
Miriam Vale Shire Council

*Updated Assessment of Water Supply Options for the
Townships of Agnes Water and 1770:
Desalination vs Pipeline*

A report prepared by Marsden Jacob Associates

6 December 2007

Marsden Jacob

A s s o c i a t e s

Financial & Economic Consultants

Email : economists@marsdenjacob.com.au

Marsden Jacob Associates
Financial & Economic Consultants

ABN 66 663 324 657
ACN 072 233 204

Internet: <http://www.marsdenjacob.com.au>
E-mail: economists@marsdenjacob.com.au

Postal address: Level 3, 683 Burke Road, Camberwell
Victoria 3124 AUSTRALIA

Telephone: (03) 9882 1600 International: +61 3 9882 1600
Facsimile: (03) 9882 1300 International: +61 3 9882 1300

Author(s): Peter Jacob

Copyright © Marsden Jacob Associates Pty Ltd 2005

This report has been prepared in accordance with the scope of services described in the contract or agreement between Marsden Jacob Associates Pty Ltd ACN 072 233 204 (MJA) and the Client. Any findings, conclusions or recommendations only apply to the aforementioned circumstances and no greater reliance should be assumed or drawn by the Client. Furthermore, the report has been prepared solely for use by the Client and Marsden Jacob Associates accepts no responsibility for its use by other parties.



Financial & Economic Consultants

TABLE OF CONTENTS

	Page
1. Background.....	1
2. Approach and assumptions.....	1
2.1.Evaluation period and discount rate.....	1
2.2.Volumes	1
2.3.Pipeline Option	2
2.4.Desalination Option	4
3. Results.....	5
4. Conclusions.....	6

1. Background

Prior to Miriam Vale Shire Council (MVSC) going to the market for a integrated water and wastewater solution, an assessment was made of alternative options for the supply of water for the townships of Agnes Waters and 1770.

This assessment concluded that the desalination option had a lower present value cost than the pipeline option. The cost difference between the two options was estimated at \$15.2 million using a real discount rate of 5%, and \$14.0 million at 7%.¹

MVSC went to the market for the integrated project – including a 1.5 ML/d desalination plant with an initial productive capacity of 1.5 ML/d but incorporating 7.5 ML/d capacity on the inlet and ocean outfall pipelines and following Ministerial approval for both the project and related funding arrangements.

Following a short-listing of proponents by EOI, three proponents were selected to submit detailed tenders.

Two competitive and compliant offers were received and are currently being evaluated according to an approved Project Evaluation Plan.

Government, through DLGP and DNRW has requested that an updated options assessment be undertaken comparing the tendered prices for the desalination project with a revised estimate for the pipeline project.

2. Approach and assumptions

2.1. Evaluation period and discount rate

A twenty-two year project evaluation period was adopted as this period was consistent with cost data provided for the desalination project, i.e., 2 year construction period followed by a 10 year operating contract with two 5 year options.

A 6% real, pre-tax discount rate was adopted with sensitivity analysis undertaken at 4% and 8%.

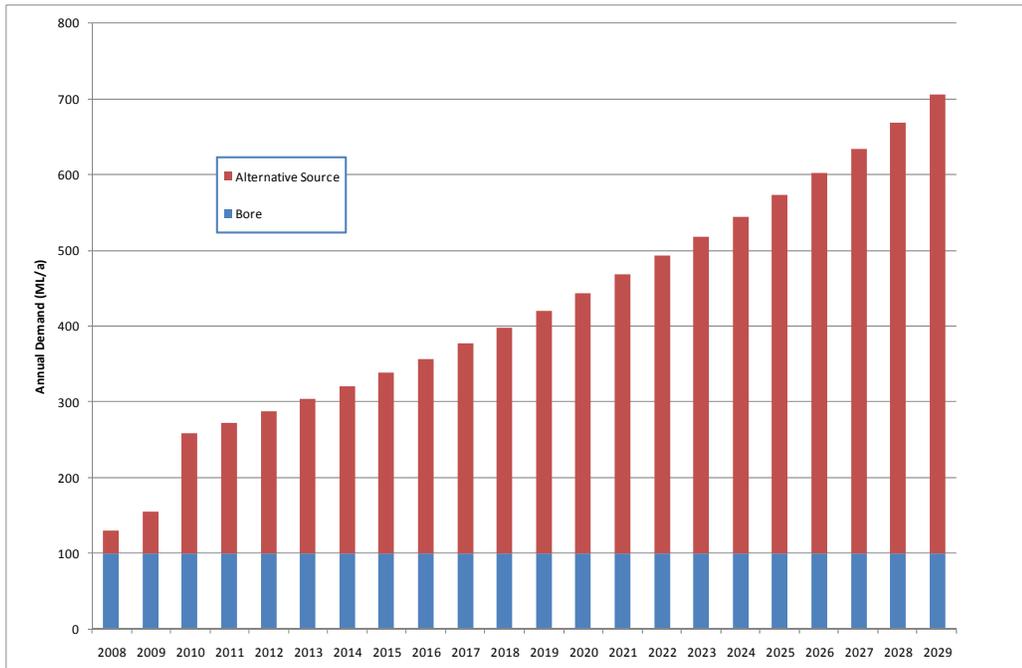
2.2. Volumes

Demands used in the option assessment were identical to those adopted for the assessment of tenders. The total annual volumes are illustrated in Figure 1. The delivered volumes will comprise varying proportions of bore water and water supplied from either the desalination plant or from the pipeline. Bore water is likely to be the lower cost water, but actual volumes will depend on the sustainability of the aquifer.

¹ Refer Engineering Estimates and Financial Implications of Pipeline and Desalination Options for Agnes Waters and 1770, July 2007. Burns Bridge Transactions.

Accordingly, a range of proportional mixes of bore water/alternative source (desalination or pipeline) were examined, i.e., 100 ML/a from the bore field was adopted as the Base Case; with sensitivity analyses undertaken assuming production from the bore field of 75 ML/a and 50 ML/a.

Figure 1: Annual Demand



2.3. Pipeline Option

This revision of the pipeline option was undertaken using revised cost estimates based on Table 9.5 of the 2006 Cardno report *Agnes Water – Town of 1770 Benaraby – Agnes Water Pipeline Cost Report* prepared for Miriam Vale Shire Council for a 200 mm diameter pipeline.² Capital costs were increased by an escalation factor of 12% based on advice from Cardno. Pumping costs were based on cost estimates provided by Cardno.

Table 2.1 sets out the capital cost estimate.

Table 2.1: Capital Cost Estimates – Pipeline Option

Item	Base Cost (\$000s)	Escalated Cost (\$000s)
Pipeline	37,153.3	41,611.6
Pump Stations – Civil Works	326.0	365.1
Pump Station – Mechanical & Electrical	250.0	280.0
	37,729.3	42,256.8

Note: Rounding errors may occur.

Account was taken of the residual life of assets at the end of the 20 year evaluation period. Table 2 sets out the assumed economic lives of the assets.

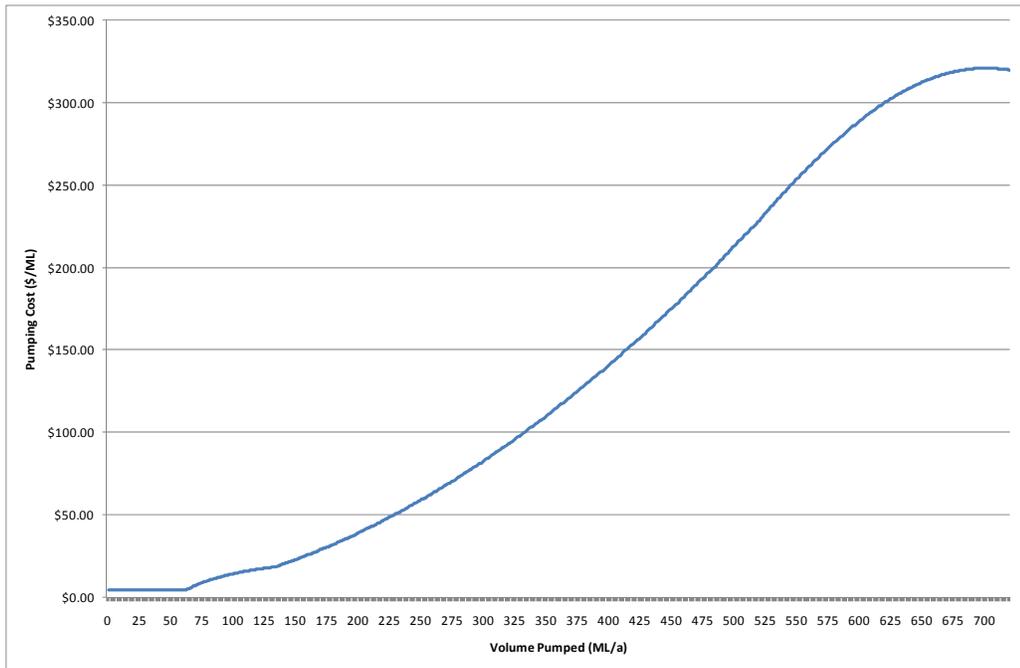
Table 2.2: Economic Lives for Pipeline Assets

Asset	Assumed Economic Lives (Years)
Pipeline	80
Pump Stations – Civil Works	60
Pump Station – Mechanical & Electrical	25

Operating costs were based on the 2006 Cardo report and are summarised as follows:

- Water cost – \$1,000 per ML
- Operations & Maintenance
 - Pipelines – 0.6% of capital cost
 - Pump station – 5.0% of capital cost
- Pumping costs – costs vary according to volumes pumped with costs illustrated in Figure 2.

Figure 2: Pumping Costs (\$/ML pumped)



2.4. Desalination Option

Unlike the pipeline option, costs for the desalination option are tender prices. The costs, therefore, are risk-adjusted, unlike those for the pipeline option.

The submitted capital cost estimates for the desalination component of the project is \$24.587 million. Table 2.3 sets out the economic lives together with the remaining (residual) life required under the contract at the end of the 20 year operational period.

Table 2.3: Economic and Residual Lives – Desalination Option

Component	Economic Life (Years)	Residual Life at End 20 Years (Years)
Tanks	60	40
Buildings	50	30
Pipelines	50	30
Mechanical	25	10
Electrical	15	10

An augmentation of the RO modules and related plant is assumed to occur in 2022 (1.5 ML/d) and 2026 (1.5 ML/d). The cost of such augmentations is estimated at \$5.94 million by Cardno based on costs contained in the tender documentation. This is some \$2.1 million higher than the Cardno cost estimate for such augmentations (\$3.81 million) estimated in their May 2006 report.²

For the operational costs, the fixed and variable operating tolls associated with the Water Service component of the contract are utilised. Importantly, the Water Services Toll includes not only the operation, maintenance and asset replacement costs of the desalination infrastructure, but also those associated with running the bore fields.

The cost estimates, therefore, are conservative toward the desalination option as they include costs associated with the bore field and reticulation system that are not included in the pipeline option.

The fixed charge is \$65,736 per month or \$788,832 per annum. The volumetric charge is \$514.05 per ML of desalination water produced.

3. Results

The present value costs (PVC) of the two options are summarised in Table 3.1 based on output from the bore field of 100ML/a.

Table 3.1: Comparison of Present Value Cost of Desalination vs Pipeline Option

Component	Present Value Cost of Option (\$ millions)		
	4%	6%	8%
Desalination Option	32.26	30.51	28.85
Pipeline Option	34.84	36.28	36.65
Difference	-2.58	-5.77	-7.81

At a 6% real discount rate, the desalination option has a present value cost of around \$30.5 million which is 16% less than the PVC of the pipeline option (\$36.3 million). Changes to the discount rate do not change the conclusion that the desalination option has a materially lower PVC compared to the pipeline option.

Reducing the volume able to be pumped from the existing bore field would only act to increase the cost difference between the two options. This is because the desalination option has a variable cost of \$514 per ML which is at least 50% of the variable cost of the pipeline option (\$1,000 per ML for the cost of water plus pumping costs). Sensitivity of the results to changes in the assumed production from the bore field is set out in Table 3.2 assuming a 6% real discount rate.

² Cardno, 2006., *Agnes Water – Town of 1770 : Desalination Plant, 1 Rev A*, Miriam Vale Shire Council, May.

Table 3.2: Impact of Volume Produced from Bore Field

Option	Present Value Cost of Option (\$ Million)		
	100ML/a (Base Case)	75ML/a	50ML/d
Desalination Option	30.51	30.64	30.77
Pipeline Option	36.28	36.57	36.87
Difference	-5.77	-5.93	-6.10

4. Conclusions

The present value cost analysis demonstrates that the desalination option has a materially (16%) lower cost than the pipeline option.

However, there are a number of other important considerations that also favour the desalination option over the pipeline option. These include:

- i) The costs for the desalination option are based on firm, competitively contracted costs. By comparison, the pipeline option costs are based on engineering estimates only and are, therefore, not risk-adjusted nor represent firm, delivered prices. Recent experience in Queensland and elsewhere in Australia suggests that the delivered cost of water infrastructure projects is generally higher than initial concept feasibility estimates.
- ii) The capital cost for the desalination option is the maximum cost. There is scope to negotiate a lower cost through acceptance of lower cost options submitted by one of the proponents. This would act to increase the cost difference between the desalination option and the pipeline option (up to an additional difference of between \$1.7 million and \$3.8 million, depending on the options taken up)
- iii) The fixed operating cost estimate for the desalination option is based on a submitted toll that covers not only operations, maintenance and asset replacement/refurbishment for the desalination plant, but also covers all activities associated with operating and maintaining the bore field. The pipeline option cost estimates only cover the cost of the pipeline and related pump stations.
- iv) Environmental approvals have been obtained for the desalination project. Such approvals would have to be obtained for the pipeline project, along with other approvals such as Native Title and Cultural Heritage. This would entail both additional costs and would increase the timeframe within which the project could be delivered.
- v) The desalination project is ready to be implemented once Government approval has been given to funding arrangements. A change in decision to the pipeline option would involve substantial delays, resulting from the need to develop Project Brief,

seek Expressions of Interest, select shortlist of proponents, go out to tender, evaluate tenders and so on. Such delays would most likely result in increased project costs, but also require the need to provide temporary water facilities – a need not required if the desalination option were to proceed.

In summary, the desalination is the lower cost option, is able to be implemented immediately, has approvals in place and is readily augmented to meet the demands of the townships of Agnes Waters and 1770.

— || —