

**Victorian Transmission System
Access Arrangement 2018 – 2022**

**Western Outer Ring Main Project
Capex Related Considerations**

**Report
to
Australian Energy Regulator
by
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1. Background

- 1.1 APA VTS Australia (Operations) Pty Limited (**APA VTS**) has submitted to the Australian Energy Regulator (**AER**) proposed terms for access to the Victorian Transmission System (**VTS**) for the period from 1 January 2018 to 31 December 2022.
- 1.2 Subsequent to the above, in March 2017 the Australian Energy Market Operator (**AEMO**) released the 2017 Gas Statement of Opportunity and the 2017 Victorian Gas Planning Report. These documents point to a marked tightening of the gas supply - demand balance in southeastern Australia, a risk of energy supply shortfalls and the need for enhancement of the capacity of VTS to ensure system requirements can be met from the winter of 2018.
- 1.3 In view of the risks now identified by AEMO, APA VTS has proposed¹ development of the Western Outer Ring Main (**WORM**) Project to allow gas to be moved at high-pressure around the perimeter of Melbourne. The Project will, among other things, enhance the ability to utilise the Iona gas storage facility and improve the capacity of the VTS to meet gas requirements for electricity generation. The WORM Project is strongly supported by AEMO.
- 1.4 I have been asked by the AER to review capital expenditure (**Capex**) forecasts for the WORM Project and to comment upon:
 - a) the reasonableness of the estimates; and
 - b) whether development of the WORM will allow capital savings elsewhere within the VTS.
- 1.5 My review and my findings are set out in the following sections of this Report.

¹ APA VTS Business Case Number 506, "Western Outer Ring Main (WORM) Project".

2. Proposed Capex

- 2.1 The WORM Project as proposed by APA VTS involves installation of:
- i) approximately 49.3 kilometres of 500 mm nominal diameter pipeline between Wollert and Plumpton;
 - ii) a Centaur 50 gas compressor at the Wollert Compressor Station to allow compression of gas into the WORM; and
 - iii) an Pressure Reduction Station (**PRS**) at Wollert to interconnect with the new WORM pipeline.
- 2.2 APA VTS's estimated Capex for the WORM Project is outlined in Table 1.

Table 1: WORM Project Estimated Capex

Project Component	Previous Estimate ² (2012 dollars)	Current Estimate ³ (2016 dollars)	Change (Red: of concern)
Pipeline			
<i>Mgmt & Land</i>	\$19.89m	\$30.24m	+50%
<i>Procurement</i>	\$13.72m	\$15.47m	+13%
<i>Construction</i>	<u>\$37.97m</u>	<u>\$47.78m</u>	+26%
<i>Total</i>	\$71.58m	\$93.49m	+31%
Wollert Compressor			
<i>Mgmt etc.</i>	\$4.40m	\$7.02m	+60%
<i>Procurement</i>	\$7.95m	\$10.71m	+35%
<i>Construction</i>	<u>\$8.33m</u>	<u>\$7.58m</u>	-9%
<i>Total</i>	\$20.68m	\$25.31m	+22%
PRS			
<i>Mgmt etc.</i>	\$1.23m	\$1.10m	-11%
<i>Procurement</i>	\$1.47m	\$1.31m	-11%
<i>Construction</i>	<u>\$1.57m</u>	<u>\$1.19m</u>	-24%
<i>Total</i>	\$4.27m	\$3.60m	-16%

- 2.3 In 2012 I considered⁴ the previous estimate of Capex for the WORM Project and concluded that the estimate was reasonable.
- 2.4 I note that between 2012 and 2016 the A\$/US\$ exchange rate rose by over 30%⁵, increasing the cost of overseas sourced materials. This is particularly relevant in the case of, and explains, the increased cost of

² APA VTS Business Case BC 083, "Western Outer Ring Main", 3 March 2012, page 13.

³ APA VTS Business Case Number 506, "Western Outer Ring Main (WORM) Project", 2017, pp 12-13.

⁴ "Victorian Transmission System - Review of Gas to Culcairn Project and Western Outer Ring Main Project", Sleeman Consulting, 25 July 2012.

⁵ The A\$/US\$ exchange rate averaged around 0.96 during 2012 compared to 1.35 during 2016. Source: Reserve Bank of Australia, online historical data.

procurement for installation of a new Centaur 50 compressor at the Wollert Compressor Station.

- 2.5 Over the same period, from 2012 to 2016, the Australian Consumer Price Index rose by more than 8%⁶.
- 2.6 Having regard for the above, the following cost items stand out as requiring explanation:
- i) Project management (inclusive of design and commissioning) and land access costs for construction of the pipeline, which have increased by 50%;
 - ii) Pipeline construction costs, which have risen by 26%; and
 - iii) Project management (inclusive of design and commissioning) costs for installation of a new Centaur 50 compressor at the Wollert Compressor Station, which have risen by 60%.

I review each of these items below.

- 2.7 Management and land access costs for the pipeline component of the WORM Project comprise \$4.21m for project management, design and commissioning plus \$26.03m for land access and approvals.

The overall increase in this cost category is attributable to material increases in the anticipated costs of acquiring an easement for the WORM pipeline. Since 2012 (when the previous estimate of WORM Capex was prepared) forecast easement acquisition costs have increased by \$16.73m⁷, principally as a consequence of rising land values and, therefore, greater compensation payments.

I am satisfied that the estimated costs of land access and approvals are reasonable. The rising land values reflect a combination of inflation generally and rezoning of land for potential residential development.

- 2.8 The increase in pipeline construction costs is a consequence of APA VTS now having completed a more detailed assessment of pipeline construction conditions. In particular, the following factors have contributed to the increase in estimated construction costs:
- i) It is now identified that it will be necessary to carry out directional boring in at least 25 locations, 8 of which involve major (long) road crossings or railway crossings;
 - ii) There are numerous outcrops of basalt along the pipeline route, which will necessitate use of rock saws or breakers and excavators;

⁶ Based upon CPIs of 100.4 for June 2012 and 108.6 for June 2016.

⁷ See APA VTS Business Case Number 504, "Western Outer Ring Main (WORM) – Easement", 2017.

- iii) There are six major water ways to be crossed, half of which are in very steep gullies; and
- iv) Just under 2 km of the pipeline route involves construction activity within active road reserves.

I am satisfied that the estimated pipeline construction costs are reasonable.

The overall cost of the pipeline component of the project is equivalent to just over \$94,800 per inch-km. While this appears high, it is consistent with costs for other projects (for example, the smaller Warragul looping project) and is explained by the factors set out above.

- 2.9 The estimated costs for management of the installation of a Centaur 50 compressor at the Wollert Compressor Station have risen significantly, and now represent almost 28% (previously 21%) of the total cost of the installation. I do not consider the costs as now estimated to be unreasonable.
- 2.10 APA VTS has explained⁸ that, in preparing its updated estimate of costs for management of the Wollert Compressor Station work, management costs have been itemised with regard for individual activities that will be required. While I have not been provided with details of the itemised assessment my preliminary judgement is that the estimated management costs are reasonable. I am of this view since installation of a new compressor at the Wollert Compressor Station, itself a high-pressure, operational facility, will:
 - i) require detailed planning and design of tie-ins and interfaces between the new and existing facilities at Wollert; and
 - ii) necessarily entail a high degree of site supervision including, for example, issue of hot work permits.
- 2.11 Overall, I conclude that APA VTS's estimated cost of the WORM Project is reasonable.

⁸ Telephone conference 16 May 2017.

3. Project Interactions

- 3.1 The fundamental purpose of the WORM is to allow large quantities of gas to be transferred at high pressure between the west, north and east of Melbourne. This capability is of particular use in:
- i) achieving high rates of injection of gas into and recovery of gas from the Iona gas storage facility; and
 - ii) supporting gas powered generation, which often requires gas at high rates of flow for relatively short periods of time.
- 3.2 Development of the WORM is proposed to address a convergence of factors, in particular:
- i) the declining availability of gas from offshore Gippsland and Otway sources, with increased dependence upon the Iona gas storage facility to meet Victorian winter peak gas demands. For the Iona gas storage facility to be of use in meeting peak system requirements, capacity is required to transport gas to and from the facility; and
 - ii) a forecast near-term peak in gas use during summer for gas powered generation, which constrains the ability to recharge the Iona gas storage facility.
- 3.3 The WORM Project interacts with other projects in two ways:
- i) First, since the WORM Project itself cannot be completed until 2020, other initiatives must be implemented to meet system requirements in advance of 2020. These are discussed in paragraphs 3.4 to 3.10 below; and
 - ii) Second, completion of the WORM Project may reduce subsequent (post 2020) dependence upon, or need for, other facilities, particularly Brooklyn compression. This is discussed in sections 3.11 to 3.13 below.
- 3.4 A commitment has been made⁹ to increase the capacity for injection of gas into the Iona storage facility from 153 TJ/d to 173 TJ/d by 2018. It is possible, but no commitment has yet been made, that the capacity for injection of gas into the Iona storage facility may be further increased to 230 TJ/d by 2020.
- 3.5 AEMO forecasts¹⁰ that the capacity of the South West Pipeline (**SWP**) to transport gas in a westbound direction to Iona needs to be around 122 TJ/d in 2017/18 rising to around 139 TJ/d by 2019/20. In contrast, the present capacity of the SWP for transport of gas to the Iona gas storage facility is 104 TJ/d.
- 3.6 AEMO does not envisage¹¹ any constraints in terms of capacity to transport gas in an eastbound direction through the SWP, from Iona to Melbourne. The present eastward gas transport capacity of the SWP is 412 TJ/d.

⁹ "Victorian Gas Planning Report", AEMO, March 2017, page 30.

¹⁰ "Victorian Gas Planning Report", AEMO, March 2017, Figure 18 on page 50.

¹¹ "Victorian Gas Planning Report", AEMO, March 2017, page 54.

- 3.7 In advance of the WORM being completed, the capacity of the SWP therefore needs to be increased to meet the requirement outlined in paragraph 3.5 above. This involves two initiatives:
- i) First, to meet immediate (2017/18) requirements, compressor 10 at the Brooklyn compressor station needs to be operated (intermittently, as required) in parallel with compressors 11 and 12. This will increase the westbound capacity of the SWP to 148 TJ/d, comfortably meeting AEMO's forecast 122 TJ/d requirement for 2017/18. This is a short-term solution only, since compressor 10 is a wet-seal compressor and is unsuitable for ongoing use.
 - ii) Second, and in replacement of the above, Brooklyn compressors 11 and 12 need to be reconfigured to allow compression of gas directly into the Brooklyn Lara Pipeline (**BLP**), and the Winchelsea compressor needs to be modified to allow bi-directional operation. These initiatives will sustainably afford a westbound SWP capacity 147 TJ/d, without need for contribution of the Brooklyn 10 compressor, thereby meeting AEMO's ongoing forecast requirement of 139 TJ/d. These works are addressed elsewhere¹². They represent the lowest cost means of meeting AEMO's forecast Iona gas injection requirement
- 3.8 The initiatives set out in paragraph 3.7(ii) will satisfy AEMO's forecast requirement for capacity in the SWP (as set out in paragraph 3.5 above). Subsequent development of the WORM will increase the westbound SWP capacity to 220 TJ/d, exceeding the requirement set out in AEMO's Victorian Gas Planning Report of March 2017 (as set out in paragraph 3.5 above).
- 3.9 AEMO has advised¹³ that it expects the requirement for westbound capacity in the SWP will continue to increase beyond 2020. Specifically, AEMO estimates that westbound gas transportation capacity of between 200 TJ/d and 250 TJ/d will be required during summer months from 2021. Since this level of capacity is not available through implementation of the initiatives set out in paragraph 3.7(ii) I accept that development of the WORM is necessary. It will not be possible to transfer gas from Longford to Iona at the rates AEMO forecasts will be required beyond 2021 if that gas has to pass through the low pressure Melbourne Inner Ring Main.
- 3.10 In addition to meeting westbound capacity requirements in the SWP, APA VTS and AEMO consider that development of the WORM will also provide system security benefits and enhance operational flexibility. These are benefits Sleeman Consulting has previously found to be wanting¹⁴.

Since development of the WORM is now necessary to meet requirements for recharge of the Iona gas storage facility it is not necessary to undertake further detailed review of these additional benefits. However, should the forecast growth in

¹² "Victorian Transmission System, Access Arrangement 2018-2020, Review of Capex for Selected Projects", Sleeman Consulting, 27 April 2017, section 6.

¹³ AEMO Submission on the APA VTS Western Outer Ring Main Proposal, provided to the AER under cover of letter dated 16 May 2017, section 3.2.

¹⁴ "Victorian Transmission System, Review of Gas to Culcairn Project and Western Outer Ring Main Project", Sleeman Consulting, 25 July 2012, pp 27-40.

demand for westbound capacity on the SWP not materialise¹⁵, it would be prudent to undertake a cost benefit analysis to ensure the abovementioned benefits are, together, sufficient to justify the relatively high cost of the WORM to service a gas market that is no longer growing.

3.11 Following development of the WORM the requirement for operation of Brooklyn compression will be significantly diminished. The WORM, coupled with bidirectional operation of the Winchelsea compressor but without need for operation of compression at Brooklyn, will afford westbound SWP capacity in excess of 200 TJ/d¹⁶.

3.12 Potential could also exist for:

- i) installation of a pressure reduction station at Rockbank to transfer gas into the Brooklyn-Ballarat pipeline from the high pressure Brooklyn-Lara pipeline (in turn supplied from the high pressure WORM pipeline), thereby overcoming the need for compression of gas into the Brooklyn-Ballarat pipeline at Brooklyn.

This initiative has been previously identified¹⁷ by APA VTS, with a cost of \$2.2m (2012 dollars). It would allow the Brooklyn compressor station to be reduced to one compressor¹⁸ (compressor 12).

APA VTS has commented¹⁹ that this initiative is no longer an option since work has been carried out at the Brooklyn compressor station to ensure it can support delivery of gas to Ballarat. I cannot accept this suggestion. Benefits associated with scaling down of the Brooklyn compressor station (including reduced operations, maintenance and compressor fuel usage) should be quantified; and

- ii) with the SWP capable of operation at up to 10.2 MPa, and capable of supplying gas into the 7.39 MPa Brooklyn-Geelong network at both Lara and Brooklyn, potential could also exist for Brooklyn compressor 12 to be either shutdown or reserved for emergency back up duties. I recommend that this opportunity also be investigated by APA VTS.

¹⁵ For example, as a consequence of either increased production of gas in South Australia or inadequate availability of gas from Longford.

¹⁶ "Victorian Gas Planning Report", AEMO, March 2017, Figure 24 on page 56.

¹⁷ "Business Case BC083", APA GasNet Australia (Operations) Pty Limited, 3 March 2012, Attachment 3.

¹⁸ "Compressor Strategy AA3 (2008 to 2012) AA4 (2013 to 2017)", APA Group, March 2012, page 24.

¹⁹ Telephone conference 16 May 2017.