Optimised Replacement Cost and Replacement Schedule of Roma Brisbane Pipeline (to meet future demand)

PUBLIC VERSION
(confidential text removed)

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Sleeman Consulting

Contents

1 Executive Summary

This document provides an independent assessment of pipeline capital cost information that is required to determine by net present value means the Depreciated Optimised Replacement Cost ('DORC') of the Roma Brisbane Pipeline ('RBP'). The following key information is presented:

- There are numerous configurations for a new gas pipeline that could meet forecast requirements for transportation of gas through the existing RBP. However, on the basis that it affords the lowest present value of costs the optimal replacement configuration for the RBP is considered to be a nominal 500 mm diameter pipeline with a maximum operating pressure of 12.5 MPa and with other features as tabulated below.

Description of Optimised Replacement Pipeline

<table>
<tr><th colspan="5">Pipeline Specification (API 5L X70)</th></tr>
<tr><th colspan="2">Pipeline Section</th><th>Nominal Diameter</th><th>Operating Pressure</th><th>Typ. Wall Thickness</th></tr>
<tr><td colspan="2">Wallumbilla to Arubial</td><td>450 mm</td><td rowspan="4">12.5 MPa</td><td>8.4 mm</td></tr>
<tr><td colspan="2">Peat to Arubial</td><td>250 mm</td><td>5.2 mm</td></tr>
<tr><td colspan="2">Arubial to Redbank</td><td>500 mm</td><td>9.3 mm</td></tr>
<tr><td colspan="2">Redbank to Swanbank (lateral)</td><td>250 mm</td><td>5.2 mm</td></tr>
<tr><td colspan="2">Redbank to Gibson Island</td><td>400 mm</td><td>5.0 MPa</td><td>10.0 mm</td></tr>
<tr><th>Location</th><th colspan="4">Installed Compression</th></tr>
<tr><td>Wallumbilla</td><td colspan="4">2 x Solar Taurus 70 size compressors</td></tr>
<tr><td>Peat</td><td colspan="4">Total 1,500 kW of reciprocating compression</td></tr>
<tr><td>Intermediate</td><td colspan="4">2 x Solar Taurus 70 size compressors</td></tr>
</table>

- The estimated capital cost of the optimal replacement pipeline is $501,619,163. The accuracy of the estimated cost is plus or minus 30%.

- The capacity of the existing RBP can be expanded from its present level to meet forecast future growth in gas transportation requirements. The preferred means of expansion is progressive installation of, and therefore commencement of a transition to, the optimised replacement configuration. With subsequent replacement of components of the RBP system (as they reach the end of their respective lives) the transition to the optimised configuration may be completed. Three variants, in terms of timing of the transition to the optimised configuration, are investigated. The preferred (lowest cost) approach is to make full use of the existing facilities in order to delay the transition to the optimised configuration.

- For both the optimised pipeline configuration and the existing/expanded RBP programmes and costs for replacement of system components as they reach the end of their useful lives are presented.

2 Introduction

2.1 Background

The Roma Brisbane Pipeline (‘RBP’) is a Covered Pipeline for the purposes of the National Third Party Access Code for Natural Gas Pipeline Systems (‘the Code’). An approved Access Arrangement, setting out terms for access to the RBP over the period to 29 July 2006, is in place.

To develop an Access Arrangement to apply to the RBP after 29 July 2006 a range of matters need to be addressed and approved in accordance with processes and requirements set out in the Code. In particular, as one of the inputs for determination of the Initial Capital Base, the Depreciated Optimised Replacement Cost (‘DORC’) of the RBP must be determined.

2.2 Purpose

This purpose of this document is to provide data, as listed below, that is necessary to allow the DORC of the RBP to be determined using a net present value methodology.

a) Optimal Replacement Pipeline

The optimal configuration of a gas pipeline to meet forecast gas transportation requirements must be identified and costed. Section 3 of this document addresses these matters.

b) Ongoing Use of Existing Pipeline

The optimal approach to expanding the existing RBP to meet forecast gas transportation requirements must be identified and costed. Section 4 of this document addresses these matters.

The net present value methodology for calculating DORC involves long term (238 year) comparison of the present values of costs associated with each of the alternatives set out above. Accordingly, it is also necessary to quantify the timing and estimated cost of replacing components of the respective pipeline systems as they reach the end of their working lives. Replacement schedules for each option are presented in Sections 3 and 4 respectively.

2.3 Approach

Information provided herein has been developed on the basis of the inputs listed below.

- Pipeline construction costs have been estimated using Sleeman Consulting’s cost database with adjustments, where necessary, to take account of varying pipeline sizes or configurations.

- Pipelines have been sized to meet peak transportation requirements which, in turn, have been derived from information provided by APT Petroleum Pipelines Limited ('APTPPL'). The forecast peak transportation quantities are depicted in Figure 1.

Figure 1: Forecast RBP Transportation Quantities

[Figure deleted – confidential]

- Operating and maintenance costs used in identifying optimal pipeline configurations have been estimated on an industry indicative basis as a function of asset types and costs.

Steady-state pipeline modelling techniques have been employed to investigate strategies for expansion of the existing RBP or for development of new-build pipelines to meet forecast gas transportation requirements. For modelling purposes, the RBP has been represented as shown in Figure 2 and the following simplifying assumptions, all of which are conservative[a], have been made.

- Markets upstream of Redbank that are modest in size have been aggregated with downstream (metropolitan) loads and have been assumed to be collocated at the end of the pipeline. This approach is conservative since its leads to modelled pipeline operating requirements being more onerous than actual operating requirements.

- The requisite length of hypothetical pipelines to replace the RBP is estimated to be 454 km, which is around 4% longer than the present

[a] Conservative is used in the context that any bias introduced as a result of the assumptions will be toward larger pipelines.

length of the RBP. The increased length reflects a requirement for metropolitan re-routing to avoid areas of urban development and provides also for a probable need for re-routing through areas such as Ipswich and Toowoomba.

The preferred route of the optimised replacement pipeline in the Brisbane metropolitan area, as depicted in Attachment 2, has been identified on a desk-top basis with complementary field inspections carried out to confirm the viability of the preferred route. It lies within a corridor that roughly parallels the Logan and Gateway motorways, and represents the least obstructed of readily identifiable options.

- It has been assumed that gas will be received from Scotia and Woodroyd at a rate of [confidential] TJ/d, which is consistent with APTPPL forecasts for 2006. The balance of the gas delivered through the RBP will be received into the pipeline at Wallumbilla.

Other technical assumptions adopted for modelling purposes are set out in Table 1.

Table 1: Modelling Assumptions

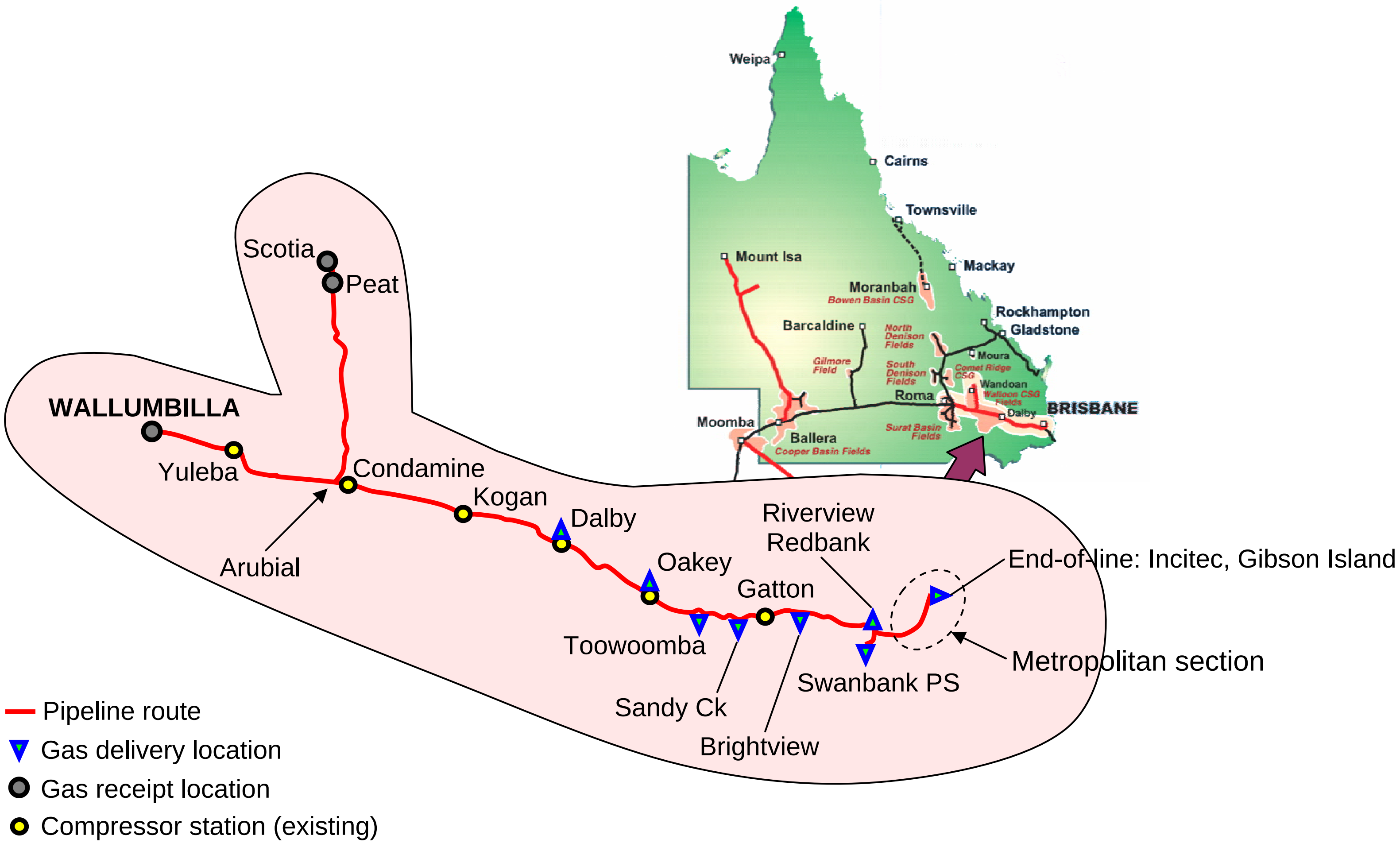
Item	Assumption
Elevations (ASL)	Wallumbilla: 300 m Toowoomba: 600 m Redbank / Swanbank: 27 m Brisbane: 5 m
Gas specification	HHV: 37.4 MJ/m^3 Specific Gravity: 0.562
Pipeline roughness	7 microns
Minimum Pressures: Upstream of Redbank Swanbank PS End- of-line	 3.0 MPa 4.5 MPa 1.5 MPa

The gas specification presented in Table 1 is based upon coal seam gas and is therefore conservative[b]. The heating value and specific gravity of gas from conventional sources or gas that may be delivered from the PNG project are both higher than the tabulated values. To the extent that gas from such sources is transported, pipeline performance will exceed modelled performance.

[b] Not all of the gas to be transported will be coal seam gas. Gas from conventional sources, or from the PNG Project, will also be transported (leading to improved pipeline performance).

Figure 2: Schematic of RBP

(Derived from schematic provided by APTPPL)



Section 3

Optimal Replacement Pipeline

The purpose of this section is to identify the configuration and cost of a gas pipeline that would allow forecast gas transportation requirements to be satisfied in an optimal manner. Ongoing requirements for replacement of components of the optimised pipeline are also identified.

3.1 Configuration Options

There are many configuration options available for a pipeline that could satisfy the forecast gas transportation requirements set out in section 2.

For a given rate of gas flow, reductions in pipeline diameter will lead to an exponential increase[c] in the need for compression. Thus, for small diameter pipelines, the cost of building and operating compression may become prohibitive in view of the number of compressors required.

Conversely, if the diameter of a gas pipeline is increased the requirement for compression will decline until, eventually, no pipeline compression is required. Further increases in diameter lead to increased pipeline costs with no offsetting reduction in compression costs.

Preliminary investigations indicated that the optimal size of pipeline to meet the market requirements set out in section 2 of this document could be expected to be in the range 400 mm to 500 mm with an operating pressure up to 15.3 MPa. On this basis, pipeline configurations of practical interest are set out in Table 2.

[c] This is because the velocity at which gas must flow increases as the pipeline diameter is decreased, leading to an exponential increase in the rate of pressure drop and hence a greater need for compression.

Table 2: Pipeline Options for Replacement of the RBP

Option	Pipeline Diameter*	Operating Pressure	Compression Programme	Other see section 3.1(b)
1a	400 mm	12.5 MPa	Initial, 2006: inlet plus two intermediate 2007: add 3rd intermediate and Loop Wallumbilla to Arubial with 250 mm 2011: add 4th intermediate	Wallumbilla to Arubial: 350 mm Peat to Arubial: 200 mm
1b	400 mm	12.5 MPa	Initial, 2006: inlet plus one intermediate 2007: add 2nd and 3rd intermediate 2011: add 4th intermediate	Wallumbilla to Arubial: 400 mm Peat to Arubial: 200 mm
1c	400 mm	15.3 MPa	Initial: inlet only 2007: add 1st intermediate 2011: add 2nd intermediate	Wallumbilla to Arubial: 350 mm Peat to Arubial: 200 mm
2a	450 mm	12.5 MPa	Initial, 2006: inlet only 2007: add 1st intermediate 2011: upgrade intermediate	Wallumbilla to Arubial: 400 mm Peat to Arubial: 200 mm
2b	450 mm	15.3 MPa	Initial, 2006: inlet only 2011: add 1st intermediate	Wallumbilla to Arubial: 450 mm Peat to Arubial: 200 mm
3a	500 mm	12.5 MPa	Initial, 2006: inlet only 2011: add 1st intermediate	Wallumbilla to Arubial: 450 mm Peat to Arubial: 250 mm
3b	500 mm	10.2 MPa	Initial: inlet only 2007: add 1st intermediate 2011: add 2nd intermediate	Wallumbilla to Arubial: 450 mm Peat to Arubial: 250 mm
3c	500 mm	15.3 MPa	Initial, 2006: inlet only	Wallumbilla to Arubial: 450 mm Peat to Arubial: 250 mm

*note: refers to pipeline section from Arubial (where inlet sections from Wallumbilla and Arubial meet) to Redbank (where the metropolitan pipeline section commences).

The pipeline configuration options set out in Table 2 have been developed with regard for the following considerations.

a) Metropolitan Pipeline Section

As depicted in Figure 2, the metropolitan section of the RBP is considered to be the section of pipeline downstream of Redbank (where the lateral to the Swanbank power station commences).

The requisite diameter of the metropolitan section is dependent upon the pressure at which gas is available at Redbank and also upon safety-related considerations arising from operation of a gas pipeline in proximity to built-up areas. To meet estimated peak gas delivery requirements a pipeline nominal diameter of 400 mm (16”) is necessary for an operating pressure of 5.0 MPa. This pressure is acceptable for the pipeline in question.

If the operating pressure for the metropolitan section is constrained to a level below about 4.5 MPa, a 450 mm (18”) pipeline would instead be required. This would lead to a cost increase with little[d], if any, ongoing technical or safety[e] related benefits.

Provision has been included for an increased pipeline wall-thickness for the metropolitan section. This is to achieve an acceptable level of puncture resistance and to ensure the hoop stress in the pipe-wall does not exceed 30% of the maximum yield stress of the pipeline steel when the pipeline is operating at its maximum pressure.

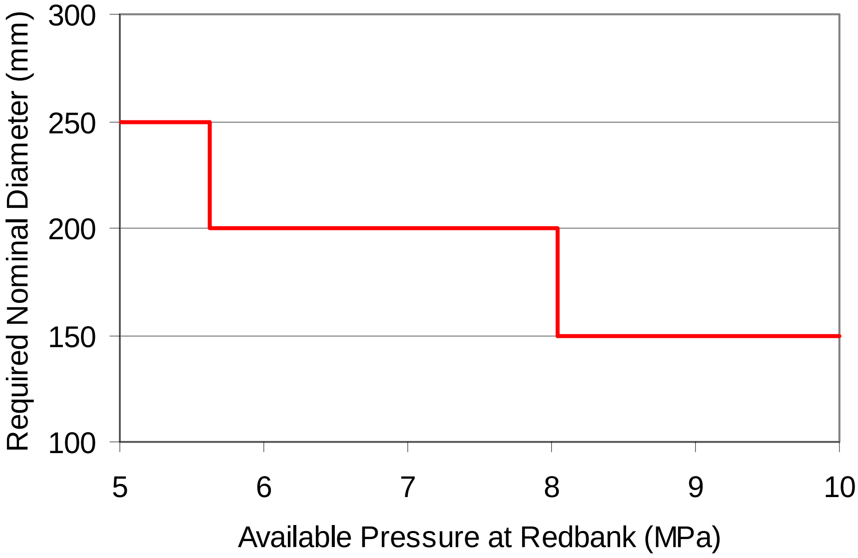
b) Swanbank Lateral

The requisite diameter of the pipeline lateral from Redbank to Swanbank is dependent upon the gas pressure available at Redbank which, in turn, is dependent upon the configuration selected for upstream infrastructure. Sizing options that are capable of meeting contractual peak-delivery commitments are indicatively as depicted in Figure 4.

In sizing the Swanbank lateral it has been conservatively assumed that the lateral will be unchanged from its present length of 8.7 km. In practice, in developing a new pipeline to replace the RBP the opportunity might exist, through minor re-routing of the pipeline in the Ipswich locality, to considerably reduce the length of the Swanbank lateral.

[d] There could be some reduction in the cost of operating gas heaters during periods of high pipeline pressure and/or low ambient temperature.
[e] Safety related matters are addressed through use of the proposed increased wall thickness of the metropolitan section.

Figure 4: Sizing of Swanbank Lateral



3.2 Optimal Replacement Configuration

To determine which of the pipeline configuration options presented in Table 2 represents the optimal replacement for the RBP detailed analyses, as outlined below, were undertaken.

The indicative capital costs of alternative configurations were estimated on a basis as outlined in Attachment 1. The present value of the indicative capital and ongoing operating and maintenance costs (including compressor fuel[f]) were then compared in order to determine which option would allow forecast gas transportation requirements to be satisfied at lowest cost. Present values were calculated on the following basis:

- 25 operating years[g] (with construction taking place in year 0):
- A real discount rate of 2.6%, which is indicative of the prevailing real risk free interest rate[h]; and
- The pipeline having no residual value at the end of the analysis period. This is because, at the end of the life of a gas pipeline, the costs of pipeline abandonment, removal of above ground facilities and restoration of land would approximately offset the scrap value of material and land that might be saleable.

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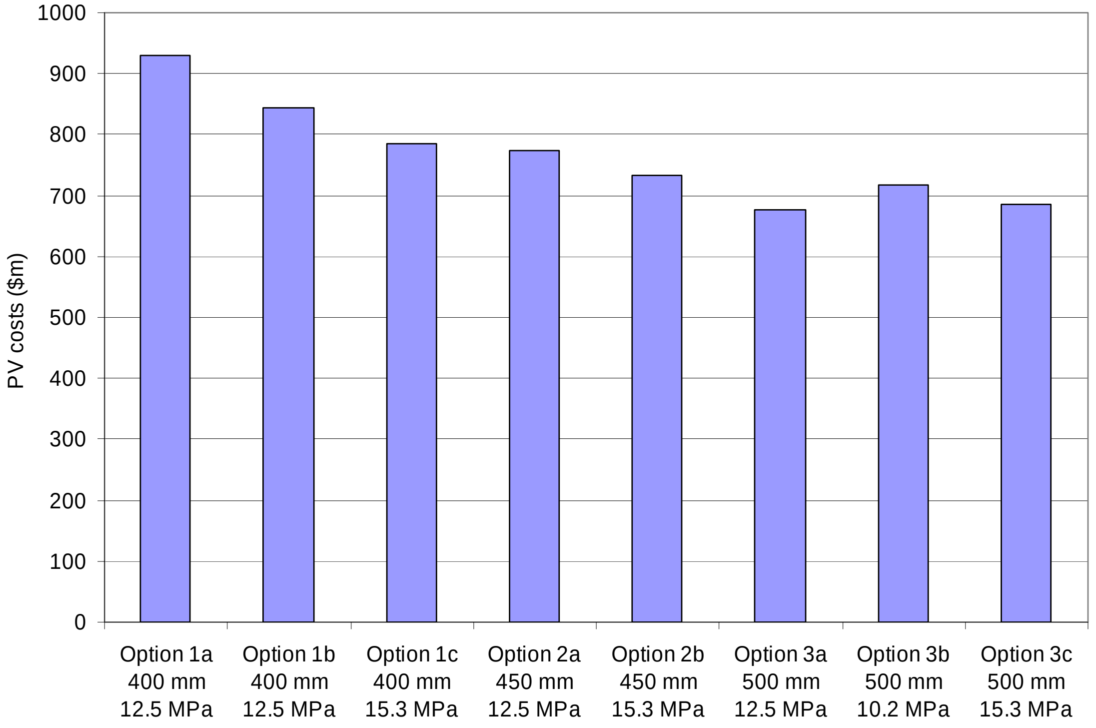
[f] Compressor fuel has been valued at $3.00/GJ.
[g] 25 years has been adopted on the basis it is indicative of the analysis period that might be used in pipeline investment decision making. Sensitivity analyses have been undertaken to confirm that the relativity of analysis results is unchanged for a longer analysis period (50 years).
[h] The value for the 10 year real risk free rate was advised by the ACCC.

Figure 5 shows the relativity between the present value of the costs of the alternative pipeline options. Moving from left to right in the Figure, as pipeline diameter is increased the reduced need for compression leads to initial reductions in capital cost. Subsequently, for pipelines with little or no compression, the cost of larger diameter pipeline and fittings leads to increases in capital cost. For the 500 mm diameter option an operating pressure of 12.5 MPa is optimal.

It is noteworthy that the relativities between the costs of alternative options as depicted in Figure 5 are unaltered even for significant variations in the discount rate or analysis period[i].

Figure 5: Capital Costs of Alternative Replacement Pipelines



Conclusion:

When forecast market growth is taken into account, the optimal replacement for the RBP is considered option 3a, that is, a pipeline with a nominal diameter of 500 mm operating at a maximum pressure of 12.5 MPa and with key features as presented in Table 3.

[i] This has been confirmed through sensitivity analyses carried out using discount rates from 0% to in excess of 8% and for an analysis periods ranging from 20 to 50 years.

Table 3: Description of Optimised Replacement

<table>
<tr><th colspan="4">Pipeline Specification (API 5L X70)</th></tr>
<tr><th>Pipeline Section</th><th>Nominal Diameter</th><th>Operating Pressure</th><th>Typ. Wall Thickness</th></tr>
<tr><td>Wallumbilla to Arubial</td><td>450 mm</td><td rowspan="4">12.5 MPa</td><td>8.4 mm</td></tr>
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<tr><td>Intermediate[j]</td><td colspan="3">2 x Solar Taurus 70 size compressors</td></tr>
</table>

The estimated capital cost of the optimised replacement pipeline is $501,619,163 (plus or minus 30%). The break-up of this cost is presented in Attachment 4.

3.3 Ongoing Replacement Programme

As components of the optimised pipeline reach the end of their useful life and become due for replacement it is assumed they will be replaced like for like. The replacement programme, together with estimated capital costs, is set out in Table 4.

Table 4: Replacement Schedule for Optimised Pipeline Configuration

Year(s)	Action	Cost
2005	Install Optimised Replacement Pipeline (ie, option 3a in Table 2)	$501,619,163
2040	Replace Compression	$91,525,409
2075	Replace Compression	$91,525,409
2085	Replace Pipeline	$394,808,426
2110	Replace Compression	$91,525,409
2145	Replace Compression	$91,525,409
2165	Replace Pipeline	$394,808,426
2180	Replace Compression	$91,525,409
2215	Replace Compression	$91,525,409

There will be some modest savings realisable when replacement of the optimised pipeline takes place since some route and easement acquisition costs incurred as part of the initial installation will not need to be re-incurred. This has been taken into account in preparing Table 4.

[j] Installation of the intermediate compression could be delayed until approximately 2011. In estimating the cost of the optimised replacement it has been conservatively assumed that all compression is installed immediately.

Section 4

Expansion and Replacement of RBP to Meet Market Requirements

The purpose of this section is to review options for expansion and ongoing replacement of the existing RBP.

4.1 Expansion and Replacement Requirements

The RBP is presently operating close to its full licence capacity of 180 TJ/d and expansion of the pipeline will be necessary to meet forecast growth in gas transportation requirements to 2017, as outlined in section 2. Expansion of the RBP to meet growing requirements for transportation of gas can be achieved through installation of compression, through addition of looping or through a combination of both.

Subsequently, as the various components of the pipeline reach the end of their working lives they will need to be replaced. At the time of replacement the opportunity will exist to adopt newer technologies or practices.

Following investigation of a range of near-term expansion and ongoing replacement options[k] it has been identified that programmes involving a progressive transition to the optimised replacement configuration (as identified in section 3 of this report) are most attractive. Three variants of this approach, as identified in Table 5, have been investigated in detail.

Table 5: Expansion-Replacement Variants Investigated

	Variant 1	Variant 2	Variant 3
Comment	For all variants, mechanisms adopted for notional expansion of the existing RBP or for replacement of components that reach the end of their useful life are themselves elements of the optimised replacement configuration.		
	After initial expansion and subsequent replacement of existing facilities the optimised configuration is realised. The difference between the variants investigated relates to the rate at which the optimised configuration is adopted.		
Replacement Strategy	Move to optimised configuration when first significant replacement expenditure (compressor replacements) is to be incurred	Move to optimised configuration when replacement of original 250 mm diameter mainline is due	Progressively replace components of RBP, delaying adoption of optimised configuration until replacement of loopline is due
Year optimised configuration realised	2017	2029	2075

[k] Options investigated included immediate abandonment of the existing RBP (to be replaced by the optimal configuration) and retention of the existing but expanded configuration ad infinitum. Both of these options were high in cost relative to the ones presented in Table 5.

4.2 Near-term Expansion

The recommended approach to expansion of the capacity of the RBP to meet forecast growth to 2017 is the same for the three variants investigated, and is summarised in Table 6.

Table 6: Near-term Expansion of Capacity of RBP

Year	Initial Expansion Programme	Estimated Cost
2006	Install 37 km of 500 mm diameter loopline downstream of Arubial	$27,551,458
2007	Install: additional 108 km of 500 mm loopline; 8 km of 400 mm loopline downstream of Redbank; and 2 x Taurus 70 compressors	$130,066,896
2010	Install further 65 km of 500 mm diameter loopline	$48,401,210

4.3 Ongoing Replacement Programme

As components of the existing RBP system reach the end of their useful life and are due for replacement, the configuration of the system can be optimised. The replacement programmes and costs for the three variants investigated in detail are outlined in Table 7.

The present value of the costs[l] of each of the options set out in Table 6 has been determined in order that the most attractive option may be identified. The present values for each option are presented in Table 8. In preparing Table 8:

- capital costs have been estimated in a manner consistent with that described in Attachment 1;
- operating and maintenance costs have been estimated as a percentage of initial capital cost on an industry indicative basis;
- compressor fuel has been valued at $3.00/GJ with compressor fuel quantities being as depicted in Figure 6; and
- two different discount periods have been used, one (238 years[m]) reflecting that appropriate for net present value DORC analyses and one (25 years) being indicative of what might be used for investment decision making.

[l] That is, capital, operating, maintenance and compressor fuel costs.
[m] As advised by the ACCC.

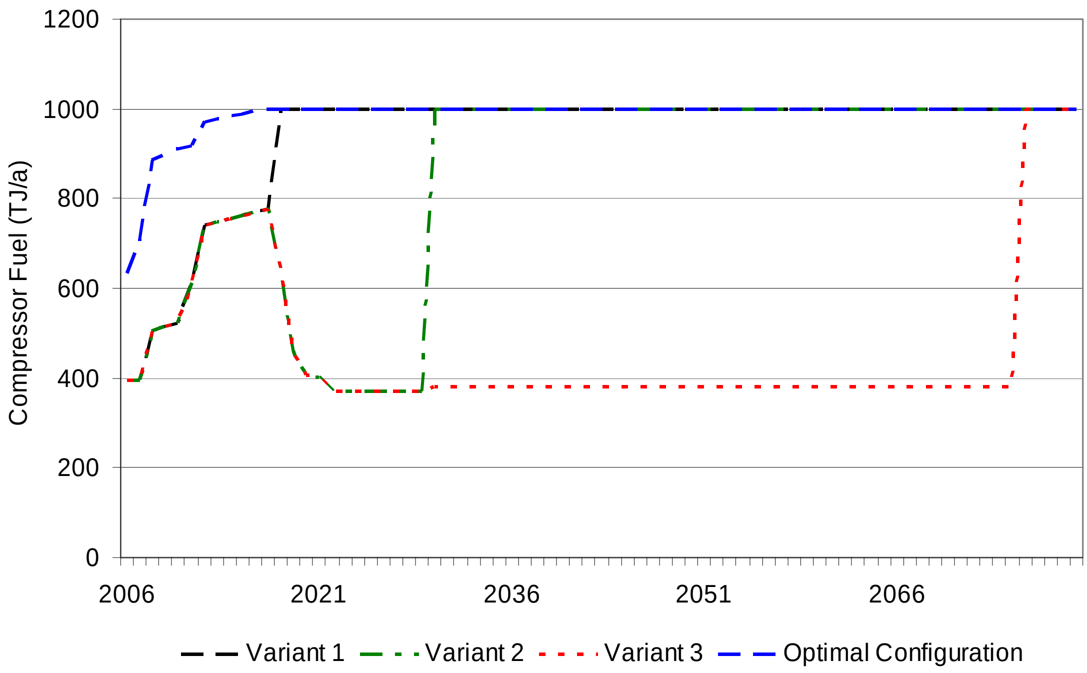
Table 7: RBP Replacement Programme Variants and Costs (Including Near-term Expansion)

	Variant 1: Move Quickly to Optimised Configuration		Variant 2: Move to Optimised Configuration when the Original 250 mm Mainline is Due for Replacement		Variant 3: Delay Adoption of Optimised Configuration Until Loopline Replacement is Due		Optimal Replacement Configuration	
Year	**Action**	**Capital**	**Action**	**Capital**	**Action**	**Capital**	**Action**	**Capital**
2006	37 km of 500 mm loop	$27,551,458	37 km of 500 mm loop	$27,551,458	37 km of 500 mm loop	$27,551,458	Instal Optimised Replacement	$501,619,163
2007	Add 500 mm (to total 145 km) and 400 mm (8 km) loop lines, and 2x Taurus 70	$130,066,896	Add 500 mm (to total 145 km) and 400 mm (8 km) loop lines, and 2x Taurus 70	$130,066,896	Add 500 mm (to total 145 km) and 400 mm (8 km) loop lines, and 2x Taurus 70	$130,066,896		
2010	Add 65 km 500 mm loop line (to total 210 km)	$48,401,210	Add 65 km 500 mm loop line (to total 210 km)	$48,401,210	Add 65 km 500 mm loop line (to total 210 km)	$48,401,210		
2017	Complete Installation of Optimised Configuration	$289,872,224	Complete 500 mm looping programme to Redbank (and scrap 2 x Saturns)	$62,549,256	Complete 500 mm Looping to Redbank (scrap 2 x Saturns)	$62,549,256		
2018			Commence Looping (17km) of Wallumbilla to Arubial with 450 mm	$13,286,978	Commence Looping (17km) of Wallumbilla to Arubial with 450 mm	$13,286,978		
2019			Add 13 km of 450 mm loop	$10,160,630	Add 13 km of 450 mm loop (scrap 1 Saturn)	$10,160,630		
2020			Add 3 km of 450 mm loop	$2,344,761	Add 3 km of 450 mm loop (scrap 1 Saturn)	$2,344,761		
2021			Add 5 km of 450 mm loop	$3,907,935	Add 5 km of 450 mm loop (scrap 1 Saturn)	$3,907,935		
2029			Complete Installation of Optimised Configuration	$197,622,665	Complete Installation of Metropolitan 400 mm Pipeline with Laterals; Add a Further 28 km of 450 mm Loop Between Wallumbilla and Arubial; Original 250mm Pipeline will be Taken out of Service.	$87,299,837		
2040							Replace all Compression	$91,525,409
2041	Replace 2 x taurus 70	$40,515,544	Replace 2 x taurus 70	$40,515,544	Replace 2 x Taurus 70	$40,515,544		
2052	Replace 2 x Taurus 70 plus Peat inlet	$51,009,865						
2064			Replace 2 x Taurus 70 plus Peat inlet	$51,009,865				
2075					Complete all Outstanding Components of Optimised Replacement (eg Peat Lateral, Inlet Compression, Balance of 450mm Line Between Wallumbilla and Arubial)	$110,322,829	Replace all Compression	$91,525,409
2076	Replace 2 x taurus 70	$40,515,544	Replace 2 x taurus 70	$40,515,544	Replace 2 x Taurus 70	$40,515,544		
2085							Replace Pipeline	$394,808,026
2087	Replace 2 x Taurus 70 plus Peat inlet	$51,009,865	Part Pipeline Replacement	$117,102,810	Part Pipeline Replacement	$117,102,810		
2090			Part Pipeline Replacement	$48,401,210	Part Pipeline Replacement	$48,401,210		
2097	Replace Pipeline (following some uncosted life extension activity to allow all replacement simultaneously)	$394,808,026	Part Pipeline Replacement	$62,549,256	Part Pipeline Replacement	$62,549,256		
2098			Part Pipeline Replacement	$13,286,978	Part Pipeline Replacement	$13,286,978		
2099			Part Pipeline Replacement and Replace Taurus x 2 plus Peat inlet comp	$61,170,495	Part Pipeline Replacement	$10,160,630		
2100			Part Pipeline Replacement	$2,344,761	Part Pipeline Replacement	$2,344,761		
2101			Part Pipeline Replacement	$3,907,935	Part Pipeline Replacement	$3,907,935		
2109			Replace Balance of Pipeline	$137,054,447	Part Pipeline Replacement	$87,299,837		
2110					Replace 2 x Taurus 70 plus Peat Inlet	$51,009,865	Replace all Compression	$91,525,409
2111	Replace 2 x taurus 70	$40,515,544	Replace 2 x taurus 70	$40,515,544	Replace 2 x Taurus 70	$40,515,544		
2122	Replace 2 x Taurus 70 plus Peat inlet	$51,009,865						
2134			Replace 2 x Taurus 70 plus Peat inlet	$51,009,865				
2145					Replace 2 x Taurus 70 plus Peat Inlet	$51,009,865	Replace all Compression	$91,525,409
2146	Replace 2 x taurus 70	$40,515,544	Replace 2 x taurus 70	$40,515,544	Replace 2 x Taurus 70	$40,515,544		
2155					Replace Balance of Pipeline	49,754,611		
2157	Replace 2 x Taurus 70 plus Peat inlet	$51,009,865						
2165							Replace Pipeline	$394,808,026
2167			Part Pipeline Replacement	$117,102,810	Part Pipeline Replacement	117,102,810		
2169			Replace 2 x Taurus 70 plus Peat inlet	$51,009,865				
2170			Part Pipeline Replacement	$48,401,210	Part Pipeline Replacement	48401210		
2177	Replace Pipeline	$394,808,026	Part Pipeline Replacement	$62,549,256	Part Pipeline Replacement	$62,549,256		
2178			Part Pipeline Replacement	$13,286,978	Part Pipeline Replacement	$13,286,978		
2179			Part Pipeline Replacement and Replace 2 x Taurus 70	$61,170,495	Part Pipeline Replacement	$10,160,630		
2180			Part Pipeline Replacement	$2,344,761	Replace 2 x Taurus 70, Peat Inlet and Part of Pipeline	$53,354,626	Replace all Compression	$91,525,409
2181	Replace 2 x taurus 70	$40,515,544	Replace 2 x taurus 70 and Part of Pipeline	$44,423,479	Replace 2 x Taurus 70 and Part of Pipeline	$44,423,479		
2189			Replace Balance of Pipeline	$137,054,447	Part Pipeline Replacement	$87,299,837		
2192	Replace 2 x Taurus 70 plus Peat inlet	$51,009,865						
2204			Replace 2 x Taurus 70 plus Peat inlet	$51,009,865				
2215					Replace 2 x Taurus 70 plus Peat Inlet	$51,009,865	Replace all Compression	$91,525,409
2216	Replace 2 x taurus 70	$40,515,544	Replace 2 x taurus 70	$40,515,544	Replace 2 x Taurus 70	$40,515,544		
2227	Replace 2 x Taurus 70 plus Peat inlet	$51,009,865						
2235					Replace Balance of Pipeline	$49,754,611		
2239			Replace 2 x Taurus 70 plus Peat inlet	$51,009,865				

Table 8: Present Value Cost of Ongoing Replacement Options[14]

	Present Value (at discount rate 2.6%[15])	
	over 238 years	over 25 years
Variant 1	$1,136,956,197	$717,860,747
Variant 2	$1,099,010,830	$685,480,458
Variant 3	$1,018,269,051	$625,056,071

Figure 6: Compressor Fuel Quantities



Conlusion:

Table 8 shows that use of the existing RBP system to defer capital expenditure on new facilities is beneficial. Consistent with this observation, Variant 3 represents the preferred strategy for initial expansion and subsequent, ongoing replacement of components of the existing RBP pipeline system.

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[14] The relativity between the costs presented in Table 8 is unchanged even with significant variations in the discount rate.

[15] Discount rate advised by the ACCC. The discount rate is indicative of the prevailing ten year real risk free interest rate.

Attachment 1

Basis of Capital Cost Estimates

The estimated capital costs set out in this document are based upon current industry indicative costs, scaled as necessary, and take into account the following factors as appropriate:

- Provision has been allowed for use of heavy wall pipe along 10% of the mainline route (eg, for creek or road crossings). Provision has also been allowed for purchase of 2.5% more pipe than the overall estimated pipeline length (to provide for cut-outs and spares);

- Provision has been made for short lateral pipelines to interconnect the optimised replacement pipeline with existing gas delivery points. The lateral pipelines are required since the route of the optimised pipeline deviates from that of the existing RBP. The following allowances have been made for gas laterals:

    - Runcorn: 2.6 km of 200 mm diameter pipeline;

    - Redbank and Mt Gravatt: total 6.0 km of 150 mm diameter pipeline.

- Provision has been made for the cost of road, rail, creek and service crossings, including the use of horizontal directional drilling where necessary. Estimates of the number of crossings have been made on the basis of desk-top investigations. The costs of restoring fences and gates are included as part of construction restoration costs.

- It is estimated, on the basis of geological information presented in Attachment 3, that:

    - up to 10% of the pipeline route will pass through terrain that necessitates drilling, blasting and excavation;

    - 45% of the pipeline route will require the use of a rock trencher; and

    - the remaining 45% of the pipeline route will be suitable for bucket wheel trenching.

- Burial of the pipeline at a minimum depth of 750 mm is assumed. The cover will be increased to at least 1,200 mm at road and creek crossings, and to 2,000 mm at rail crossings. In populated areas it is anticipated a minimum depth of cover of up to 1,200 will be appropriate.

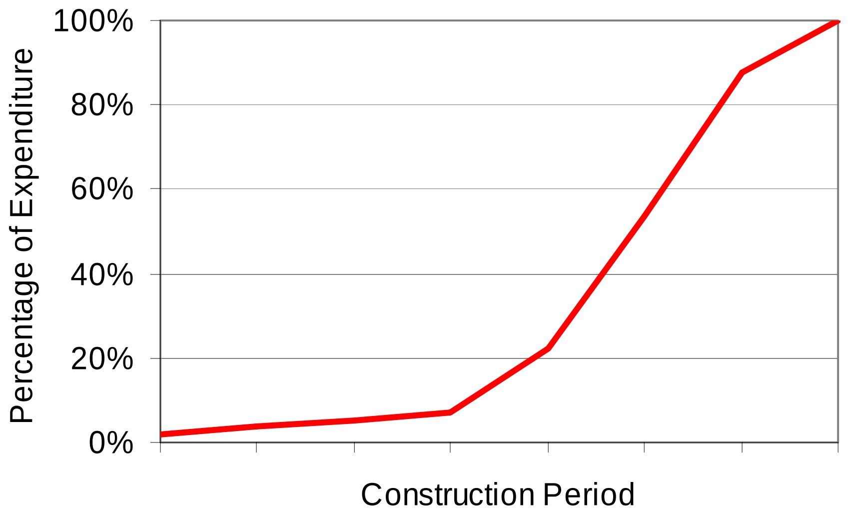
- Provision has been made for APTPPL owned gas delivery facilities at Oakey, Toowoomba, Sandy Creek, Brightview and Redbank and for remote operated valves at all other gas receipt or delivery locations. The gas delivery facilities have capacities ranging from [confidential].

A pressure control facility (referred to as Swanbank city gate) is also required at Redbank to regulate the pressure of gas delivered into the metropolitan pipeline section. The pressure regulation facility will include gas filtration and heating.

The optimised pipeline configuration does not require the installation of pressure reduction or control facilities at Arubial.

- Provision has been made for interest incurred during construction of the optimised replacement pipeline. The interest amount has been calculated on the basis of:
  - a nominal, pre-tax cost of capital of 10.0%[16]; and
  - an estimated profile for expenditure of pipeline capital costs, as depicted in Figure 4.

Figure 4: Expenditure Profile



- No provision has been made for GST since such amounts would, in any case, be refunded to a pipeline developer.

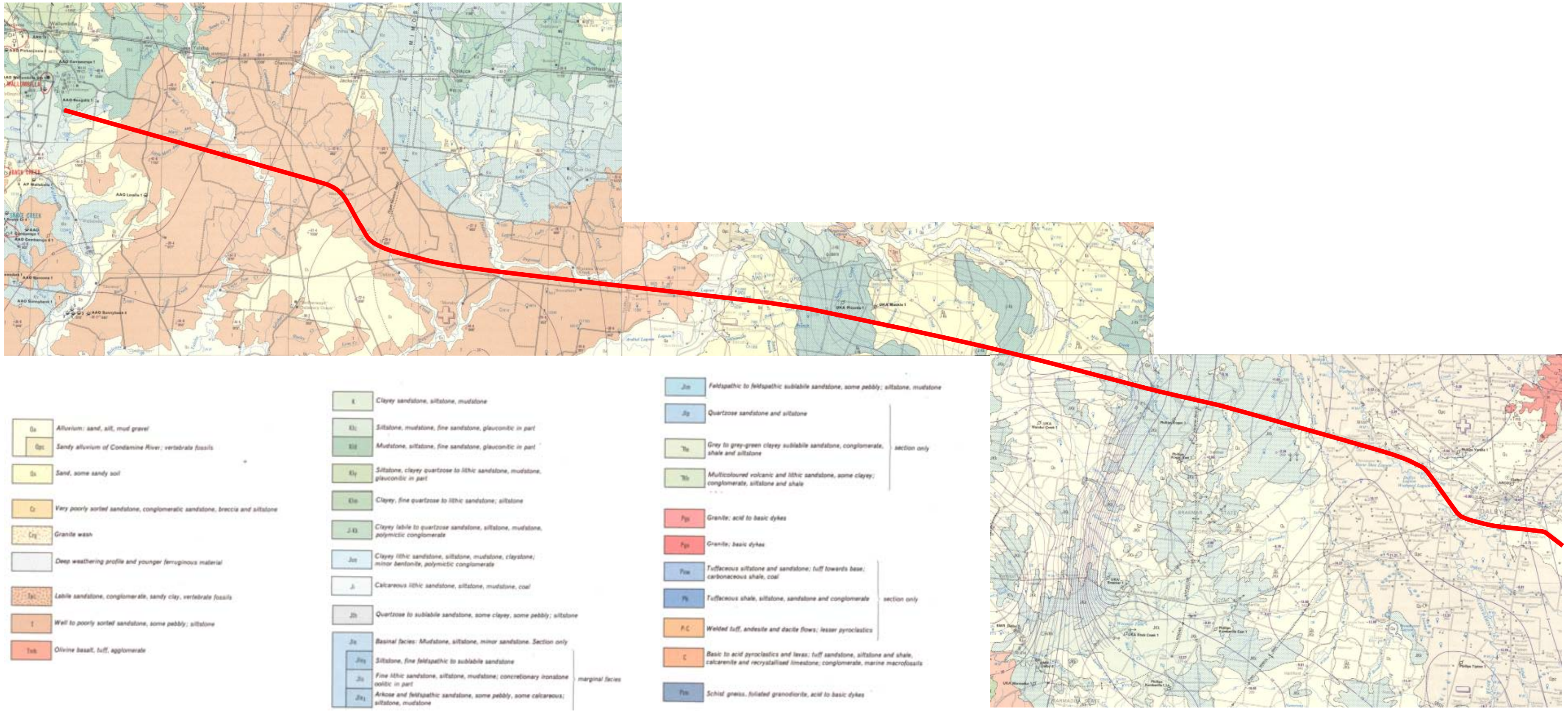
An example cost calculation (for the optimised replacement pipeline configuration) is provided in Attachment 4. A similar approach was adopted in determining the cost of other options presented in section 3 of this document. Cost estimates set out herein are considered to have an accuracy of +/- 30%.

[16] This figure is as advised by the ACCC.

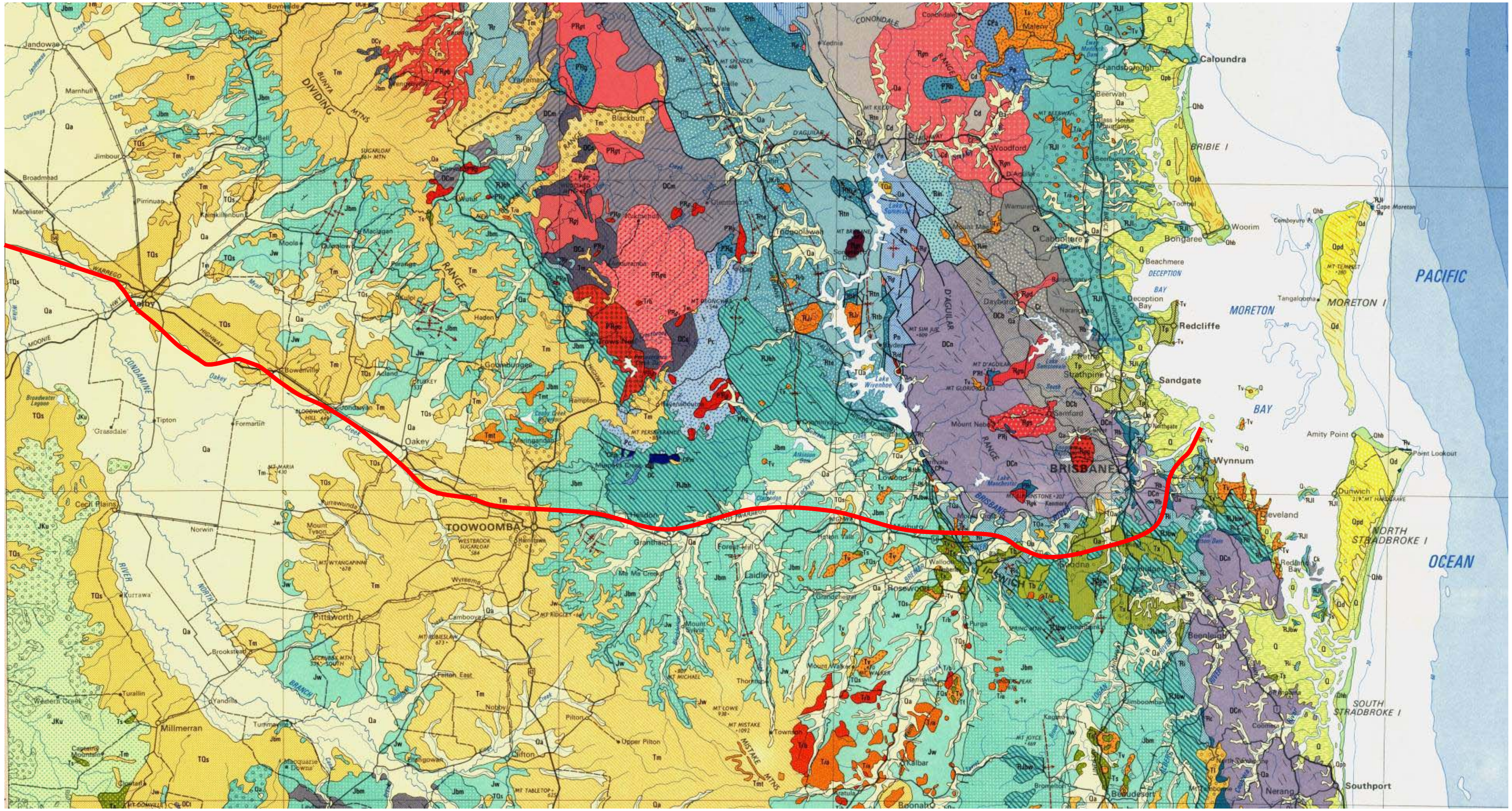
Attachment 2: Preferred Metropolitan Pipeline Route to Avoid Heavy Urban Development

Existing pipeline route (indicative) ⸺ Proposed metropolitan deviation

Attachment 3, Part 1: Indicative Pipeline Route Wallumbilla to Dalby



Attachment 3, Part 2: Indicative Pipeline Route Dalby to Brisbane



Attachment 4

Calculation of Capital Cost – Optimised Replacement Pipeline

Item	Comment			Cost
Externally coated linepipe, delivered				
Subtotal Linepipe				*$126,201,100*
Construction				
Pipeline Construction			$123,472,550	
Road, rail, creek, river and other service crossings			$19,565,400	
Signage			$900,000	
Subtotal Construction				*$143,937,950*
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 Taurus 70		$33,790,617	
Peat	2 x Reciprocating		$8,180,000	
Intermediate	2 x Solar Taurus 70		$33,790,617	
Subtotal Compressors				*$75,761,234*
Camps				
Subtotal				*$20,780,000*
Project Costs				
Approvals (inc. Environmental and Compliance)			$6,000,000	
Land Access and Management			$9,000,000	
Geotechnical			$360,000	
Surveying			$1,500,000	
Office/workshop			$1,700,000	
Linepack	APTPPL Share		$180,000	
Subtotal				*$18,740,000*
Cumulative costs			*$404,084,095*	
Project Costs				
Engineering and Project Management		7.50%	$30,292,807	
Owner's Costs (commercial, legal, etc)		2.00%	$8,078,082	
Provision for unspecified items		7.04%	$30,526,493	
Subtotal				*$68,897,382*
Interest During Construction				
Calculated at 10.0% rnominal pre-tax				*$28,637,686*
Optimised Replacement Cost				**$501,619,163**