Estimate of Capital Cost of Corio Loop

14 March 2006

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1 Background

VENCorp, as operator of the Victorian gas transmission system, has identified[1] that, from 2008, the capacity of the gas transmission system may fall short of what is required to meet peak market requirements for transportation of gas. Following an investigation of options for expansion of the capacity of the gas transmission system, VENCorp has recommended that the South West Pipeline be looped by installation of a 500mm diameter pipeline between Lara and Brooklyn (the 'Corio loop'). VENCorp has recommended the Corio loop be available for operation by 1 March 2008.

GasNet Australia, owner of the Victorian gas transmission system, has subsequently made application to the ACCC (pursuant to section 8.21 of the National Gas Code) seeking confirmation that capital expended in development of the Corio loop will satisfy requirements for inclusion in the Capital Base for the Victorian gas transmission system.

This document has been prepared to assist the Australian Competition and Consumer Commission in its assessment of GasNet's forecast of the capital cost of the Corio loop.

2 Review of Technical Specification for Corio Loop

The Corio loop is to be nominally 500 mm in diameter with an overall length of 57 km and a maximum allowable operating pressure ('MAOP') of 10.2 MPa. The loop will be designed, constructed and operated to comply with AS 2885-1997 (the Australian Standard for Gas and Liquid Pipelines) and will be used to transport pipeline quality gas that could be expected to comply with the requirements of AS 4564-2003 (the Australian Standard Specification for general purpose natural gas).

Particular features of the envisaged design of the Corio loop (as set out in Annexure B to GasNet's section 8.21 application) and their relevance are examined in the following subsections.

2.1 Pipe Material

GasNet envisages the Corio loop will be built using API 5L grade X70 steel linepipe with an outer diameter of 508 mm. The pipeline wall thicknesses tentatively selected by GasNet are somewhat (but not in all cases) conservative, as illustrated in Table 1.

The envisaged selection of grade X70 steel is appropriate. The use of lower grade steels would lead to a requirement for increased pipeline wall thicknesses and, in turn, to increased steel tonnages and costs.

[1] Refer to "Major System Augmentation Report for the Victorian Principal Transmission System", VENCorp, November 2005.

The use of higher grade steel (X80) could lead to technical challenges (eg, welding) and offset possible savings from reduced tonnages.

Table 1: Pipeline Wall Thicknesses

Pipeline classification	Wall Thickness (and design factor[2])	
	GasNet envisaged	Possible alternative
Light (ie, standard) wall	7.9 mm (72%)	7.6 mm (72%)
Heavy wall	11.1 mm (50%)	9.2 mm (60%)
Extra heavy wall	12.7 (40%)	13.5 mm (30%)

Although the most appropriate wall thicknesses will need to be determined during the detailed design process, it appears the prospect could exist for a modest reduction in steel tonnages.

2.2 Pipeline Coating and Corrosion Protection

GasNet envisages that, as a corrosion prevention measure, the Corio loop pipework will be externally coated and internally lined.

External coating is essential for corrosion prevention, with choices including high density polyethylene ('HDPE' or 'yellow-jacket), fusion bonded epoxy ('FBE') and tri-laminate. However, the envisaged use of internal lining[3] as a corrosion control mechanism is of questionable value. It is anticipated the Corio loop will be used for transport of pipeline quality natural gas, which is not corrosive to steel, and possible concerns regarding drop-out of liquids at pressure regulating stations have been addressed through the use of gas heating.

Internal lining of pipelines (without need for internal coating of joints) may also be carried out for other reasons, including enhancement of flow characteristics and operating efficiency. To determine whether internal lining of the Corio loop may be justified for these reasons would require flow analyses having regard for predicted throughputs and operating pressures.

2.3 Mid-line Valve and Scraper Stations

GasNet envisages the installation of two mid-line isolation valves. This assumption is consistent with provisions of the Australian pipeline design code (AS 2885) and is reasonable for preliminary purposes.

[2] The design factor is the pipeline hoop stress, expressed as a percentage of the minimum yield stress of the specified pipeline material, when operating at the MAOP.
[3] If internal lining is used for corrosion control purposes, pipeline joints would also need to be lined following welding.

Provision has also been made for the installation of pigging facilities, which is appropriate for ongoing, prudent pipeline operations and management.

2.4 City Gate Station and Associated Upgrades

Although the basis for interconnection of the Corio loop with existing facilities at Brooklyn has not been formalised, GasNet has indicated that a new city gate station (comprising heaters, pressure regulation and metering) will be required. To ensure reliability of gas delivery, it is appropriate that the new gate station be designed to incorporate multiple runs. In addition, the capacity of the existing Brooklyn city gate station will need to be expanded through installation of an additional regulator run.

2.5 Geological Conditions Along Pipeline Route

GasNet anticipates some 6 km of the route of the Corio loop will be subject to urban encroachment, and around 46 km of the route will traverse rocky terrain. This expectation has been confirmed through preliminary review of the geological conditions along the pipeline route, as presented in Attachment 1.

In addition, it is estimated (through desk-top review) that creek, river and service crossings may be of the order set out in Table 2.

Table 2: Preliminary Estimate of Crossing Numbers

Crossing Type	Estimated Number (order of magnitude)
Rivers[4]	2
Major Creeks[5]	5
Minor creeks	6
Major Highway	1
Railway	3
Road	10
Services (allowance)	222

2.6 Construction Basis

GasNet notes that pipeline construction will be carried out in accordance with Australian Standard AS 2885.1, which is appropriate.

[4] Little River and Werribee River
[5] Hovell, Lolypop, Skeleton, Cherry and Jones Creeks

Environmental and occupational, health and safety requirements will also apply.

GasNet has proposed a minimum depth of cover of 900 mm. This exceeds code requirements for semi-rural land across which much of the pipeline route will pass. The need for a 900 mm (rather than 750 mm) minimum cover should be scrutinised during the detailed design process.

3 Estimated Capital Cost of Corio Loop

The capital cost of the Corio loop has been estimated herein on the basis of industry indicative materials and construction cost data that is reflective of (or has been adjusted to reflect) prevailing Australian conditions. Details of the estimated capital cost are set out in Table 3 together with the cost estimate provided to the ACCC by GasNet. Although Table 3 has been prepared to facilitate comparison of cost estimates, in the absence of details regarding the derivation of GasNet's cost estimate it is possible there may be differences in the way in which individual cost items have been categorised.

Table 3: Estimated Capital Cost of Corio Loop

Cost Item	Estimated Cost	
	Independent	GasNet
Linepipe	$13.4m	$15.8m
Construction	$28.8m	$32.0m
Pipeline Facilities	$5.6m	$6.8m
Licences, Easements, Other	$1.8m	$3.4m
Engineering and Management	$3.7m	$3.7m
Owner's Costs	$1.0m	n/a
Provision for Unidentified Costs	$4.1m	n/a
Total	$58.4m	$61.7m

The following explanatory comments regarding items set out in Table 3 are noteworthy.

- The 'provision for unidentified costs' that is included in Table 3 is necessary given the preliminary nature of the cost estimate set out herein. In particular, the estimate has been made in advance of (and or without the benefit of) technical specification, quantity surveying, route inspection and the like. As a result, there are cost components (such as bolts, gaskets and painting, lighting) that have not been specifically quantified and which are, instead, included in the provision for

unidentified costs. As with the other cost items, the provision for unidentified costs is itself subject to uncertainty.

- Owner's costs, as set out in Table 3, are costs (such as commercial, contracting, internal monitoring and reporting and the like) that will be incurred by the owner/developer of a pipeline but which are not included under other cost items. It is likely these costs have been included by GasNet under the 'licences, easements and other' cost item. For the purpose of the estimate set out herein, the licences, easements and other cost item covers environmental approvals (including cultural heritage), surveying and geotechnical input and land access, without provision for unforseen complications.

The estimated total capital cost of constructing the Corio loop is $58.4m with a level of confidence of +/- 20%. In order of magnitude terms, the estimated capital cost might be increased by amounts as set out in Table 4 if design and construction is as envisaged by GasNet. Variations of this nature would appear to account for much of the difference between the independent and GasNet estimates of Linepipe and Construction costs, as set out in Table 3.

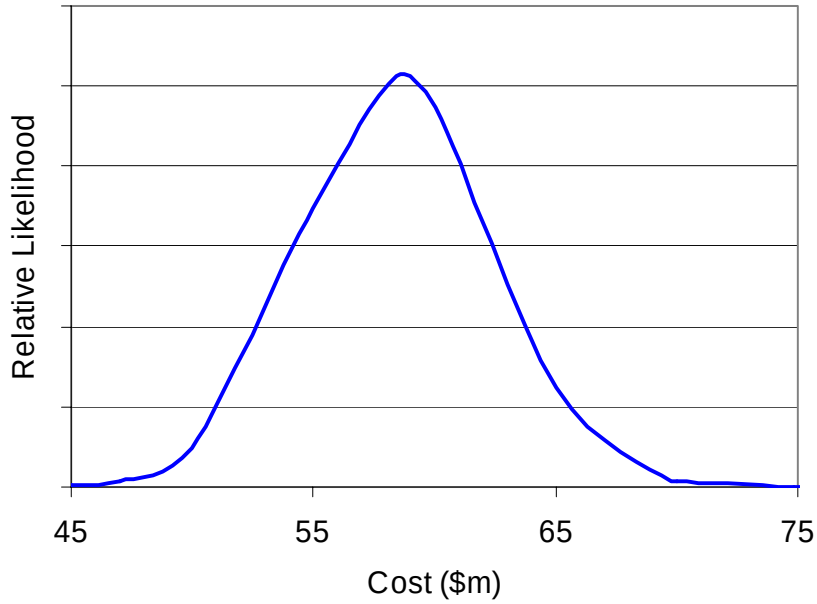
Table 4: Possible Additional Costs

Item	Additional Cost (order of magnitude)
Wall thicknesses as per GasNet	$0.9m
Internal coating of pipeline Indicative cost of joint coating[6]	$1.1m $2.3m
900 mm minimum cover	$0.4m

The possible range of capital costs can be represented graphically in the manner presented in Figure 1. Figure 1 depicts an hypothetical[7] normal distribution of costs about a mean of $58.4m with a standard deviation of $3.9m.

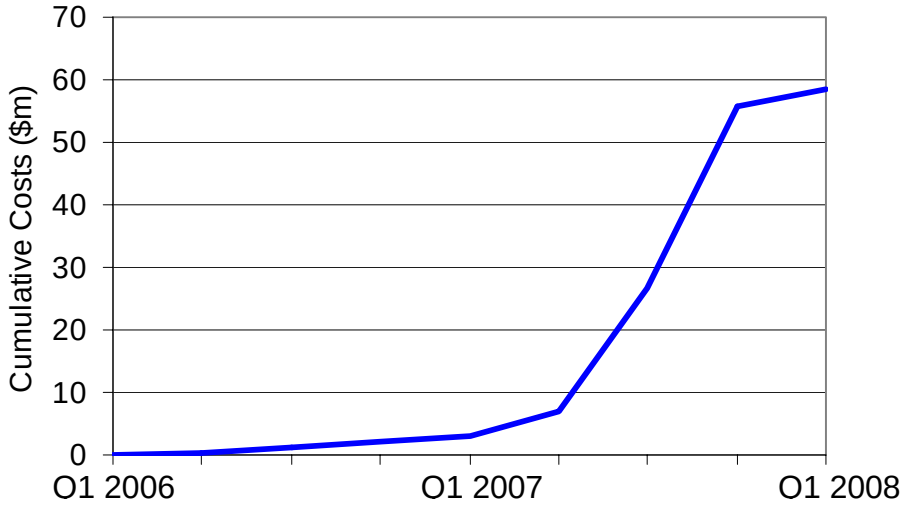
[6] Required if internal lining is for corrosion control reasons. Otherwise not required.
[7] The normal distribution has been used for illustrative purposes.

Figure 1: Corio Loop Construction Cost Estimate



In addition to the construction costs as estimated above, it may be appropriate (although it is beyond the scope of this report) to provide for capitalisation of interest incurred during construction. To assist with this exercise should it be required, an estimate of the timing of expenditure for construction of the Corio loop is depicted (on a quarterly basis) in Figure 2.

Figure 2: Timing of Expenditure



4 Conclusion

On the basis of prevailing technical and cost factors and information provided regarding the route of the Corio loop (as provided to the ACCC by GasNet):

- The capital cost of the Corio loop is estimated to be between $46.7m and $70.1m (being $58.4m +/- 20%). A cost toward the higher end of the range may eventuate, for example, if pipeline conditions (toughness of rock, weather, etc) are poor, or if high levels of industry activity (such as construction of the PNG Pipeline in Queensland) lead to increased construction or other costs; and

- There is a high level of certainty (99.9%) that the cost of constructing the Corio loop will not exceed $70.1m.

Since the proposed size and configuration of the Corio loop have already been the subject of a rigorous review process, it is expected that the final cost of developing the Corio loop will be reasonable if it lies within the range of costs set out above. GasNet's estimated construction cost provision of $67.9m (being $61.7m plus 10% contingency, but excluding financing costs) is therefore reasonable.

Attachment 1: Indicative Pipeline Route