to be $1.4 million. The cost relates primarily to the awareness campaign that would need to accompany a pricing change of this magnitude.

Operating cost estimates

For Option 1, operating costs (including pumping costs) are $4.1 million in the first full year of operation (FY2022–23).

For Option 2, operating costs are $3.8 million in the first full year of operation (FY2033–34).

No additional ongoing operating costs are required for Option 3. It is assumed that any additional activity required to respond to bill and leak enquiries can be managed with existing resources.

Economic assessment

Consistent with Infrastructure Australia assessment guidelines, the cost–benefit analysis undertaken as part of the economic assessment includes costs and benefits that are incremental to the base case.

The costs in the economic assessment include the upfront capital and ongoing operating costs (specified above).

Benefits included in the economic assessment include:

- avoided base case costs—resulting in cost savings associated with delivering Stage 1 and Stage 2 of the pipeline concurrently (relevant to Option 1)
- agricultural benefits— benefit realised from increased access to water allocations by irrigators when Townsville City Council transfers its channel capacity to Sunwater (relevant to Option 1 and Option 2)
- water saving benefits—resulting from reduced demand for water by Townsville residents that delays the need for the next major supply augmentation (relevant to Option 3)
- residual value—any residual value of the asset beyond the assessment period (relevant to Option 1 and Option 2).

Table 1.4 summarises the key outcomes of the cost–benefit analysis.

Table 1.4 : Cost–benefit analysis results (present value, 7% discount rate)

	Option 1 (Stage 2 pipeline now)	Option 2 (Stage 2 pipeline later)	Option 3 (Tariff reform)
	$ million		
Avoided costs (capex and opex)	80.1	–	–
Agricultural benefits	16.2	51.8	–
Water savings	–	–	2.9
Residual value	2.7	22.6	–
Total benefits	98.9	74.4	2.9
Capex	–275.0	–123.1	–1.4
Opex	–43.9	–13.6	–
Total costs	–319.0	–136.6	–1.4
Net benefit	–220.1	–62.2	1.5
	Ratio		
Benefit–cost ratio	0.3	0.5	2.0

Option 1 and Option 2 both have a net present cost and a benefit–cost ratio of less than one, which indicates that there is no compelling economic justification for them to proceed.

Any avoided costs associated with Option 1 ($80.1 million) are offset by a lower agricultural benefit ($35.6 million) and a higher overall capital and operating cost ($182.4 million) when compared to Option 2.

Option 3 has a benefit–cost ratio of greater than one, as it would reduce demand and delay the next supply augmentation. There is an economic case for price reform to proceed. However, implementation of price reform is a matter for Townville City Council.

The wider economic impact assessment

Communities in the project area experience a higher level of unemployment than the rest of Queensland overall. Youth unemployment in the Townsville area, for example, is over 16 per cent.

Under Option 1, the average number of new jobs created during the three-year construction phase for both pipeline options would be 691 new jobs, of which approximately 202 are direct jobs and 489 indirect jobs. It is estimated that Option 1 will provide 30 new full-time positions on an ongoing basis from 2022, with 9 being in

direct employment and 21 in indirect employment. It is also estimated that Option 1 will increase the value of ongoing agricultural output by $3 million per year.

Under Option 2, the same 691 new construction jobs will be created, though these jobs will be created in 15 years. Option 2 will provide higher employment benefits once the pipeline is in operation, as irrigators will be able to use the additional channel capacity once the Stage 2 pipeline is built in 2034. Therefore, Option 2 is estimated to provide an additional 284 jobs, with 86 of those being in direct employment and 198 in indirect employment. Once commissioned, Option 2 is estimated to increase the value of agricultural output by $28 million per year.

Both Option 1 and Option 2 will increase output in the construction sector and supporting industries during the construction period and in the agriculture sector and supporting industries during the operational phase. During construction, both options will deliver approximately $251 million in additional output, with approximately $118 million in direct output and $133 million in indirect output.

Non-economic benefits of a pipeline

During stakeholder engagement, issues were raised about the non-economic benefits of a pipeline (Option 1 and Option 2), relative to an upgraded Sunwater channel. These issues include:

- **Ownership:** With the Stage 2 pipeline, there would be no use of Sunwater infrastructure between the Burdekin River and Townsville. Single ownership by Townsville City Council of the infrastructure between the Burdekin River and Ross River Dam, at Toonpan, would allow the council to make all decisions itself. There would be no reliance on a third party. The council could make decisions about when to operate the pipeline, and about the level of maintenance to undertake to match the council's risk profile. In this way, a single entity would be responsible for delivery, and treatment infrastructure and coordination costs would be reduced.
- **Reliability:** An upgraded channel and the Stage 2 pipeline can deliver the same maximum volume of water per day. Accordingly, the modelled water security outcomes are identical. However, the shutdown period of a channel for maintenance is likely longer than that of a pipeline, which could impact on water reliability. We consider that this additional risk could be managed by the council, by ensuring that enough pumping is done prior to the shutdown so that Ross River Dam has enough water to account for the shutdown, plus an extra volume to account for a contingency.
- **Water quality:** With a council-owned pipeline, the council would have more control over long-term operation and maintenance decisions that have an impact on water quality and certainty. Weed control is an issue in an open channel and is currently treated with acrolein. 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.
- **Broader benefits:** The infrastructure Australia complaint economic assessment presented above does not include the impact of new jobs or the indirect economic benefits. Building the Stage 2 pipeline will create 691 new jobs, of which approximately 202 are direct jobs and 489 are indirect jobs. It will also provide 30 new full-time positions on an ongoing basis from 2022, with 9 being in direct employment and 21 in indirect employment.

  The construction will deliver approximately $251 million in additional output, with approximately $118 million in direct output and $133 million in indirect output.

Bill impacts

Under Option 1 and Option 2, three government funding scenarios for assessing the potential water bill impacts for Townsville residents were examined for each option, as part of the financial analysis.

Funding scenario A was based on the Australian Government contributing all the upfront capital funding, with the operating costs recovered from customers through pricing. Funding scenario B was based on the Australian Government contributing $195 million towards the upfront capital costs, with the remaining capital cost and operating costs recovered from customers through pricing. Funding scenario C was based on no grant funding being received and all costs being recovered from customers through water pricing.

Table 1.5 : Residential bill impacts

Option	Impact on residential customers bills		
	Funding scenario A (full government funding)	Funding scenario B ($195 million government funding)	Funding scenario C (no government funding)
Option 1 (Stage 2 pipeline now)	4%	8%	22%
Option 2 (Stage 2 pipeline later)	4%	12%	25%

Based on cost-reflective apportionment. For Option 2, bill impacts do not occur until 2034.

Under the core scenario (scenario B), if Option 1 was implemented, residential bills would rise by an average of 8 per cent (combination of both fixed and variable water charges). Option 2 bill impacts are higher, as the possible $55 million saving is not achieved.

The financial implications of Option 3 are that $1.4 million will be incurred in implementation costs. The proposed water tariff is revenue-neutral and has no net bill impacts. However, depending on their level of water use, customers would experience a wide range of bill impacts due to the introduction of a usage tariff.

Implementation

The construction of a Stage 2 pipeline could not commence until the design and approvals have been completed. Table 1.6 sets out the activities that need to be completed before pipeline construction could commence. It would take approximately 12 months to complete these activities—until June 2020, assuming a 1 July 2019 start. This assumes that approval activities could be completed in parallel and that no major environmental, geotechnical or cultural heritage issues are identified.

The timeline to implement has implications for Option 1, as well as the ability to achieve the $55 million savings. The $55 million saving can only be realised if the upgrade to the channel and construction of a new pump station can continue to be postponed while the Stage 2 approvals are being achieved. Townsville City Council has advised that there is some flexibility in how it manages its water resources, for example, by drawing down storage levels and pumping through the existing pipeline if needed. However, Townville City Council would require funding certainty for the Stage 2 pipeline in order to delay the upgrade to the Sunwater channel and pump station.

Table 1.6 : Timelines for implementation

Activity	Time taken	Necessary pre conditions	Earliest completion
Supporting investigations including: • detailed hydrologic and hydraulic study of Burdekin River at Clare Weir and surrounds • detailed ground survey • further geotechnical investigations	3 months		September 2019
Operational agreements with Sunwater	3 months		September 2019
Engineering design	6 months	Supporting investigations	March 2020
Land access	6 months	Pipeline route confirmed through supporting investigations	March 2020
Ecological survey	2 months		September 2019
Cultural Heritage Management Agreement	4 months	Pipeline route confirmed part-way through engineering design Proponent for the project identified	March 2020
Indigenous Land Use Agreement	6 months	Pipeline route confirmed part-way through engineering design Proponent for the project identified	

Activity	Time taken	Necessary pre conditions	Earliest completion
Regulatory approvals (including EPBC Act referral, Infrastructure Designation)	12 months		June 2020
Procurement	3 months	Engineering design needs to be completed	June 2020

The Stage 2 pipeline would take 18 to 24 months to construct; therefore, the pipeline could not be expected to be finished until December 2021, at the earliest.

The business case analysed ten contracting models that could deliver the Stage 2 pipeline. The analysis found that the most appropriate way in which to deliver it, is for Townsville City Council to bear the construction risk and to put the contract out for tender in small packages for which (local) tier two and three contractors could bid.

Conclusions

Economic and financial analysis alone does not suggest a compelling case to build this pipeline. However, there are benefits of a pipeline (under both Option 1 and Option 2) that are not included in the economic assessment under an Infrastructure Australia approach. Broader issues that could be taken into account include:

- Townsville City Council would not be reliant on another party for the transportation of water.
- Urban water supply would not be interrupted during a channel shutdown period.
- There would be no need to manage weeds and manage the public perceptions relating to the use of acrolein in a shared agricultural and urban network.
- Building the Stage 2 pipeline will create 691 new jobs, of which approximately 202 are direct jobs and 489 are indirect jobs. The construction will deliver approximately $251 million in additional output, with approximately $118 million in direct output and $133 million in indirect output.

It is appropriate that decision-makers take these broader issues into account, as well as the economic assessment that has been undertaken, consistent with Infrastructure Australia guidelines.

The overall conclusions are the following:

1) Under the base case:
   - All the combined activities undertaken recently to secure the water supply to Townsville have been highly effective in reducing the estimated frequency of water restrictions. Townsville will have very high water security for at least 60 years.

2) Under Option 1:

   a) Economic assessment
   - Construction of the Stage 2 pipeline will not improve water security, relative to the base case. The Stage 2 pipeline is technically feasible.
   - $55 million of channel upgrade and pump station expenditure would be avoided. However, the net cost would be $226 million.
   - The benefit–cost ratio is 0.3.
   - Water bills would need to increase by 5 per cent, assuming government funding of $195 million.
   - The value of ongoing agricultural output will increase by $3 million per year.

   b) Wider benefits
   - 691 new jobs will be created, of which approximately 202 are direct jobs and 489 are indirect jobs. It is estimated that Option 1 will provide 30 new full-time positions on an ongoing basis from 2022, with 9 being in direct employment and 21 in indirect employment.
   - During construction, both options will deliver approximately $251 million in additional output, with approximately $118 million in direct output and $133 million in indirect output.

3) Under Option 2:

   a) Economic assessment

   - Construction of the Stage 2 pipeline will not improve water security, relative to the base case. The Stage 2 pipeline is technically feasible.
   - The Sunwater channel would be upgraded and the new pump station would be constructed. This would mean that the $55 million savings would not be realised. The cost would be $280 million, in 2019 dollars—although the deferral would create a benefit of $129 million compared to Option 1, due to the time value of money.
   - An upgraded channel would have agricultural benefits for irrigators, once the Townsville City Council moved their water out of the channel and into the pipeline, in 15 years' time.
   - Additional time is allowed to resolve any environmental or cultural heritage issues that may arise.
   - The benefit–cost ratio is 0.5.
   - Water bills would need to increase by 9 per cent, assuming government funding of $195 million, in present value terms.
   - Option 2 is estimated to increase the value of agricultural output by $29.1 million per year.

   b) Wider benefits

   - Option 2 is estimated to provide an additional 294 jobs, with 89 of those being in direct employment and 205 in indirect employment. Once commissioned, the construction will create a benefit in 15 years' time of $129 million.
   - During construction, both options will deliver approximately $251 million in economic activity will be created.

4) Option 3:

   a) Introducing a two-part tariff for all residential water tariffs in a manner consistent with the National Water Initiative. This would:

   - Improve efficiency of water use and reduce water demand by 2.1 per cent.
   - Defer the need for the next augmentation.

   b) The benefit–cost ratio is 2.0.