



NETWORK PLANNING REPORT - T006

PAKENHAM (Timing and Planning)

March 2007

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Executive Summary

The increasing loads along the Lurgi (Morwell-Dandenong) pipeline and higher than average growth at Pakenham raises the prospect of delivery pressures falling below the minimum pressure obligation at Pakenham South.

This report assesses the impact of increasing loads, brought about by the increase in demand from residential and commercial developments in the Pakenham and Warragul area, as well as the load increase at the Dandenong Terminal Station supplying gas around Dandenong and the surrounding areas.

The report presents a network planning view for the maintenance of the minimum pressure obligation at Pakenham South, a lateral connected to the Lurgi pipeline.

The assessment indicates that a breach in the minimum pressure obligation is not expected at Pakenham South during the forecast period (to 2010). However, the model indicates that the increased gas flow velocity, which is above the recommended limit advised by GasNet, will require augmentation of the pipeline. In late 2005, approximately two thirds of the 80 mm diameter Pakenham South branch pipeline was replaced with 150 mm diameter pipe. It is recommended that the remaining 80 mm diameter section of the Pakenham South branch pipeline be duplicated with 150 mm diameter pipe.

Introduction

The Pakenham lateral is connected to the Lurgi pipeline approximately 27.5 km east of the Dandenong City Gate (CG). Figure 1 shows a schematic of the Longford and Lurgi pipelines. Origin Energy Assets Management (OEAM) reports that Pakenham has been experiencing growth of approximately 7% pa, with some 1,000 new customers per year.

In September 2005, a 708 meter section of pipe on the Pakenham branch pipeline was replaced with a larger 150 mm diameter pipe, which has reduced pressure drop along the pipeline. The remaining 80 mm diameter pipeline is approximately 452 meter long.

This report presents assessments of the forecast:

- demand, delivery pressures and average gas velocity for the period 2007–2010; and
- gas flow velocities along the 80 mm diameter section of the Pakenham South branch pipeline.

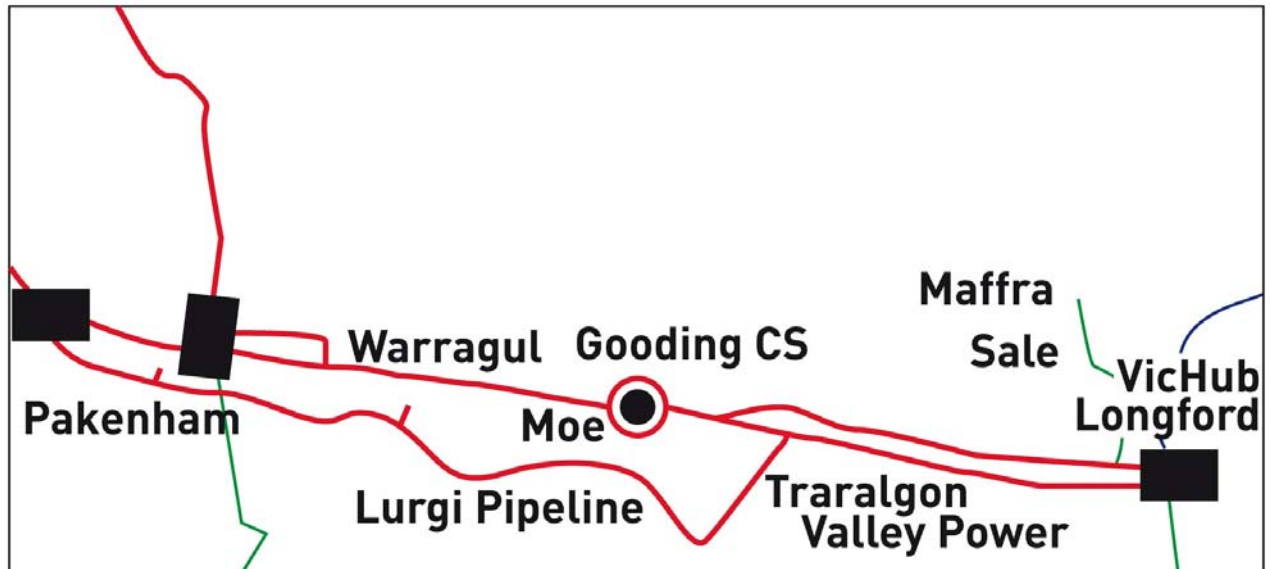
Planning Inputs

Error! Reference source not found. lists the key planning inputs used in the modelling.

Table 1 - Key planning inputs

Item	Detail
Forecast demand data	Supplied by OEAM and Alinta and 2005 Gas APR ¹
Historical data	Extracted from VENCORP's TADIS database
Modelling software	Gregg Engineering WinFlow version 4.060503.3081 Gregg Engineering WinTran version 4.060505.9089
Model of PTS used	Common Model version 2006

Figure 1 - Longford and Lurgi Pipeline schematic



¹ The 2005 report represented the latest information available at the time of the analysis. A later review of 2006 demand found that changes in the demand forecasts were minor and have no material impact on the timing and nature of the augmentations.

Assessment

Forecast Demand

The 1 in 20 winter peak day demand for 2006–2010 was established using forecast data provided by the relevant Distribution Business (DB), together with the system demand forecasts included in the 2005 Gas APR. Table 2 lists the forecast demands at Pakenham South, and nearby off-takes from the Lurgi pipeline.

Table 2 - 1 in 20 forecast winter peak day demand (TJ/day)

Location	2006	2007	2008	2009	2010
DTS (Lurgi)	57.20	57.20	57.20	55.73	55.73
Lyndhurst	0.93	0.94	0.94	0.95	0.95
Clyde North	0.36	0.37	0.37	0.37	0.37
Pakenham South	4.37	4.42	4.44	4.46	4.46
Warragul	3.84	3.98	4.10	4.22	4.30
Moe	3.20	3.24	3.25	3.27	3.26

Modelling Methodology and Assumptions

The latest Gregg Engineering model was used to forecast delivery pressures along the Lurgi pipeline.

The modelling assumptions include the following:

- Forecast demand for all locations is extracted from the 2005 Gas APR.
- Forecast demand for Pakenham South is provided by OEAM.
- Hourly demand profiles for Pakenham South are based on the actual demands recorded during 10 August, the peak day for 2005.
- Jeeralang is assumed to be operating at a flat rate throughout the day (included as a worst-case scenario, as this is unlikely on a 1 in 20 day).
- Morwell CG pressure is set to 2,760 kPa, and the Morwell back-up regulator is set to 1,800 kPa.
- Full availability of transmission assets is assumed, with no forced outages.

Result Analysis

Table 3 lists the modelling results, for the period 2007–2010. This indicates that a breach of the minimum pressure obligation at Pakenham South is not expected within the next five years.

Table 3 - 1 in 20 winter peak day forecast pressures (kPa)

Location	Minimum Pressure Obligation (kPa)	2007	2008	2009	2010
Lyndhurst	1,400	1,743	1,742	1,746	1747
Clyde North	1,200	1,793	1,792	1,795	1795
Pakenham South	1,400	1,668	1,664	1,663	1664
Warragul	1,400	1,495	1,486	1,339	1349
Moe	1,400	2,450	2,449	2,448	2448

The forecast shows Warragul's minimum pressure obligation will be breached from 2009 onwards. The Warragul constraint is addressed in the VENCORP Network Planning Report (P004) - Warragul (Planning), March 2007.

GasNet has advised that gas flow velocities above 15 m/s are inconsistent with maintaining the integrity of the pipeline. Further assessment reveals that during 1 in 20 peak demand days, high gas velocities (above the recommended limit) are expected at the smaller 80 mm diameter section of the Pakenham South branch, as shown in Table 4. The modelling results also show that in 2010, duplication of the remaining 80 mm section with 100 mm pipe and 150 mm pipe will reduce the average gas velocities to 8 m/s and 4 m/s, respectively.

Table 4 - Forecast (maximum) average gas velocity (m/s) for 1 in 20 peak demand day

Location	2007	2008	2009	2010
Pakenham South current (m/s)	21	21	22	22
Pakenham South with 100 mm duplication (m/s)	-	-	-	8
Pakenham South with 150 mm duplication (m/s)	-	-	-	4

Conclusion

Following the replacement of approximately two thirds of the Pakenham South branch in 2005, a breach of the minimum pressure obligation at Pakenham South is not expected within the next five years.

The forecast high gas velocity (over 20 m/s) exceeds GasNet's advised limit for the maintenance of pipeline integrity. Duplication of the remaining 80 mm section with 150 mm diameter pipe, consistent with the existing diameter of the Pakenham South branch, will resolve this issue.

Recommendations

It is recommended that the remaining 80 mm section of Pakenham South branch pipeline be duplicated with 150 mm pipe to address the high gas velocity issues.

Definitions

CG	City Gate.
DB	Distribution Business; a distribution pipeline network operator.
DB Connection Deed	An Agreement between VENCORP and a Distribution Business.
DCG	Dandenong City Gate, from which gas leaves the transmission system and enters the distribution system at Dandenong.
DTS	Dandenong Terminal Station, supplies DB transmission and distribution systems
Gas APR	Gas Annual Planning Report, published by VENCORP by 30 November each year.
OEAM	Origin Energy Assets Management
Minimum Pressure Obligation	The minimum pressure obligation stipulated in the System Security Guidelines and/or Distribution Business Connection Deeds that VENCORP must operate the system to maintain.
PTS	The Principal Transmission System, serving Gippsland, Melbourne, Central and Northern Victoria, Albury, the Murray Valley region, Geelong, and the western region of Victoria. The PTS is owned by GasNet and operated by VENCORP.
SSG	System Security Guidelines, developed and maintained by VENCORP, for the operation and security of the PTS.
SWZ	System withdrawal zone.