



NETWORK PLANNING REPORT – T001

SUNBURY (Timing)

March 2007

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## Executive Summary

The increasing demand along the Sunbury lateral has raised the prospect of the 1,100 kPa minimum pressure obligation at Sunbury being breached within the next five years. This report assesses the impact of increased demand (from residential developments in the Sunbury-Sydenham area) on the minimum pressure obligation.

This report presents a network planning assessment of minimum delivery pressures at the various city gates located on the Sunbury lateral. The report uses historical data, demand forecasts, and the Gregg Engineering model of the Principal Transmission System (PTS) to predict the year delivery pressures are likely to fall below the minimum pressure obligation.

The modelling results indicate that a breach in the minimum pressure obligation is likely to occur at Sunbury under 1 in 20 peak day conditions in 2012.

The timing of the constraint identified in this report is based on the assessment taking into account GasNet's advice about the added compression (Compressor Unit 12) at the Brooklyn Compressor Station and the augmentation that has been proposed to solve the Ballarat constraint.

## Introduction

The increasing number of housing developments throughout the Shires of Melton and Bulla has raised the probability that shortfalls in gas deliveries will occur along the Sunbury lateral. Growth in Tariff V (residential) load for this region is approximately 4% pa, which is significantly higher than the State average of 1% pa. The Sunbury lateral is connected to the Brooklyn-Ballarat pipeline approximately 14 km west of the Brooklyn Compressor Station. Figure 1 shows the Sunbury lateral schematic.

This report presents:

- a review of historical demand and delivery pressures for the Sunbury lateral;
- an assessment of the forecast demand and delivery pressures for the period 2009–2012;
- an examination of the impact on the Sunbury lateral from the proposed Plumpton City Gate (CG) and the increase in gas flow through the Rockbank CG.

The report also identifies a specific year beyond which delivery pressures on a winter peak day will fall below the minimum pressure obligation.

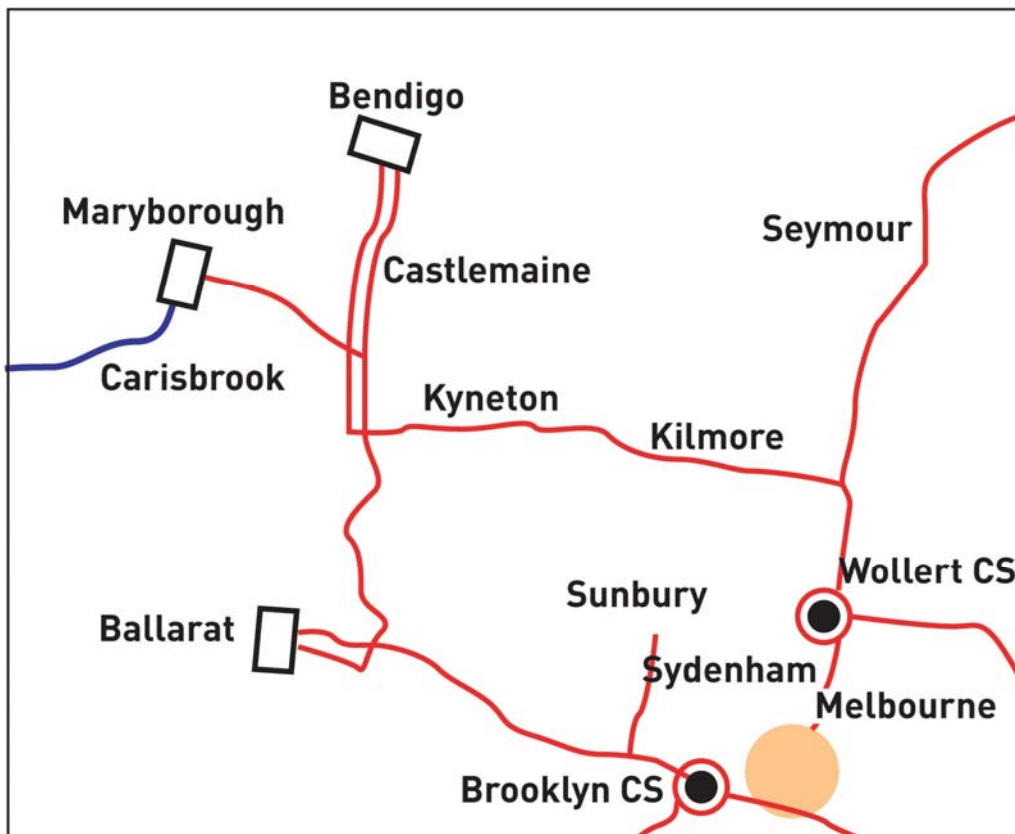
## Planning Inputs

Table 1 lists the key planning inputs used in the modelling.

Table 1 - Key planning inputs

Item	Detail
Forecast demand data	Supplied by SP AusNet and 2005 Gas APR <sup>1</sup>
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
VENCORP's Network Planning Report - T002 Ballarat (Timing)	VENDOCS #178656
VENCORP's Network Planning Report - P002 Ballarat (Planning)	VENDOCS #191798

Figure 1 - Sunbury lateral schematic



<sup>1</sup> The 2005 report represents 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

### Historical Demand and Minimum Pressure Review

An investigation of the demand and delivery pressures along the Sunbury lateral for the period 2000-2005 revealed that delivery pressures of less than 1,600 kPa were consistently registered on peak Ballarat system withdrawal zone (SWZ) demand days, but not necessarily peak demand days for the PTS as a whole. The lowest pressure (1,117 kPa) was recorded at Sunbury during 29 July 2003, and coincided with a peak PTS demand of 1,032 GJ.

The following figures show the hourly demand and pressure for the Sunbury, Diggers Rest and Sydenham during 29 July 2003.

Figure 2 – Sunbury pressures: 29 July 2003

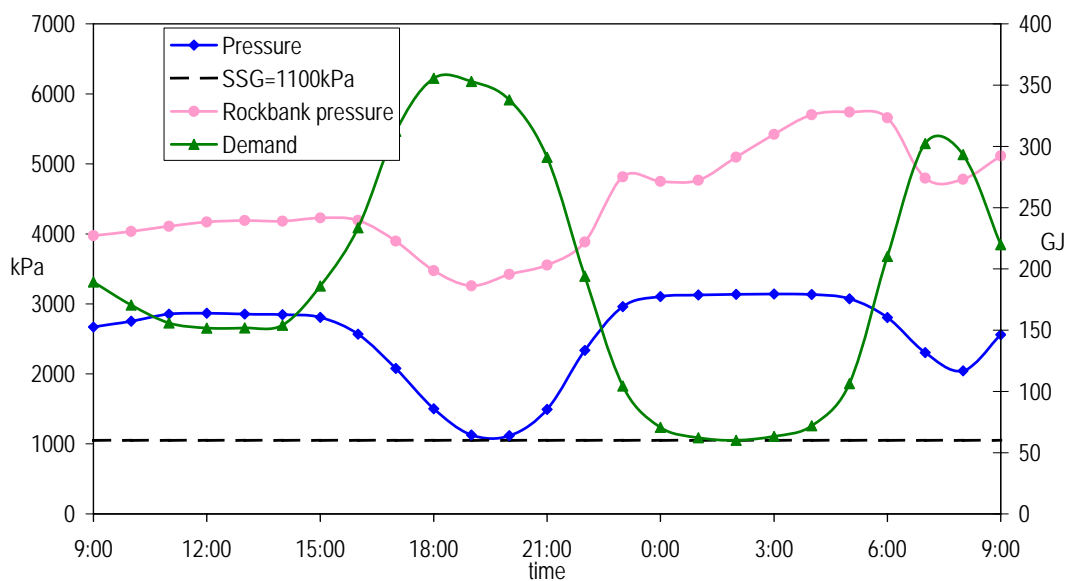


Figure 3 - Diggers Rest pressures: 29 July 2003

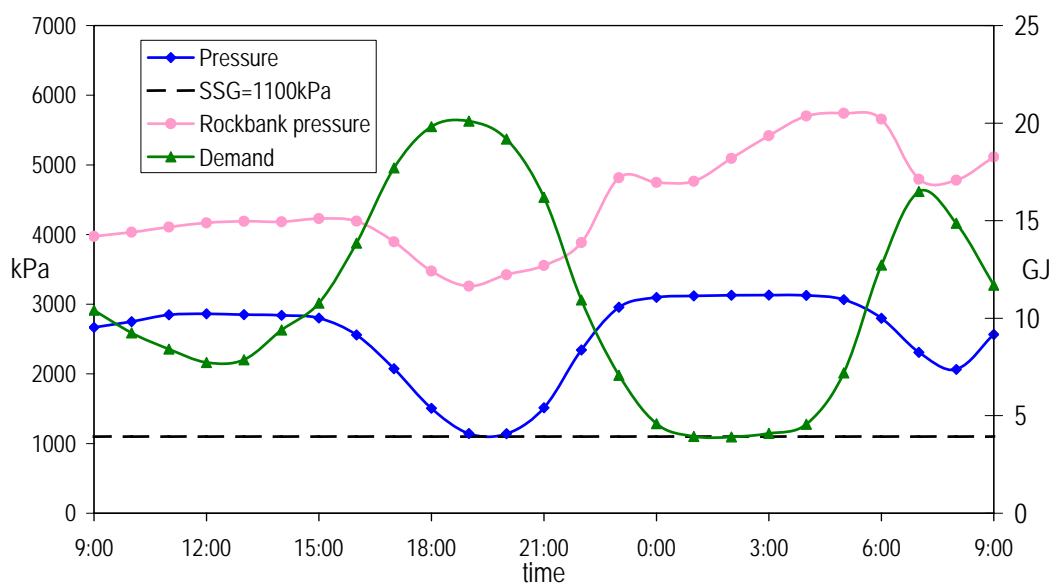
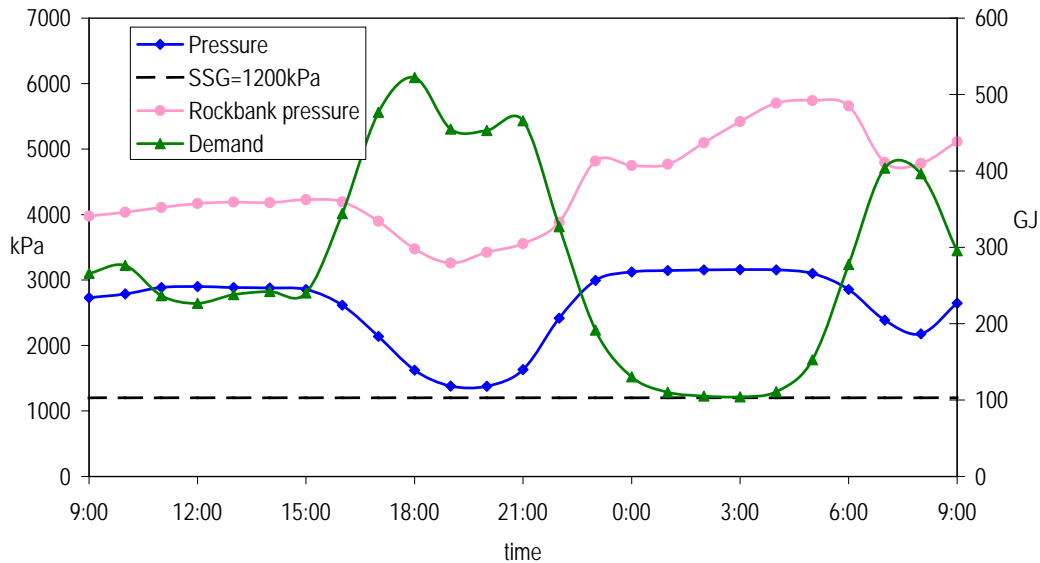


Figure 4 – Sydenham pressures: 29 July 2003



### Forecast Demand

The 1 in 20 historical demand data for 2002–2005 is weather normalised to the 1 in 20 winter peak day standard. The forecast 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 demand along the Sunbury lateral and neighbouring offtakes. The proposed new connection at Plumpton has been included as an indication of expected growth in this area.

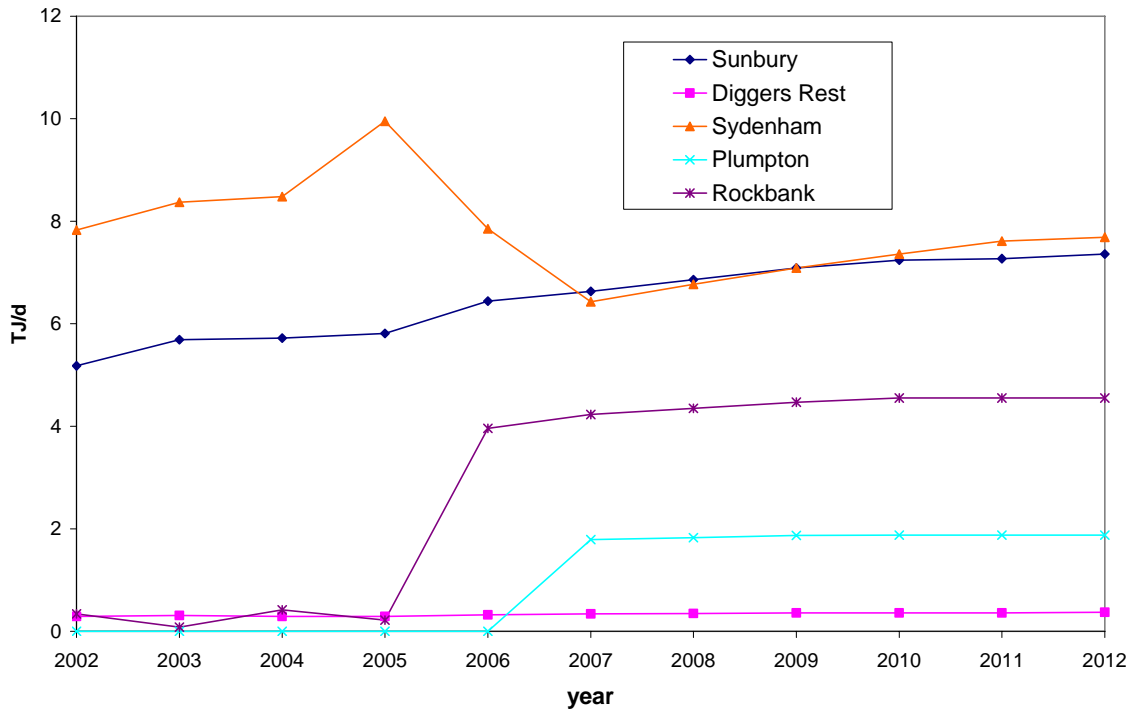
Table 2 - 1 in 20 historical and forecast winter peak day demand (TJ)

Location	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Sunbury	5.18	5.69	5.720	5.81	6.44	6.63	6.86	7.09	7.24	7.27	7.36
Diggers Rest	0.29	0.31	0.29	0.29	0.32	0.34	0.35	0.36	0.36	0.36	0.37
Sydenham	7.83	8.37	8.48	9.95	7.85	6.43	6.77	7.09	7.36	7.61	7.69
Plumpton	0.00	0.00	0.00	0.00	0.00	1.79	1.83	1.87	1.88	1.88	1.88
Rockbank	0.34	0.08	0.42	0.22	3.96	4.23	4.35	4.47	4.55	4.55	4.55

Figure 5 shows the growth in winter peak day demand for the period 2002–2012. It also highlights the decrease in demand at Sydenham, given load is transferred (assumed to be around 2006) from Sydenham to Rockbank and the proposed Plumpton connection.



Figure 5 - Growth in demand (1 in 20 winter peak day)



### Modelling Assumptions

The latest Gregg Engineering model was used to forecast delivery pressures incorporating all proposed new connection points.

The modelling assumptions include the following:

- The Gas APR standard approach that applies the 1 in 20 peak day with a beginning-of-day (BoD) linepack of 20 TJ below target, and an initial forecast based on a 1 in 2 peak day that is rescheduled from 1300 hrs.
- Forecast demand for Sunbury, Diggers Rest and Sydenham is based on hourly peak loads provided by SP AusNet.
- Load at Rockbank is based on SP AusNet estimates of the load shift from Sydenham due to the connection to the Rockbank CG.
- Load at the proposed Plumpton CG is based on SP AusNet estimates of the load shift from Sydenham due to this new CG connection.
- Loads as per the VENCORP customer transfer meter (CTM) peak day forecast.
- Hourly demand profiles for Sunbury, Diggers Rest, and Sydenham are based on the actual demands recorded during 10 August, the peak day for 2005 (see Appendix 1).
- Demand profiles are assumed to be the same for Rockbank, Plumpton, and Sydenham.
- Compressor efficiency is assumed to be 67% (Brooklyn) and 70% (Wollert).
- Injection profiles are assumed to be flat.
- Liquefied natural gas (LNG) is used as required to maintain Dandenong CG inlet pressure.
- Full availability of transmission assets is assumed, with no forced outages.
- Two Saturn compressors are available to compress gas to Ballarat.
- Augmentation to solve the Ballarat constraint is constructed before winter 2010.

The minimum pressure obligation at Sunbury is 1,100 kPa.

## Results Analysis

Table 3 lists the modelling results for the period 2009– 2012.

**Table 3 - Forecast pressures (kPa) for a 1 in 20 winter peak day**

Location	Minimum Pressure Obligation (kPa)	2009	2010 <sup>1</sup>	2011	2012
Sunbury	1,100	1,804	1,478	1,332	939
Diggers Rest	1,100	1,985	1,689	1,564	1,247
Sydenham	1,200	2,322	2,129	1,996	1,763
Plumpton	-	2,738	2,521	2,412	2,145
Rockbank	1,800	4,185	3,885	3,843	3,757

1. Modelling for 2010 onwards incorporate augmentation that has been proposed to solve the Ballarat constraint.

The modelling indicates that delivery pressures to Sunbury will fall below the minimum pressure obligation in winter 2012.

## Conclusion

The growth in demand along the Sunbury lateral will increase the likelihood that pressures will fall below the minimum pressure obligation.

The Sunbury lateral's low pressure conditions can be alleviated with a connection to Rockbank and Plumpton. However, after 2008, the combined Sydenham, Plumpton and Rockbank demand will reduce the gas flows to the Sunbury end of the lateral.

The modelling results conclude that a breach in the minimum pressure obligation will occur at Sunbury under 1 in 20 peak conditions in 2012.

The results are conditional on the installation of the Brooklyn compressor unit 12 (in 2007) and the construction of the proposed Ballarat constraint augmentation before winter 2010.

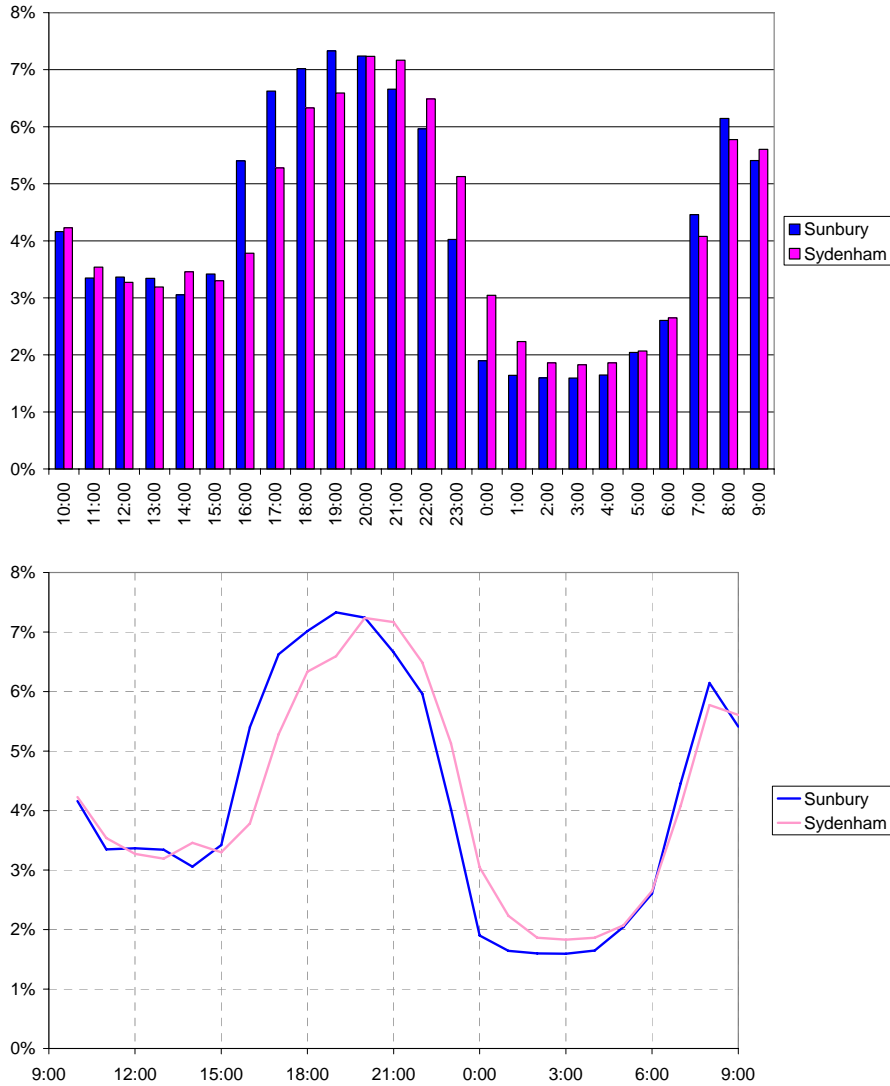
## Definitions

<b>Ballan bifurcation</b>	The location (near Ballan) where the Brooklyn-Ballarat pipeline splits to feed Ballarat and Bendigo.
<b>CG</b>	City Gate.
<b>DB</b>	Distribution Business; a distribution pipeline network operator.
<b>DB Connection Deed</b>	An Agreement between VENCORP and a Distribution Business.
<b>Gas APR</b>	Gas Annual Planning Report, published by VENCORP by 30 November each year.
<b>GasNet's Compressor Strategy</b>	GasNet's document dated September 2006, which sets out the compressor strategy to support GasNet's Corporate Plan. The document provides details about the current and proposed operations at existing compressor stations, and details the facilities and proposed augmentations.
<b>Minimum Pressure Obligation</b>	The minimum pressure obligation stipulated in the System Security Guidelines and/or Distribution Business Connection Deeds that VENCORP must operate the system to maintain.
<b>PTS</b>	The Principal Transmission System, serving Gippsland, Melbourne, Central and Northern Victoria, Albury, the Murray Valley region, Geelong, the western region of Victoria. The PTS is owned by GasNet and operated by VENCORP.
<b>SSG</b>	System Security Guidelines, developed and maintained by VENCORP, for the operation and security of the PTS.
<b>SWZ</b>	System withdrawal zone.

**APPENDIX 1**

Figure 6 shows the hourly demand profiles (expressed as a percentage of the daily total) for Sunbury and Sydenham on 10 August 2005, as used for the modelling.

**Figure 6 - Sunbury and Sydenham demand profiles**



Although the morning peaks occur at the same time, the evening peak occurs an hour later at Sydenham.