

ROCKHAMPTON TO YEPPOON PIPELINE - PROJECT MANAGEMENT ASPECTS



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ABSTRACT

This \$49.4 million project provides a link between the Rockhampton and Capricorn Coast water supply networks. The project has received State and Federal Government funding and will supplement the existing Waterpark Creek source for the Capricorn Coast. It involves approximately 42km of 600mm and 750mm diameter Ductile Iron Cement Lined pipeline as well a pump station and a 10ML reservoir.

Project Delivery will be explored in terms of the number and type of contracts employed, risk and the management of the many contract interfaces.

Special design aspects are discussed including above ground valve facilities, rural fire hydrants and service connection points.

1.0 PROJECT BACKGROUND

The Rockhampton to Yeppoon Pipeline (known hereafter as ‘the pipeline’) will deliver treated water to the Capricorn Coast water supply system. Raw water will be drawn from the Fitzroy River and treated at the existing Glenmore Water Treatment Plant before being pumped through the pipeline to the Capricorn Coast. The pipeline is comprised of mainly 750mm and 600mm diameter PN35 DICL pipe and is capable of delivering up to 37ML/day to the Capricorn Coast System with 2 pumps operating at Ibis Ave No 2 Pump Station.

This water will supplement the existing Waterpark Creek source which is nearing the extraction limit of 17 ML/day (4,400 ML per annum).

The Capricorn Coast Water Supply Sources Study (Cardno Jan. 2005) concluded that the least cost method of supplementing the Capricorn Coast’s water supply beyond the development of Waterpark Creek and Sandy Creek was by the construction of a pipeline from the Fitzroy River Barrage, provided substantial financial support could be secured from the other tiers of Government. The capital cost of the infrastructure required to meet the year 2056 water demands of the Capricorn Coast was \$49.4 million and the funding secured for the project is outlined in Table 1.

Table 1: *Funding Sources – Rockhampton to Yeppoon Pipeline Project*

Federal Government	\$16,467,000	33.3%
Queensland Government	\$20,000,000	40.5%
Livingstone Shire / Fitzroy River Water	\$12,933,000	26.2%
Total	\$49,400,000	

Five alternative routes for a pipeline to the Capricorn Coast were examined in the Capricorn Coast Water Supply Sources Study (Cardno Jan. 2005).

While there was little difference in an economic comparison of the alternative routes, construction along the Rockhampton – Yeppoon Road alignment was considered the less expensive option.

The pipeline route and the overall strategic design of the project was further refined through the Fitzroy River Pipeline Preliminary Alignment and Investigation (Cardno Sept. 2006).

The existing and future demands used in design consider population increases on the Capricorn Coast between 2.5% and 3% per annum. The estimated water requirement by the year 2056 to meet the needs of the Capricorn Coast is predicted to be about 13,000ML/a (refer Figure 1).

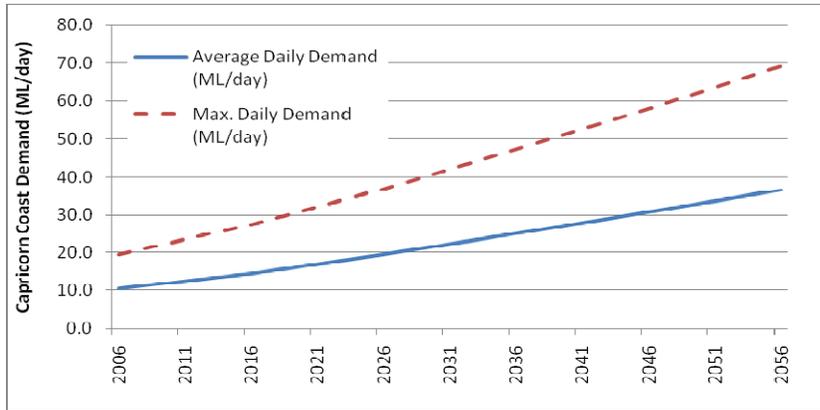


Figure 1: Predicted growth in Capricorn Coast water demand

Figure 2 shows a basic layout of the system as it will commence operation in 2010.

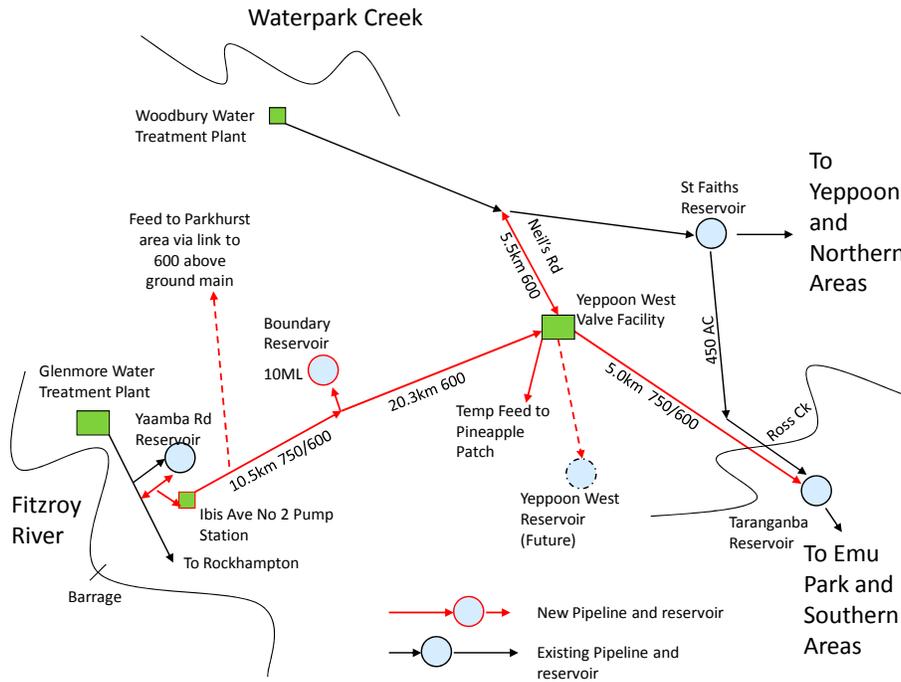


Figure 2: Rockhampton to Yeppoon Pipeline – Infrastructure Layout

2.0 PROJECT DELIVERY

The following Table 2 outlines the approximate forecast cost break-up for the project. These costs include preliminary expenses but do not represent contract totals. Project Management includes easement acquisition/compensation, legal expenses and other expenses not attributed to specific infrastructure items.

Table 2: *Forecast break up of expenses – Rockhampton to Yeppoon Pipeline Project*

Work Parcel	Contractor	Contract Form	Percentage of project cost
Pipe and Fittings	Tyco	Supply Contract	39.1%
Ibis Ave Pump Station	JCQ Project Builders	Conventional Construction Contract	5.2%
Yeppoon West Valve Facility and Taranganba Reservoir Connection	JCQ Project Builders	Conventional Construction Contract	4.7%
Yeppoon West Reservoir (discontinued)	Bailey Civil Contractors	Conventional Construction Contract	0.4%
Boundary Reservoir 10ML	Hornick Constructions	Design and Construct Contract	6.0%
Underbores	UEA	Conventional Construction Contract	1.7%
Pipeline Construction	Bailey Civil Contractors	Conventional Construction Contract	23.9%
Pipeline Construction	Fitzroy River Water	In House	8.7%
Design / Project Management	Fitzroy River Water / Cardno	In House / Professional Services Agreement	10.3%

Conventional construction contracts were lump sum contracts using a Modified AS2124. The contracts included specific requirements required by the federal funding including compliance with the National Code of Practice and the Equal Opportunity for the Women in the Workplace Act 1999.

All documentation was issued electronically and this worked well except for some minor issues regarding the pdf of drawings.

The use of a Design and Construct contract for Boundary Reservoir was seen as an opportunity to allow a contractor to competitively bid on what is a reasonably standard product. It is considered that a quality product and value for money was achieved.

Project management was carried out by officers of the former Livingstone Shire Council and Fitzroy River Water with support from Cardno when necessary.

3.0 INTERFACES BETWEEN CONTRACTS

It was intended to use the minimum amount of contracts possible in order to minimize any interface issues between contracts. There are potential issues in any situation where a contractor is relying on the actions of others. Two examples encountered on this project are given below and some further issues are raised under risk:

- The underbore contractor was required to install and test the enveloper pipe and the service pipe. However, in order to test the service pipe, a concrete thrust block was necessary to hold the 2,100kPa test pressure. This thrust block would have been sizeable due to the large entry and exit pits the underborer used and would then need to be removed by the main contractor to allow the pipe connection to be made. The matter was resolved by the underbore contractor testing to 500kPa test pressure (thrust was held by connection to the enveloper pipe) and the main contractor completing a test to the required 2,100kPa pressure at a later time; and
- A situation arose where one contractor was given possession of site over an area held by another contractor. Whilst the possession of site issue could be easily resolved the fact that AS2124 provides that the Principal Contractor remains so until the final certificate is issued presented a problem. AS2124 provides that 21 days notice is required to remove a Principal Contractor.

4.0 RISK

The following Table 3 briefly outlines some of the risks for the project, their controls and comments on the effectiveness of the controls / approaches

Table 3: *Project Risks – Rockhampton to Yeppoon Pipeline Project*

Risk	Control	Comments
Delay in the supply of pipe due to high demand for pipe at the time had the potential to delay the project	A separate contract was let for pipe supply before detailed design was completed. Fittings supply contracts were let immediately design was completed.	Would have been good to avoid a separate contract for this if possible.
Mismanagement of environmental issues could result in fines and embarrassment	A detailed Construction and Environmental Management Plan was prepared for the project which the contractor was required to adopt.	No issues of significance arose.
Delays in taking easements had potential to delay the project.	The Acquisition of Land Act was utilized to take easements rather than negotiation with landowners over compensation. The compensation is determined after the easement is taken.	Some design changes resulted in new easements being required. Work in these areas was postponed until approvals were in place.
Delays in obtaining State Agency approvals had potential to delay the project.	The environmental approval was sought in 2 stages. Stage 1 related to the majority straightforward aspects of the project. Stage 2 related to a more contentious marine crossing at Ross Creek, Yeppoon.	The Stage 2 application still caused some minor project delay.
The original federal government funding required that the project be completed by November 2009.	Local Government amalgamation and the consequent redesign of some aspects of the project resulted in a new completion date of June 2010.	All major works are expected to be complete by 30 June 2010.

Risk	Control	Comments
Compliance with Cultural Heritage obligations could result in fines and embarrassment	Addressed early through investigations and contracts with the local aboriginal people.	No issues of significance arose.
Potential delay due to contract interface issues .	The most significant issue was due to principal supplied pipe and fittings. This was managed through detailed stockpile site inventory and direct communication between the contractor and the supplier.	There was some delay in material supply, delivery to incorrect stockpile sites and related matters.
The provision of underbores is specialist high risk work and would potentially affect project timeframes.	A separate underbore contract was let prior to the major construction contract in an attempt to complete this work early.	Issues with the underbore contract and rain delay meant that the desired early completion of work did not result.
The volume of rock encountered had potential for significant additional cost and would potentially affect project timeframes.	Rock was to be paid at an agreed rate per cubic metre (that is – the Principal took the risk). Rock was defined as production rates less than 15m ³ per hour for a 30 Tonne excavator.	The volume of rock encountered was slightly less than the 9,750m ³ budgeted for pipeline excavation.
Provision of service connections to the pipeline may affect pipeline integrity	Tees rather than direct tapped service connections were used.	

5.0 SPECIAL DESIGN FEATURES

Three ‘rural fire hydrants’, involving a hydrant, concrete slab and formed access were provided at strategic road intersections to service nearby communities along the route.

The Yeppoon West Valve Facility is an above ground facility including 9 major valves and 2 flowmeters. It is intended to provide ease of maintenance and operation rather than the installation of traditional pits which have issues of confined space access and cramped working conditions. The provision of the above ground facility is considered to be cost neutral when compared to the alternative which involved three large concrete pits.

The provision of service connection points to a major pipeline for the conveyance of bulk water is unusual. However, the local political landscape demanded that connections be provided. As a result 40 tees were installed at strategic locations to service the maximum amount of properties. Many of the service connections were co-located with scours and air valves to reduce cost. Pressure reducing valves will be required on some connections and individual small diameter PRV’s for each service are to be installed at the time of connection.

6.0 CONCLUSIONS

What did we learn and what advice can we provide?

- Do not underestimate the time required for taking easements and obtaining State Agency approvals;
- Carefully analyze the risk and focus effort in the right area; and
- Utilize the minimum number of contracts as possible. Pay careful attention to contract interfaces as these will present potential risk.

7.0 ACKNOWLEDGEMENTS

Special thanks to Dan Toon and Nev Brown of the former Livingstone Shire Council who were influential in getting the project off the ground.

Special thanks to the many Fitzroy River Water officers involved in the project for their efforts in delivering a successful project. Many photographs and other information from Fitzroy River Water has been included in this presentation.