Addendum to
Optimised Replacement Cost
of Existing Roma Brisbane Pipeline

Transient Impacts

PUBLIC VERSION
(confidential text deleted)

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Contents

1 Executive Summary

The report titled 'Optimised Replacement Cost of Existing Roma Brisbane Pipeline' was prepared to identify and cost the optimal configuration of a gas pipeline with a steady-state capacity equivalent to the 180 TJ/d licence capacity of the existing Roma Brisbane Pipeline ('RBP'). The report concludes that a 400 mm nominal diameter pipeline, with an operating pressure of 12.5 MPa upstream of Redbank and 5.0 MPa downstream of Redbank, would be optimal.

In reality however, the RBP provides services other than steady-state transportation of gas. In particular the RBP is, and conceptual replacements of it must be, capable of:

- intermittent delivery of gas at a rate up to 225 TJ/d, which is considerably in excess of the steady-state capacity licence capacity; and

- storing at least [confidential text deleted] Mm^3 of gas during periods of low gas demand with the stored gas subsequently available for delivery during peak demand periods.

This Addendum has been prepared to quantify the impact of the abovementioned, transient service requirements upon the configuration and cost of the optimal replacement for the RBP. In preparing this Addendum, no provision has been made for future growth in quantities of gas to be transported or stored in the RBP.

Having regard for transient service requirements, it is considered that the optimal replacement for the RBP would be 450 mm nominal diameter with an operating pressure of 10.2 MPa upstream of Redbank and 400 mm nominal diameter with an operating pressure of 5.0 MPa downstream of Redbank. The optimised replacement pipeline would be equipped with inlet gas compression and has an estimated cost of $422,747,433.

2 Background

The report titled 'Optimised Replacement Cost of Existing Roma Brisbane Pipeline' investigated pipeline configurations that would have a capacity equivalent to that of the existing, looped and highly compressed Roma Brisbane Pipeline ('RBP'). The costs of alternative configurations were estimated and compared on a discounted cashflow basis to identify the optimal replacement configuration and cost.

The pipeline capacity analyses undertaken in preparing the abovementioned report were performed using steady-state modelling techniques to identify pipelines with a capacity equivalent to the licence (or 'nameplate') capacity of the RBP.

In reality however, the RBP meets more onerous, transient service requirements. The RBP is capable of:

- delivering gas for power station use at rates considerably in excess of its steady-state capacity; and

- storing gas during periods when power stations are off-line or operating at low loads, with the stored gas subsequently available for delivery during peak demand periods. To do this, the pipeline must have a sufficient level of useable linepack[a].

This Addendum has been prepared to quantify the impact of the transient service requirements upon the configuration and cost of pipelines that could notionally replace the RBP. It is important to note that in preparing this Addendum no provision has been made for future growth in quantities of gas to be transported or stored in the RBP[b].

[a] Useable linepack may be thought of as the difference between the quantity of gas that can be stored within the pipeline when it is operating at off-peak conditions and the minimum quantity of linepack that must be contained within the pipeline in order for it to meet peak transportation requirements.

[b] The report titled 'Optimised Replacement Cost and Replacement Schedule of Roma Brisbane Pipeline (to meet future demand)' investigates replacement options that are optimised to meet both present and future service requirements.

3 Transient Requirement and Configuration Options

The transient service requirements to be satisfied by the RBP are summarised in Table 1.

Table 1: Transient Requirements (2006)

Peak delivery rate from pipeline[c]	225 TJ/d
Average pipeline throughput[d]	148 TJ/d
Useable linepack, minimum[e]	confidential

Pipeline configurations that could satisfy the tabulated transient performance requirements are summarised in Table 2.

Table 2: Pipeline Configurations to Meet Transient Requirement

Option	Nominal Size Arubial - Redbank	Mainline MAOP	Compression
1	350 mm	12.5 MPa	Inlet + 3 intermediate
2		15.3 MPa	Inlet + 2 intermediate
3	400 mm	10.2 MPa	Inlet + 3 intermediate
4		12.5 MPa	Inlet + 2 intermediate
5	450 mm	10.2 MPa	Inlet + 1 intermediate
6		12.5 MPa	Inlet + 2 intermediate
7	500 mm	10.2 MPa	Inlet only
8		12.5 MPa	Inlet only
9	600 mm	10.2 MPa	none

For all scenarios the metropolitan pipeline section was 400 mm nominal diameter with an operating pressure of 5.0 MPa.

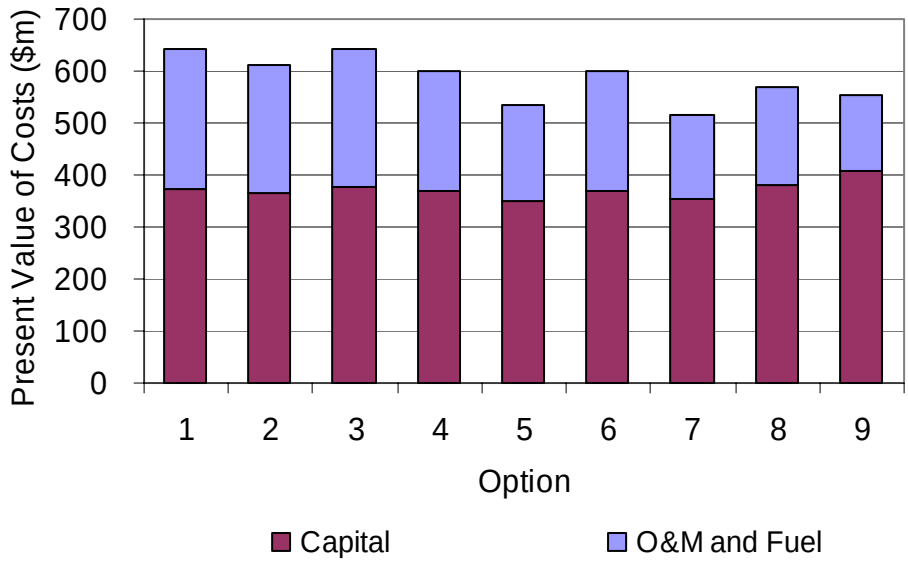
4 Modelling Results

The capital costs of the pipeline configuration options presented in Table 2 were estimated and, together with compressor fuel and operating and maintenance costs, were compared on a discounted cashflow basis to identify the optimal replacement configuration. Present values were calculated for a 25 year period at a discount rate of 2.6%. Other assumptions made for modelling purposes were as have been previously described.

[c] Derived from Figure 4.5 on page 12 of "Roma-Brisbane Pipeline Network, Optimised Replacement Cost Study", Venton & Associates, January 4, 2006.
[d] Average of throughput forecasts for 2005/06 and 2006/07 as set out in Table 13 on page 23 of "Access Arrangement Information for Roma Brisbane Pipeline", 31 January 2006.
[e] The useable linepack requirement represents the quantity of gas delivered into (and to be stored within) the RBP during off-peak periods for subsequent use during peak periods.

Figure 1 shows the present values of the costs for each of the alternative replacement pipeline options. In preparing Figure 1, it has been recognised that compression, when installed, will not be required to operate continuously at full load.

Figure 1: Present Value of Costs



Option 7 is lowest cost. Compared to the next lowest cost option (number 5) option 7 has a higher pipeline cost (associated with the larger diameter) but has lower compression capital and operating costs.

Taking account of transient requirements, the optimal configuration of pipeline to replace the existing RBP is considered to be a pipeline with characteristics as summarised in Table 3.

Table 3: Description of Optimised Replacement (to meet Present Transient Requirements)

Pipeline Specification, API 5L X70			
Pipeline Section	Nominal Diameter	Operating Pressure	Typ. Wall Thickness
Wallumbilla to Arubial	450 mm	10.2 MPa	7.0 mm
Peat to Arubial	250 mm		4.4 mm
Arubial to Redbank	500 mm		7.6 mm
Redbank to Swanbank (lateral)	250 mm		4.4 mm
Redbank to Gibson Island	400 mm	5.0 MPa	10.0 mm
Installed Compression			
Location	Power Required	Assumed Power Installed	
Wallumbilla	3,220 kW	2 x 3,500 kW Centaur 40	
Peat	390 kW	2 sites, each with 500 kW reciprocating compression	

The recommended pipeline configuration has a useable linepack in excess of 1.5 Mm^3, which satisfies the requirement for off-peak storage of gas.

5 Optimised Replacement Cost

The estimated capital cost of the optimised replacement pipeline (ie, the optimised replacement cost) is $422,747,433, calculated as set out in Attachment 1. The estimate is based upon industry indicative costs, scaled as necessary, and takes into account factors as previously detailed[f].

The estimated optimised replacement cost is considered to have an accuracy of +/- 30%.

[f] See report titled 'Optimised Replacement Cost of Roma Brisbane Pipeline'.

Attachment 1

Optimised Replacement Cost

Item	Comment	Cost
Coated Linepipe, delivered		
Subtotal Linepipe		*$109,052,408*
Construction		
Subtotal Construction		*$164,717,950*
Main Line Valves		
Subtotal MLV's		*$2,526,000*
Receipt, Delivery and Related Facilities		
Subtotal Facilities		*$7,680,000*
Scraper Stations (Inlet or Outlet)		
Subtotal Scrapers		*$4,457,811*
SCADA and Communications		
Provision		*$4,000,000*
Compressor Stations		
Wallumbilla	2 x Solar Centaur 40	$22,796,437
Peat	2 x Reciprocating Stations	$7,430,000
Subtotal Compressors		*$30,226,437*
Project Costs (including linepack)		
Subtotal		*$18,740,000*
Cumulative costs		*$341,400,605*
Project Costs		
Engineering and Project Management		$25,591,545
Owner's Costs (commercial, legal, etc)		$6,824,412
Provision for unspecified items		$24,834,644
Subtotal		*$57,250,601*
Interest During Construction		
Calculated at 10% nominal pre-tax		*$24,096,227*
Optimised Replacement Cost		**$422,747,433**