Attachment 8.3

Capacity Management Plan

2016/17 to 2020/21 Access Arrangement Information

Australian Gas Networks

APA Group

Asset Strategy and Planning

Australian Gas Networks

SOUTH AUSTRALIA NETWORKS

CAPACITY MANAGEMENT PLAN

ACCESS ARRANGEMENT INFORMATION

ATTACHMENT 8.3

June 2015

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Reference Documents

Date	Title
June 2014	SA Distribution System Performance Review (DSPR) - 2014

Abbreviations

Abbreviation	Definition
AEMO	Australian Energy Market Operator
AMP	Asset Management Plan
CAPEX	Capital Expenditure
CBD	Central Business District
CI	Cast Iron
DPTI	Department of Planning, Transport and Industry
DSPR	Distribution System Performance Review
GDC	Gas Distribution Code
GIS	Geographic Information System
HFM	Hastings Fund Management
HIA	Housing Industry Association
HP	High Pressure
IRR	Internal Rate of Return
LP	Low Pressure
MAP	Moomba to Adelaide Pipeline
MIRN	Meter Installation Registration Number
MP	Medium Pressure
NOP	Nominal Operating Pressure
NPV	Net Present Value
OPEX	Operating Expenditure
OTR	Office of the Technical Regulator
ROI	Return on Investment
SA	South Australia
SCADA	Supervisory Control and Data Acquisition
TP	Transmission Pressure
UAFG	Unaccounted for gas
UPS	Unprotected Steel

PREFACE

The objective of this Capacity Management Plan (CMP) is to document:

- The current capacity performance of AGN's SA Distribution Networks;
- The basis for maintaining capacity within AGN's South Australian Distribution Networks;
- Projected load growth and other drivers for network augmentation; and
- The scope, timing and budget estimates of augmentation projects required to cost effectively sustain network growth and maintain a safe and reliable supply of gas to consumers.

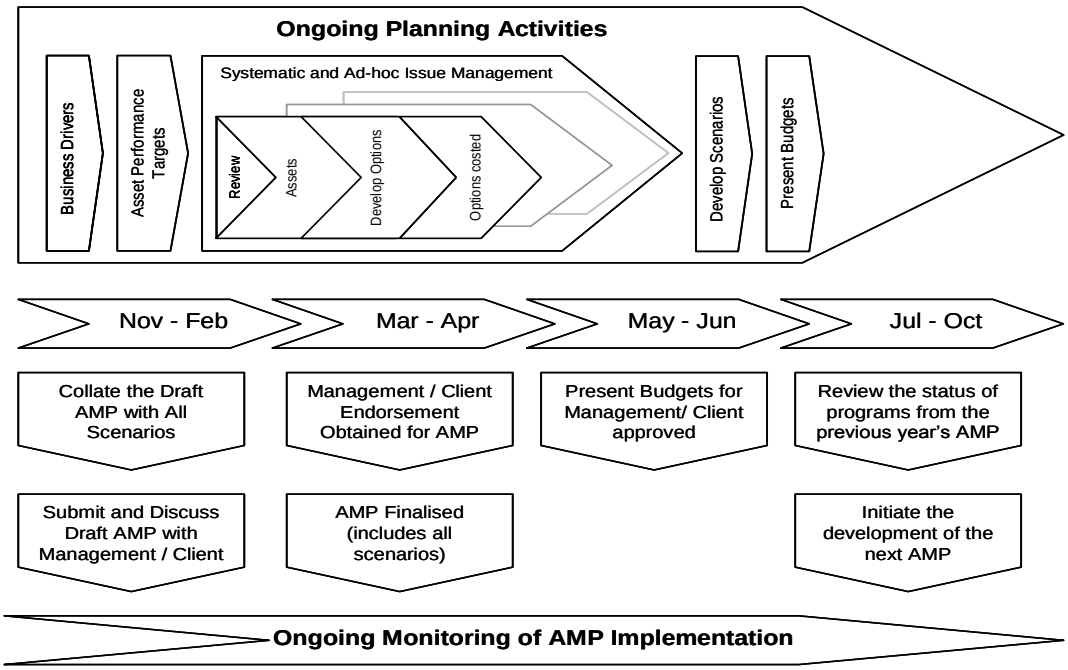
The body of the CMP is structured into 3 Sections:

- **Section 1 – General –** This section contains an overview of the South Australia networks and associated assets covered by this plan, and the processes associated with network capacity management
- **Section 2 – Network Supply and Demand** – This section sets out the demand forecasts, network performance and augmentation requirements.
- **Section 3 – Appendices** – This section contains more detailed information on the SA metro network and the location of gate states.

Update and review cycle

The development of this plan is part of the overall asset management planning year-round process with two parallel streams of work:

- Stream 1: Ongoing monitoring of asset performance and the ongoing monitoring of implementation of the previous year's Asset Management Plan (AMP) projects.
- Stream 2: Review of asset performance, risk assessment, development of technical solutions, development of budgets and securing approvals for future projects.



Revision and Update of the Plan

The Manager, Asset Strategy & Planning, is responsible for revising and updating this plan.

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SECTION 1 - GENERAL

1.1 Network Overview

This section documents AGN's principal gas distribution networks managed from South Australia, and the associated assets within those networks. Refer to Appendix 1 for map details.

1.2 Sources of Supply

AGN's SA managed networks (apart from Mt Gambier) are supplied with natural gas from:

- The Moomba to Adelaide Pipeline (MAP) - An 800 km 520 mm diameter pipeline delivering gas to all of AGN's South Australian networks except Mt Gambier. This pipeline is owned and operated by EPIC Energy (Epic).

- The SEAGas Pipeline (Port Campbell (Victoria) to Adelaide) - A 680 km 455mm diameter pipeline delivering gas to AGN's Adelaide and Mt Gambier networks. This pipeline is owned and operated by SEAGas Ltd.

Gas is delivered into AGN's networks via gate or custody transfer stations owned by Epic or SEAGas Ltd. These stations consist of facilities that control the delivery pressures and measure the quantity and quality of gas delivered into AGN's networks.

AGN has access to metering facilities data through interface agreements.

The table below summarises AGN's principal networks (excluding Riverland, see below) along with their respective (EPIC and/or SEAGas) supply points. Refer to Appendix 2 for details.

Network	Gate/Custody Station Location
Adelaide Metro - ADL	Elizabeth Gate Station Taperoo Gate Station Dry Creek Gate Station SEAGas Dry Creek
Nuriootpa - NURI	Nuriootpa Gate Station (Tanunda Road)
Freeling - FRL	Stockwell Road
Angaston - ANG	Gawler Road
Whyalla - WHY	Lincoln Highway Gate Station
Port Pirie - PTPR	Warnertown Road - Solomontown
Mount Gambier - MTG	Nick Lyons Road
Peterborough - PTB	Cotton Road
Waterloo - WTL	Tozer Road
Virginia - VRG	Park Road

AGN owns and operates gate stations in its Riverland network which are used to deliver gas to several sub networks. Although connected to AGN's transmission system main rather than directly from the MAP or SEAGas Pipeline, they are deemed gate station supply points under the SA Retail Market Procedures.

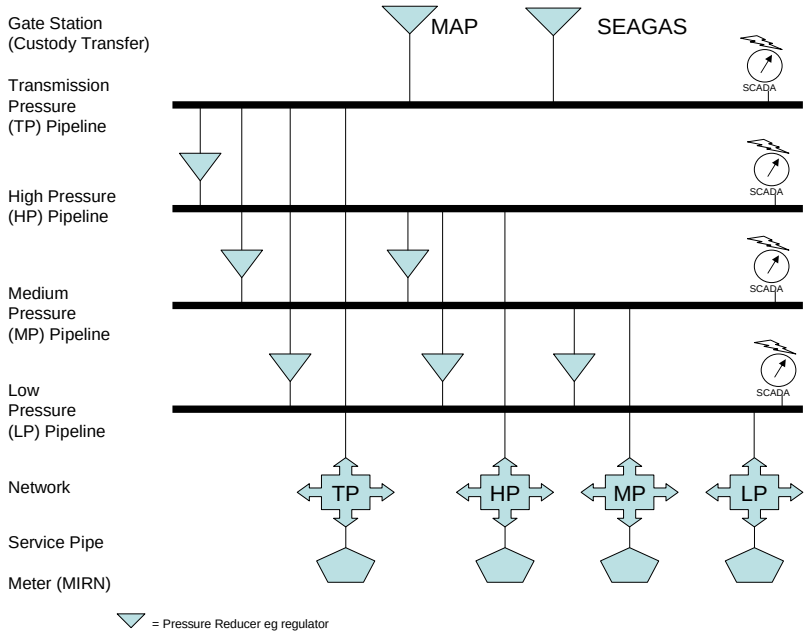
The table below summarises the supply points to the discrete sub networks within the Riverland gas network.

Network	Gate/Custody Station Location
Riverland - RVLD	Upstream of Angaston Compressor Station
Murray Bridge	Eleanor Terrace, Murray Bridge
Berri	Winkie Rd, Berri
Mildura	20th Ave, Mildura

1.3 Network Configuration

The following diagram provides an overview of a gas distribution network's key components.

Connections between pipelines at different pressures are achieved through district regulator stations (DRSs).



1.3.1 Network Pressure Tiers

The network operates with four pressure tiers as defined in the following table.

Pressure Regime	Definition
Transmission Pressure (TP)	MAOP exceeds 1050 kPa
High Pressure (HP)	MAOP between 210 kPa and 1050 kPa
Medium Pressure (MP)	MAOP between 7 kPa and 210 kPa
Low Pressure (LP)	MAOP up to 7 kPa

AGN's networks are operated at pressures within the nominated maximum and minimum allowable operating pressures. Emergency over pressure control is provided on all networks to ensure the nominated MAOP is not exceeded.

Each network has its own defined operating range depending on the network configuration and capacity requirements. Operating pressures may vary seasonally, depending on the annual load profile.

AGN's networks nominal operating pressure ranges are summarised in the following table. Actual operating pressures may vary around these nominal values but in all cases pressures are maintained below the specific MAOP of the network.

SA Networks Nominal Operating Ranges - kPa					
Network	TP1	TP2	High	Medium	Low
ADELAIDE		800-1750	70-350	35-100	1.2-1.7
ANGASTON	2800-7000		70-350		
BERRI	2800-7000		70-350	35-100	
FREELING			70-350		
MILDURA	2800-7000		70-350 600-800		
MT GAMBIER			250-475	35-200	1.2-1.7
MURRAY BRIDGE	2800-7000	700-1650	70-350		
NURIOOTPA	2800-7000		70-350		
PT BONYTHON			70-350		
PT PIRIE			70-350		
VIRGINIA			70-350		
WASLEYS			70-350		
WATERLOO CORNER			70-350		
WHYALLA				35-100	

TP1 – Transmission pressure pipelines to regional networks
TP2 – Transmission pressure pipelines within distribution networks

Minimum pressures have been nominated based on the following considerations:

- Maintaining sufficient capacity to ensure variation in demand, caused by weather and/or consumer diversity, does not result in loss of supply;
- Meeting minimum inlet design pressures to ensure effective pressure control by district regulators feeding lower tier networks is maintained;
- Maintaining a minimum of 1.0 kPa at the outlet of domestic meters; and
- Meeting designated supply pressures for I&C meters.

1.3.2 Pipe Material and Length

The following tables set out the inventory of all mains within AGN's Adelaide and Regional (excluding Riverland and Berri Mildura) transmission and distribution networks as of 30 June 2014.

Adelaide Metro Distribution Network Installed Mains (30 June 2014) - km					
Network	PE	CI	UPS	PS	Total
LP	428	763	75	37	1,303
MP	1,918	68	11	388	2,385
HP	2,422	0	0	1,091	3,513
TP	0	0	0	190	190
TOTAL	4,768	830	86	1,706	7,390

Regional Distribution Networks Installed Mains (30 June 2014) - km					
Network	PE	CI	UPS	PS	Total
LP	19	3	14	2	38
MP	164	0	5	101	270
HP	191	0	0	38	229
TP	0	0	0	18	18
TOTAL	374	3	19	159	556

Length of Mains (30 June 2014) - km			
Network	Distribution Mains	TP Mains	Total
Adelaide Metropolitan	7,200	190	7,390
Mount Gambier	213	0	213
Murray Bridge	30	1.9	32
Angaston	13	0	13
Nuriootpa	30	0.4	30.4
Berri	9	10.3	19.3
Freeling	8	0	8
Port Pirie	125	5.6	130.6
Whyalla	103	0	103
Peterborough	5	0	5
Snuggery	0	0.8	0.8
Grand Total	**7,736**	**209**	**7,945**

1.4 Capacity Management

This section details the philosophy, process and criteria that underpin supply and demand management within AGN's SA networks.

1.4.1 Capacity Management Approach

Network capacity is managed by:

- Monitoring network performance;
- Assessing forecast demand;
- Assessing threats to supply; and

- Addressing the above according to the risk they present, balancing the costs of doing so against the benefits of expending limited resources elsewhere in the network.

Network capacity is managed to avoid:

- Potentially hazardous conditions for consumers should momentary loss of supply occur as result of insufficient pressure;
- Disruption to the community; and
- Breaching regulatory obligations.

Network capacity is augmented when:

- The minimum pressure in a network falls, or is forecast to fall, below the recommended minimum end of main pressure during design load conditions. Design load conditions take into account seasonality, consumer type, load profile and other factors that contribute to peaks in demand.
- There is insufficient redundancy within the network, which adversely affects the security of supply to a large number of consumers.

1.4.2 Capacity Management Process

The capacity management process is summarised in the following schematic.

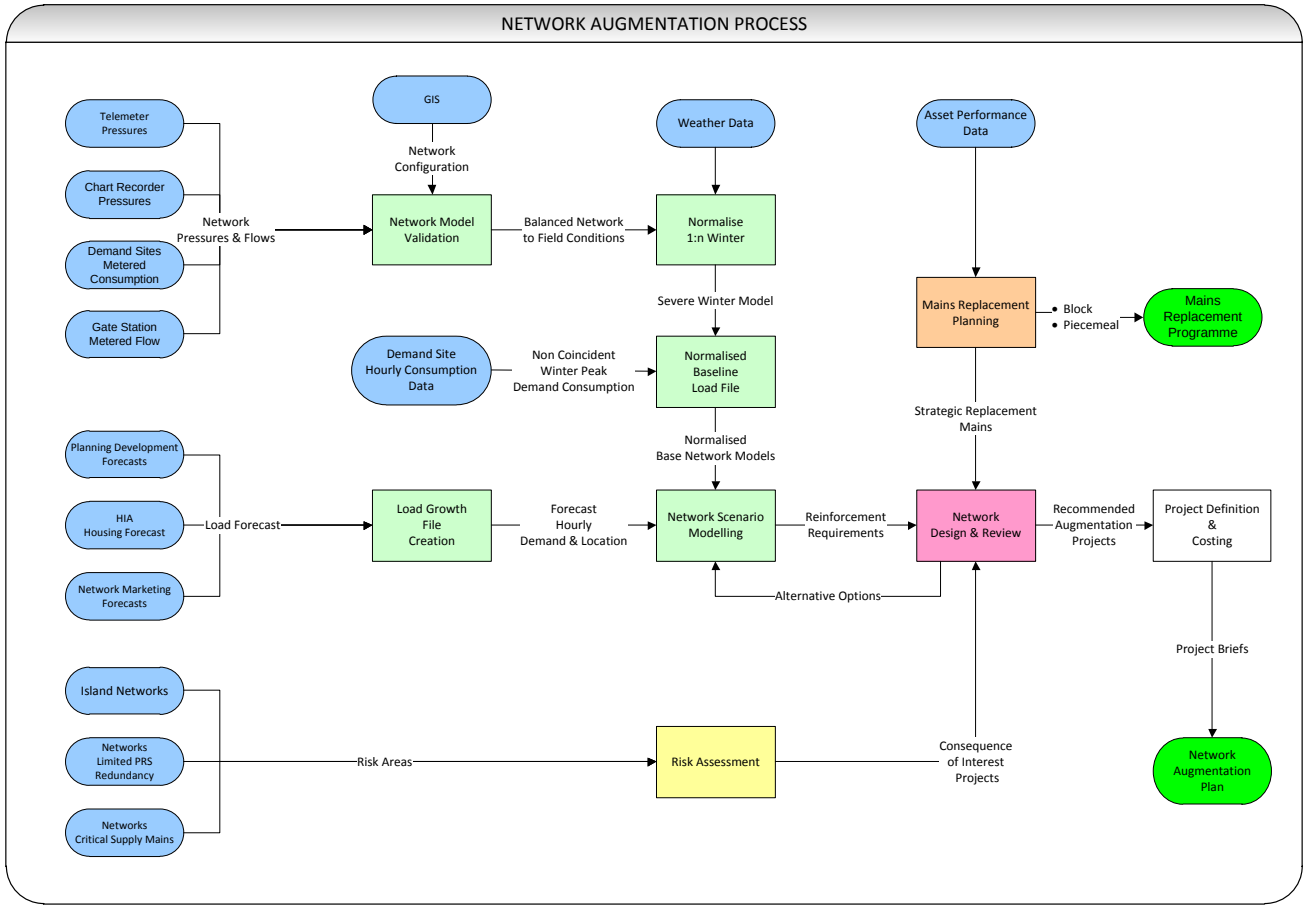


Figure 1 – Capacity management Process

Capacity Management involves the following key activities:

1. *Maintaining Baseline Capacity Models* - Meter to main connectivity configuration is maintained within the GIS. Network configurations are exported across into capacity modelling software (Synergee) where network models are validated against actual field conditions using gate station inputs, actual large volume customer hourly demand, actual system pressures and derived Tariff R and Tariff C loads based on billing history maintained with the Billing System.

   Computer models are iteratively balanced so that modelled pressures match those from the field.

2. *Design Load Assessment* - Tariff R and C design loads are derived from the validated baseline network load, corrected to allow for additional consumption consistent with a 1 in 25 year winter's day. This is based on +/- 95% confidence levels of the network 20-year peak hour supply trend line. This approach also normalises for variation in Tariff R and C consumer usage patterns not related to cold weather.

Tariff D customer load is normalised on the basis of variation in consumption during the daily peak hour period throughout winter.

3. *Forecasting Load Growth* - Department of Planning Transport and Industry[1] (DPTI) and HIA statistics as well as internal marketing trend analysis and expert projections where available are used to forecast the number and location of new residential connections.

   Internal market trend analysis is used to determine the rate of new connections for I&C and Demand market sectors.

   The additional connections are converted to an expected hourly demand at specific locations within the network. The output of this process is an annual load growth file that is superimposed on the network model to identify future capacity constraints.

4. *Network Scenario Modelling - A* computer based network modelling application (Synergee) is used to evaluate various load scenarios and augmentation options. Capacity shortfalls are identified and solutions modelled to confirm augmentation requirements.

5. *Mains Replacement Planning*- The identification of mains for replacement involves assessing key operating data (leaks, supply pressures, gas outages, risk analysis). Priority areas are identified from which detailed replacement strategies are formulated. In some instances "redundant" mains may be abandoned and in others additional supply mains may be required to facilitate replacement.

   The output of this process is combined with capacity and security of supply issues to optimise the location and size of principal supply mains within the network.

6. *Project Initiation* - The various capacity, replacement and security of supply issues are reviewed and options considered. A recommended solution is defined and submitted for inclusion into a 5-year augmentation plan. The plan is reviewed annually to confirm the timing and scope of proposed projects.

7. *Project Business Cases* – A business case is prepared for projects identified for implementation within the budget year and approved in line with the appropriate Delegation of Authority.

   Each project's business case addresses:

   - Scope, cost and timing
   - Background to the project
   - The options considered
   - The recommended option, and its justification
   - An economic analysis
   - A risk assessment
   - Compliance with regulatory "Conforming Expenditure" requirements (see below)
   - Cost Breakdown

[1] Previously referred to as Planning SA

1.4.3 Economic Regulation

Augmentation expenditure must conform to the National Gas Rules 79 (1) and (2).

National Gas Rules Capital Expenditure Criteria Rule 79

(1) Conforming capital expenditure is capital expenditure that conforms with the following criteria:

- The capital expenditure must be such as would be incurred by a prudent service provider acting efficiently, in accordance with accepted good industry practice, to achieve the lowest sustainable cost of providing services;
- The capital expenditure must be justifiable on a ground stated in sub rule (2).

(2) Capital expenditure is justifiable if:

a) The overall economic value of the expenditure is positive; or
b) The present value of the expected incremental revenue to be generated as a result of the expenditure exceeds the present value of the capital expenditure; or
c) The capital expenditure is necessary:

   i. to maintain and improve the safety of services; or
   ii. to maintain the integrity of services; or
   iii. to comply with a regulatory obligation or requirement; or
   iv. to maintain the service provider's capacity to meet levels of demand for services existing at the time the capital expenditure is incurred (as distinct from projected demand that is dependent on an expansion of pipeline capacity).

d) The capital expenditure is an aggregate amount divisible into 2 parts, one referable to incremental services and the other referable to a purpose referred to in paragraph (c), and the former is justifiable under paragraph (b) and the latter under paragraph (c).

The processes employed by AGN ensure that augmentation expenditure meets the requirements of the National Gas Rules.

1.4.4 Capacity Assessment Criteria

Tariff R and C design loads are based on peak hour loads expected during a 1 in 25 year event. Typically, an additional 10 - 15% to the actual peak day/peak hour demand is applied to cater for the effects of cold weather and variability in consumer usage patterns.

Tariff D loads are not considered temperature sensitive. Tariff D design loads are based on observed peak hour actual during the peak evening period during winter.

Detailed connection and load growth data is provided in section 2 of this document.

1.4.5 Security of Supply

Gas is regarded by the community as an essential service, with an accompanying expectation that it will be uninterruptible under all but the most extreme (*force majeure)* events.

Historically, risks to supply arising from network failure have been considered relatively low probability events, with the network configuration typically providing intrinsic capacity to cater for such events.

Scenarios where a single point of failure could result in significant number of consumers losing supply are evaluated based on cost and risk with additional mains, regulators, surveillance equipment specified where appropriate.

1.4.6 Network Risk Assessment

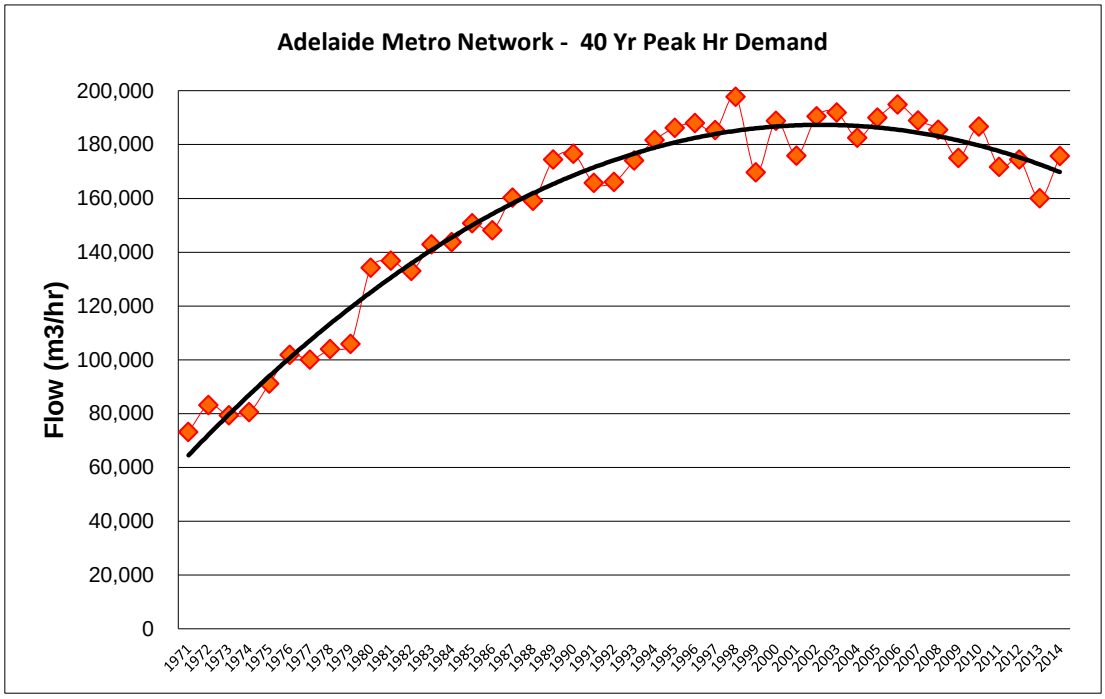
All Network augmentation projects are assessed using an established risk matrix and prioritisation criteria to provide a relative risk rating as part of prioritisation of stay in business Capex projects. Further details on the risk assessment framework can be found in Section 3.3 of the Asset Management Plan.

SECTION 2 - NETWORK SUPPLY AND DEMAND

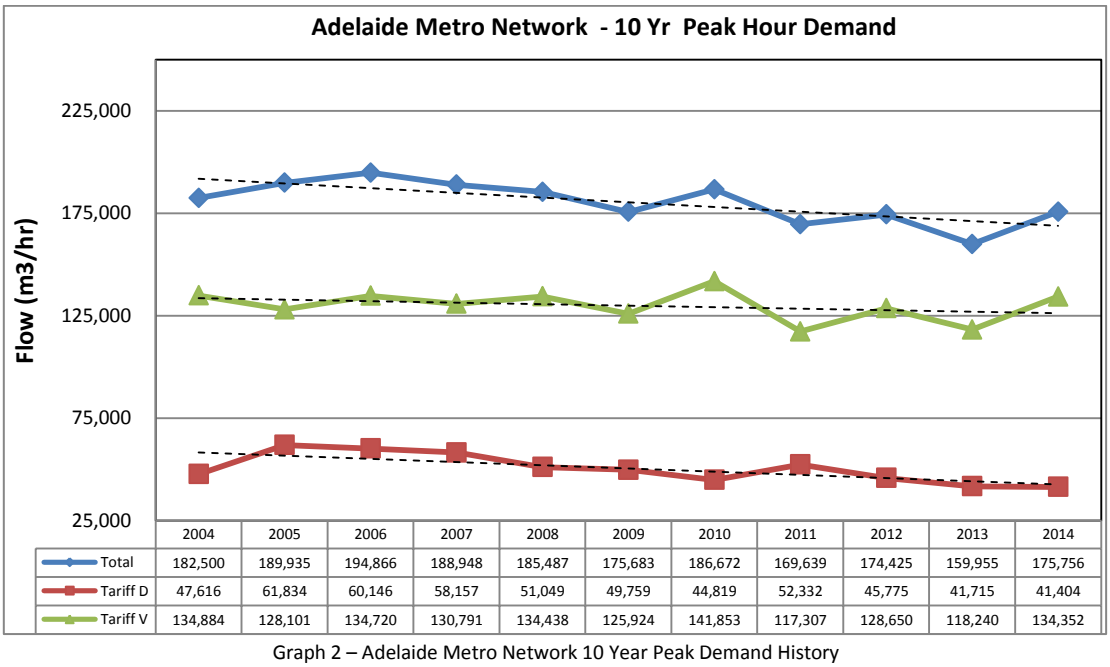
This section provides an overview of network supply and demand issues. Details of network performance (peak day analysis) are detailed in the 2014 South Australian networks Distribution System Performance Review (DSPR)

2.1 Historic Peak Hour Demand

2.1.1 Adelaide Network



Graph 1 – Adelaide Metro Peak Hour Demand History



	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Total	182,500	189,935	194,866	188,948	185,487	175,683	186,672	169,639	174,425	159,955	175,756
Tariff D	47,616	61,834	60,146	58,157	51,049	49,759	44,819	52,332	45,775	41,715	41,404
Tariff V	134,884	128,101	134,720	130,791	134,438	125,924	141,853	117,307	128,650	118,240	134,352

Graph 2 – Adelaide Metro Network 10 Year Peak Demand History

The following key points to note from the trends relating to the trend in peak consumption in the Adelaide Network area are as follows:.

- The Adelaide transmission network has been assessed as having sufficient capacity to cater for a 1:25 year demand event.

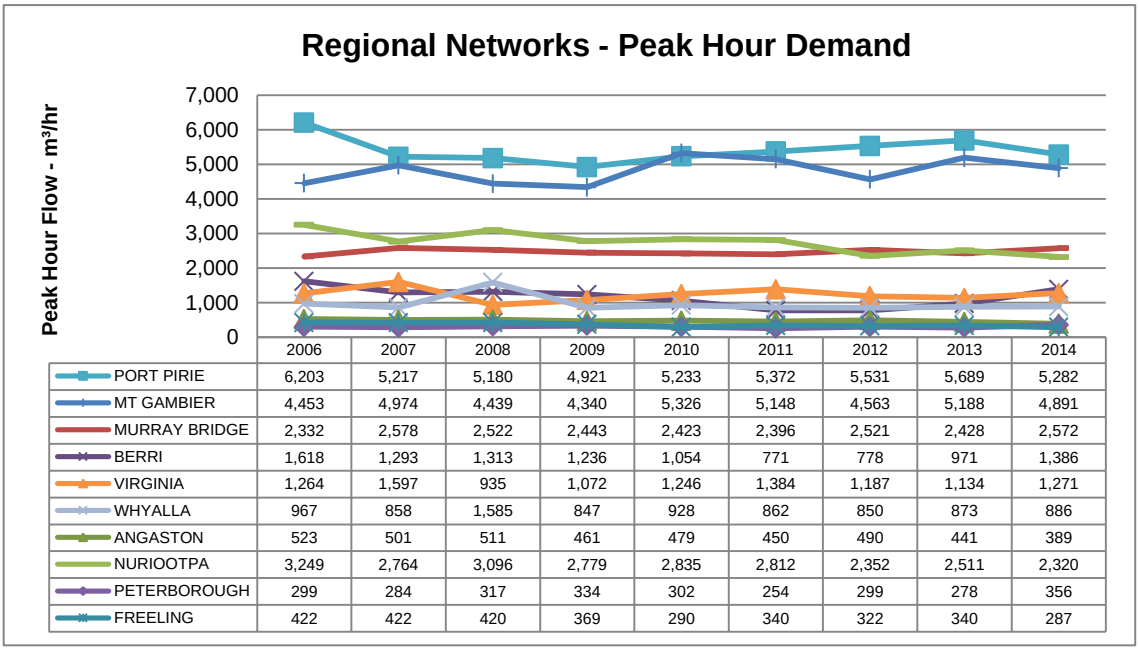
  The 1:25 criterion was associated with a 95% upper confidence level around the long term (20 year) peak hour trend line. The trend in peak hour consumption has been at the lower bound of expectations and over the last 5 years, below the 1:25 year lower confidence level. A combination of more energy efficient house designs, a declining manufacturing sector and reduced gas heating loads (due to reverse cycle air conditioning) are contributing to changes in peak hour network demand. This has been offset to some extent by use of high instantaneous demand gas hot water services.

  As a result of the decrease in peak hour demand, the 1:25 network demand design criterion has been revised downwards. This has effectively reduced the design "margin" to a less conservative level, extending the capacity life of the network, and deferring augmentation that otherwise may have been required.

- The impending closure of the Elizabeth GMH plant in 2017 is expected to free up capacity in the northern region of the Adelaide metropolitan area.

- Shippers faced significant 'imbalance' costs during the 2013 winter due to a physical constraint of delivering gas from the SEAGAs Pipeline into the northern areas of the Adelaide network. To assist market operation, a key valve in the network (previously closed to facilitate flows within the network) was opened in July 2014 to enable more gas from western Victoria to flow into the northern region of the Adelaide network.

2.1.2 Regional Networks



	2006	2007	2008	2009	2010	2011	2012	2013	2014
PORT PIRIE	6,203	5,217	5,180	4,921	5,233	5,372	5,531	5,689	5,282
MT GAMBIER	4,453	4,974	4,439	4,340	5,326	5,148	4,563	5,188	4,891
MURRAY BRIDGE	2,332	2,578	2,522	2,443	2,423	2,396	2,521	2,428	2,572
BERRI	1,618	1,293	1,313	1,236	1,054	771	778	971	1,386
VIRGINIA	1,264	1,597	935	1,072	1,246	1,384	1,187	1,134	1,271
WHYALLA	967	858	1,585	847	928	862	850	873	886
ANGASTON	523	501	511	461	479	450	490	441	389
NURIOOTPA	3,249	2,764	3,096	2,779	2,835	2,812	2,352	2,511	2,320
PETERBOROUGH	299	284	317	334	302	254	299	278	356
FREELING	422	422	420	369	290	340	322	340	287

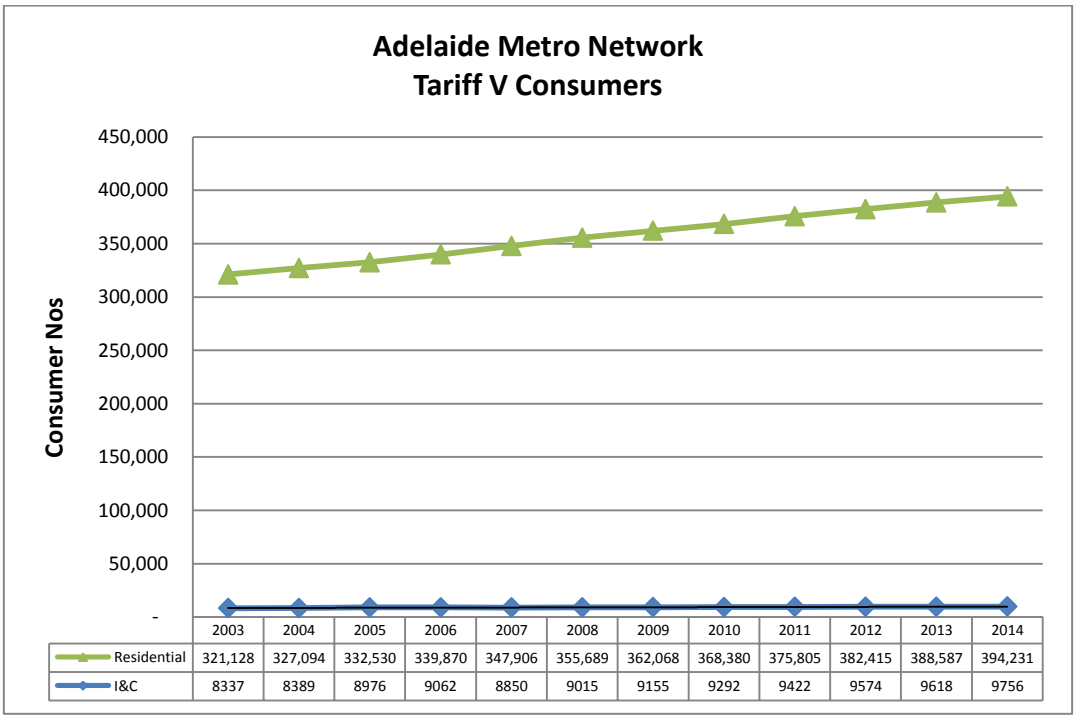
Graph 3 – Regional Networks Peak Hour Demand

The key points to note from the trends in peak consumption in the regional networks are as follows:

- Demand across regional networks has been relatively flat over the last few years with no substantial increase forecast over the next regulatory period.
- The demand through the Mount Gambier and Port Pirie gate stations is at about 80% of capacity. The capacity of the gate stations will be monitored carefully over the next few years.
- Demand at the Murray Bridge Township is approaching the capacity of the supply main between the Murray Bridge gate station and the township regulator. Augmentation of this main is planned during the next regulatory period.

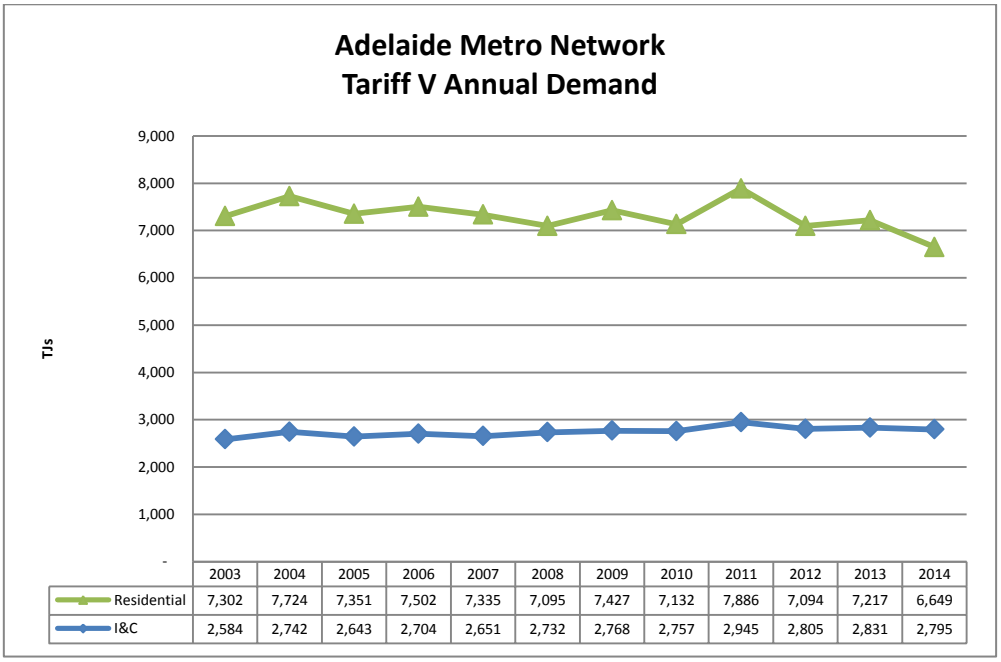
2.2 Annual Demand

2.2.1 Adelaide Network

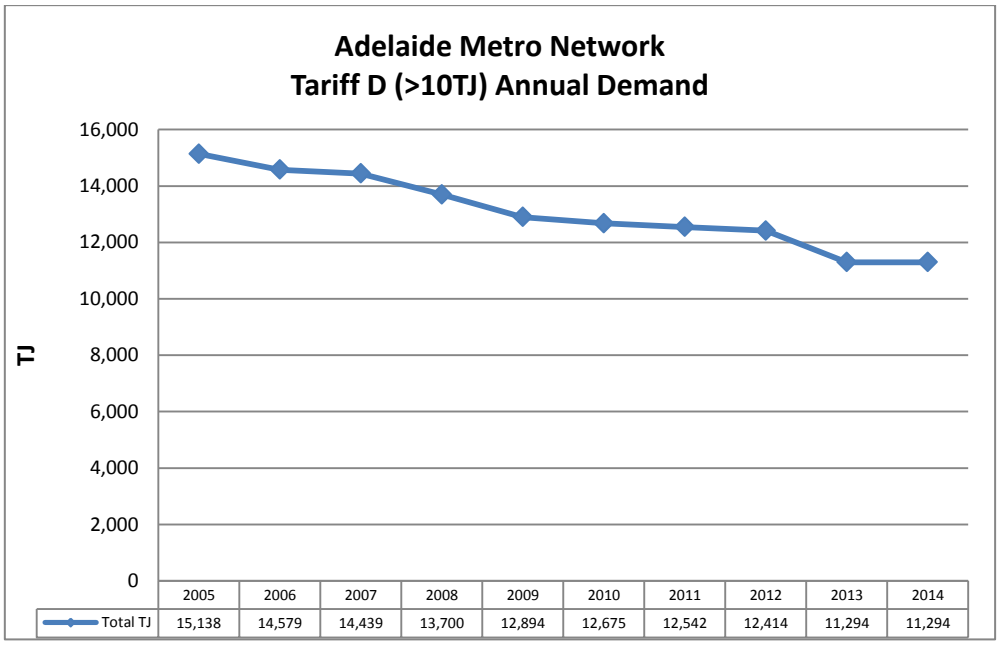


	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Residential	321,128	327,094	332,530	339,870	347,906	355,689	362,068	368,380	375,805	382,415	388,587	394,231
I&C	8337	8389	8976	9062	8850	9015	9155	9292	9422	9574	9618	9756

Graph 4 – Adelaide Metro Tariff V Consumers



Graph 5 – Adelaide Metro Tariff V Annual Demand

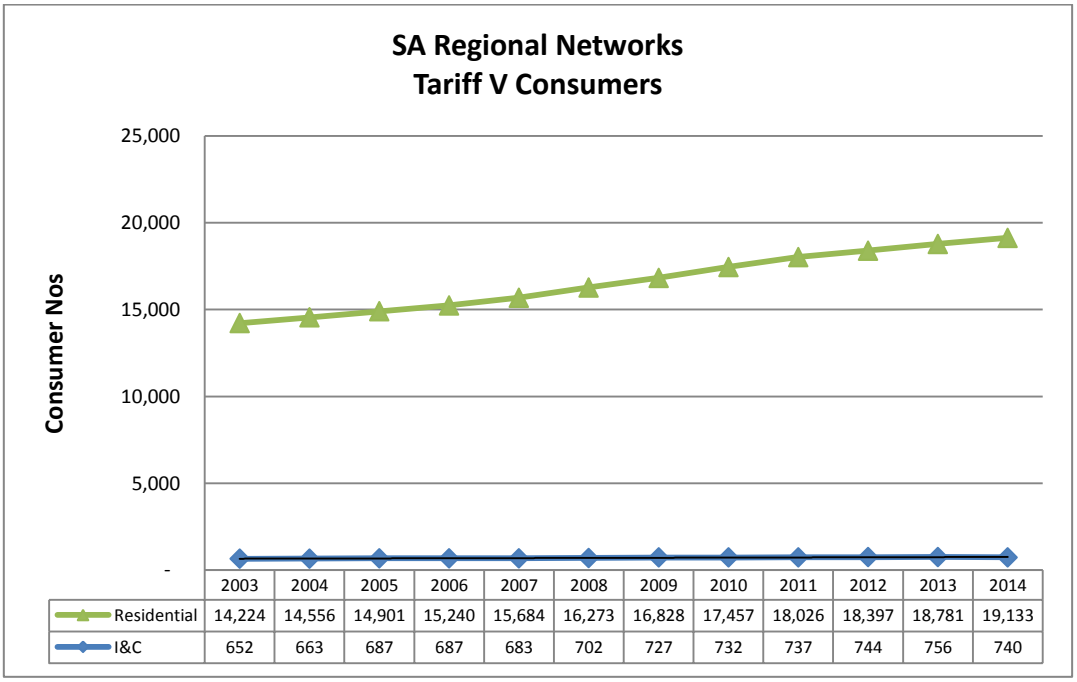


Graph 6 – Adelaide Metro Tariff D Annual Demand

The following key points to note from the trends in annual demand in the Adelaide network are set out below.

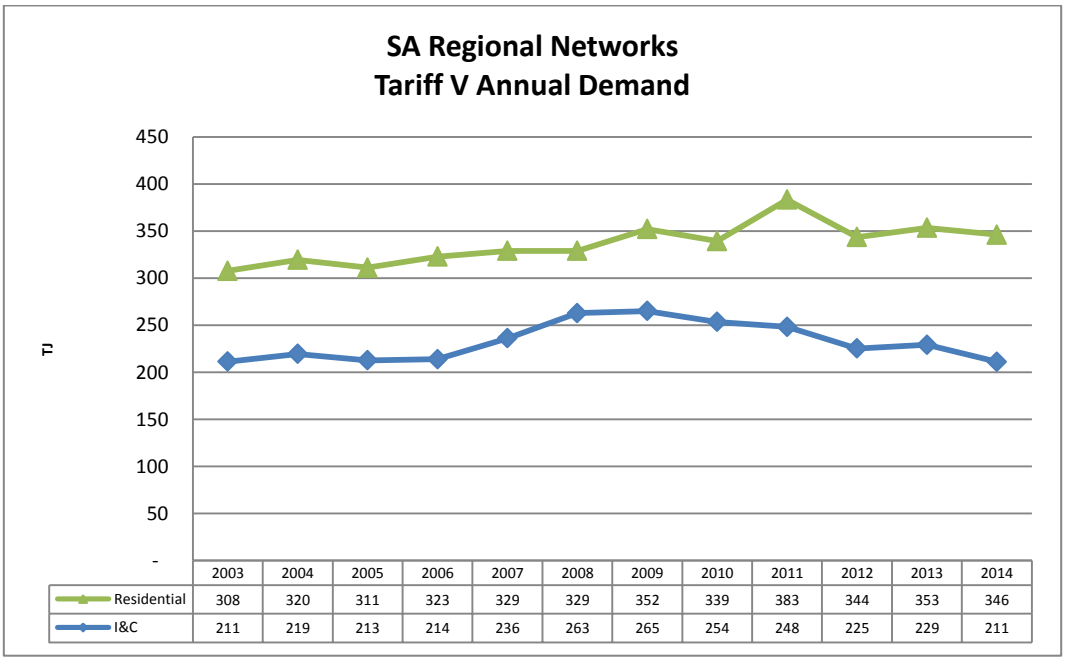
- Tariff V customer growth has been very consistent over the last 10 years with an annual growth rate of about 1.9%.
- Tariff V annual demand has fallen by 10% over the last 10 years despite a 20% increase in consumer numbers over that period. The falling consumption is due to declining average consumption due to a combination of more efficient housing designs, reduction of gas heating loads (with consumers choosing reverse cycle air conditioning) and a downturn in manufacturing.

2.2.2 Regional Networks



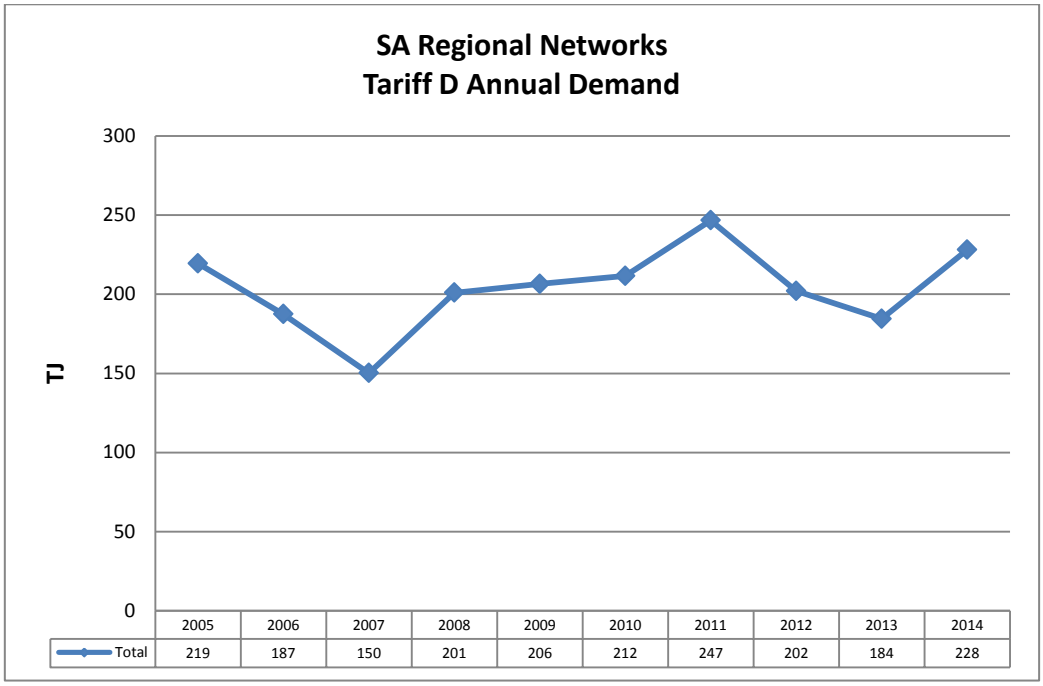
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Residential	14,224	14,556	14,901	15,240	15,684	16,273	16,828	17,457	18,026	18,397	18,781	19,133
I&C	652	663	687	687	683	702	727	732	737	744	756	740

Graph 7 – Regional Tariff V Consumers



	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Residential	308	320	311	323	329	329	352	339	383	344	353	346
I&C	211	219	213	214	236	263	265	254	248	225	229	211

Graph 8 – Regional Tariff V Annual Demand



Graph 9 – Regional Tariff D Annual Demand

The key points to note from the trends in annual demand in the regional networks are set out below.

- While regional Tariff V consumer numbers have increased by 30% over the last 10 years, there has been only a 3% increase in total annual demand over the same period.
- Tariff D annual demand in regional networks has fluctuated in accordance with industry and economic factors, and this variable trend is likely to continue in the foreseeable future.

2.3 Customer Connections

2.3.1 Tariff V (<10 TJ) MIRN Count

	Total Tariff V MIRN Count									
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Adelaide Metro - R	**332,530**	**339,870**	**347,906**	**355,689**	**362,068**	**368,380**	**375,805**	**382,415**	**388,587**	**394,231**
Adelaide Metro - I&C	**8,976**	**9,062**	**8,850**	**9,015**	**9,155**	**9,292**	**9,422**	**9,574**	**9,618**	**9,756**
Adelaide Metro Total	**341,506**	**348,932**	**356,756**	**364,704**	**371,223**	**377,672**	**385,227**	**391,989**	**398,205**	**403,987**
SA Regional - R	**14,901**	**15,240**	**15,684**	**16,273**	**16,828**	**17,457**	**18,026**	**18,397**	**18,781**	**19,133**
SA Regional - I&C	**687**	**687**	**683**	**702**	**727**	**732**	**737**	**744**	**756**	**740**
SA Regional - Total	**15,588**	**15,927**	**16,367**	**16,975**	**17,555**	**18,189**	**18,763**	**19,141**	**19,537**	**19,873**
Angaston - R	220	227	229	244	250	256	265	274	283	288
Angaston - I&C	21	22	23	26	30	29	30	29	30	29
Angaston - Total	241	249	252	270	280	285	295	303	313	317
Berri - R	20	28	34	42	48	52	61	64	66	72
Berri - I&C	16	15	15	17	17	18	19	16	17	19
Berri - Total	36	43	49	59	65	70	80	80	83	91
Freeling - R	13	14	15	16	18	50	94	122	152	174
Freeling - I&C	7	6	5	5	5	5	5	6	6	6
Freeling - Total	20	20	20	21	23	55	99	128	158	180
Mount Gambier - R	6,389	6,619	6,882	7,219	7,433	7,654	7,852	8,006	8,149	8,245
Mount Gambier - I&C	303	301	296	298	307	307	311	317	319	299
Mount Gambier - Total	6,692	6,920	7,178	7,517	7,740	7,961	8,163	8,323	8,468	8,544
Murray Bridge - R	47	53	71	107	152	200	241	261	293	342
Murray Bridge - I&C	23	24	27	27	28	30	30	34	35	36
Murray Bridge - Total	70	77	98	134	180	230	271	295	328	378
Nuriootpa - R	357	389	445	497	553	634	716	750	787	836
Nuriootpa - I&C	19	21	23	25	25	25	26	27	29	29
Nuriootpa - Total	376	410	468	522	578	659	742	777	816	865
Peterborough - R	35	35	35	37	44	46	50	50	55	54
Peterborough - I&C	16	17	17	18	18	18	17	17	17	17
Peterborough - Total	51	52	52	55	62	64	67	67	72	71
Port Pirie - R	4,753	4,777	4,824	4,855	4,892	4,923	5,002	5,059	5,100	5,129
Port Pirie - I&C	157	155	153	160	160	162	162	162	161	159
Port Pirie - Total	4,910	4,932	4,977	5,015	5,052	5,085	5,164	5,221	5,261	5,288
Virginia - R	17	18	19	26	62	111	140	160	170	176
Virginia - I&C	9	11	13	14	15	15	18	17	17	17
Virginia - Total	26	29	32	40	77	126	158	177	187	193
Wasleys - R	0	0	0	0	0	0	0	0	0	0
Wasleys - I&C	1	1	1	1	1	1	1	1	1	1
Wasleys - Total	1	1	1	1	1	1	1	1	1	1
Waterloo Corner - R	3	3	3	4	4	4	4	4	4	4
Waterloo Corner - I&C	1	2	1	1	1	1	1	1	1	3
Waterloo Corner - Total	4	5	4	5	5	5	5	5	5	7
Whyalla - R	3,047	3,077	3,127	3,226	3,372	3,527	3,601	3,647	3,722	3,813
Whyalla - I&C	114	112	109	110	120	121	117	117	123	125
Whyalla - Total	3,161	3,189	3,236	3,336	3,492	3,648	3,718	3,764	3,845	3,938
SA Networks - R	**347,431**	**355,110**	**363,590**	**371,962**	**378,896**	**385,837**	**393,831**	**400,812**	**407,368**	**413,364**
SA Networks - I&C	**9,663**	**9,749**	**9,533**	**9,717**	**9,882**	**10,024**	**10,159**	**10,318**	**10,374**	**10,496**
SA Networks - Total	**357,094**	**364,859**	**373,123**	**381,679**	**388,778**	**395,861**	**403,990**	**411,130**	**417,742**	**423,860**

Table 1 – Historic Tariff V MIRN Count

2.3.2 Tariff D (>10 TJ) MIRN Count

Tariff D MIRN Count										
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Adelaide Metro	144	141	142	139	138	135	132	130	122	122
SA Regional	10	10	9	9	9	8	8	8	8	8
Total	154	151	151	148	147	143	140	138	130	130

Table 2 – Historic Tariff D MIRN Count

2.3.3 Forecast Connections

The following table sets out the forecast new service connections (gross connections) as developed by the Commercial group. These are offset to some extent by about 1,500 annual disconnections which have not been taken into account in the table below.

Forecast New Service Connections							
	FY 15/16	FY 16/17	FY 17/18	FY 18/19	FY 19/20	FY 20/21	Total AA
New Home Connections	5,282	4,886	4,592	4,781	5,093	5,306	24,658
Existing Home Connections	1,435	1,435	1,435	1,435	1,435	1,435	7,175
Multi User Connections	579	498	464	463	547	544	2,516
Total Domestic connections	**7,296**	**6,819**	**6,491**	**6,679**	**7,075**	**7,285**	34,349
I&C <10TJ connections	220	259	229	272	277	281	1,318
I&C >10TJ connections	0	1	0	0	0	0	1
Total I&C Connections	**220**	**260**	**229**	**272**	**277**	**281**	1,319
Total Connections	**7,516**	**7,079**	**6,720**	**6,951**	**7,352**	**7,566**	35,668

Table 3 - Forecast New Service Connections.

Based on historic trends about 95% of connections will be within the Adelaide metropolitan area and of these about 50% will be within the central region, 30% in the northern region and 20% in the southern region.

The following table summarises the top 20 growth suburbs based on the average residential MIRN count over the 2012 and 2013 calendar years.

Suburb	MIRN Count Growth 2 Year Average Dec 2013
ANDREWS FARM	215
NORTHGATE	212
MAWSON LAKES	178
SEAFORD MEADOWS	165
MUNNO PARA	156
BLAKEVIEW	150
MUNNO PARA WEST	146
GOLDEN GROVE	110
MORPHETT VALE	108
ST CLAIR	102
MANSFIELD PARK	80
PARAFIELD GARDENS	67
BROMPTON	64
ALDINGA BEACH	58
FINDON	57
REYNELLA	57
SMITHFIELD PLAINS	56
MAGILL	55
EVANSTON GARDENS	54
SEATON	54
Total	2144
Total Adelaide Metro	6217

Table 4 - Forecast New Service Connections.

2.3.4 Step Out Developments

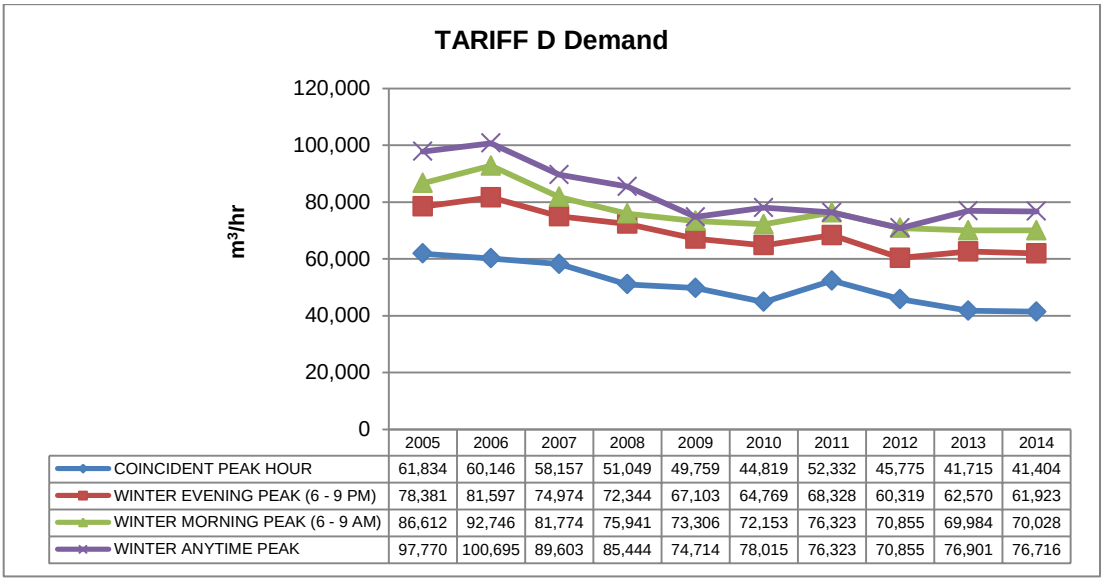
The step out developments that are either currently under development or are expected to be developed in the near future include:

- Reticulation of gas to Tanunda, north of Adelaide, is expected to be complete by mid-2015.
- A plan to extend a trunk supply main to McLaren Vale has been approved with construction planned to commence in 2015/16.
- Monarto – A front end engineering design (FEED) study is planned during the next regulatory period to assess supply options and viability of gas supply to Monarto. Refer to business case SA 77 for details.
- Two Wells – Reticulation of proposed residential development north of the township is forecast for the next regulatory period. A 4.9 km supply main is envisaged. Refer to business case SA 24 for details.

2.4 Demand

2.4.1 Adelaide TP Network Tariff D Peak Hour Demand

The following table summarises the spread of Tariff D consumer peak hourly consumption under various scenarios.



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
COINCIDENT PEAK HOUR	61,834	60,146	58,157	51,049	49,759	44,819	52,332	45,775	41,715	41,404
WINTER EVENING PEAK (6 - 9 PM)	78,381	81,597	74,974	72,344	67,103	64,769	68,328	60,319	62,570	61,923
WINTER MORNING PEAK (6 - 9 AM)	86,612	92,746	81,774	75,941	73,306	72,153	76,323	70,855	69,984	70,028
WINTER ANYTIME PEAK	97,770	100,695	89,603	85,444	74,714	78,015	76,323	70,855	76,901	76,716

Graph 10 – Adelaide TP Tariff D Peak Hour Demand

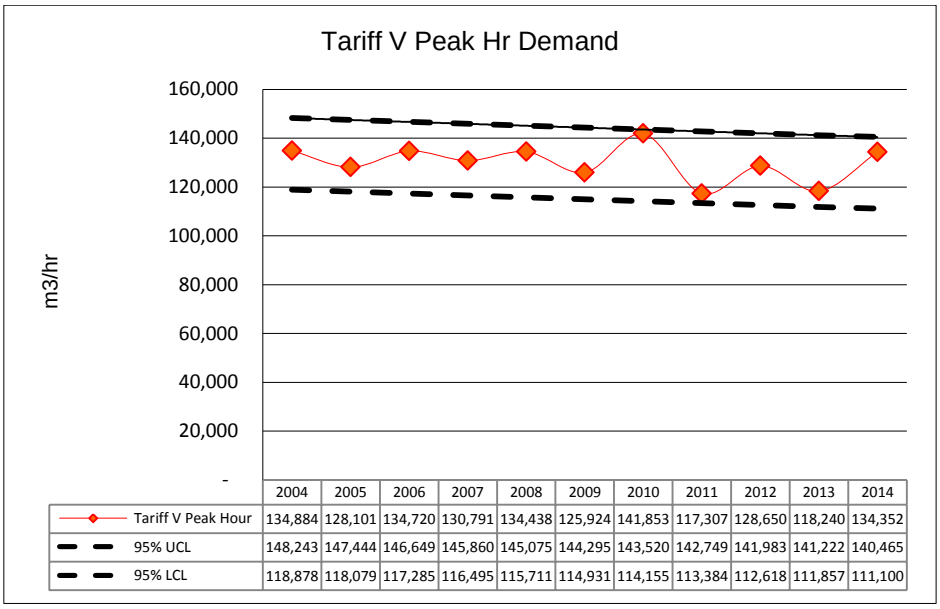
Growth in gas consumption from the Tariff D market sector is expected to generally track in line with overall changes in GDP, potentially adding a further 1,500 m^3/hr annual growth. Historically demand has been relatively flat over the last 5 years, symptomatic of declining manufacturing in South Australia.

Due to the uncertainty of the location and timing of new Tariff D consumers, no allowance has been made for new Tariff D consumers. Should these emerge then the scope, cost and timing of network reinforcement will be evaluated on a case by case basis.

For network capacity modelling purposes the 2014 Tariff D actual maximum winter evening peak has been assumed for the next 5 years.

2.4.2 Adelaide TP Network Tariff V Peak Hour Demand

A net increase in Tariff V (residential and I&C) connections of about 5,500 connections per year is forecast. Based on the current system-wide average peak day and peak hour consumption, an annual increase of about 2,000 m^3/hr/year is expected. However the Tariff V peak hour demand has been reducing as shown in the following graph.



	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Tariff V Peak Hour	134,884	128,101	134,720	130,791	134,438	125,924	141,853	117,307	128,650	118,240	134,352
95% UCL	148,243	147,444	146,649	145,860	145,075	144,295	143,520	142,749	141,983	141,222	140,465
95% LCL	118,878	118,079	117,285	116,495	115,711	114,931	114,155	113,384	112,618	111,857	111,100

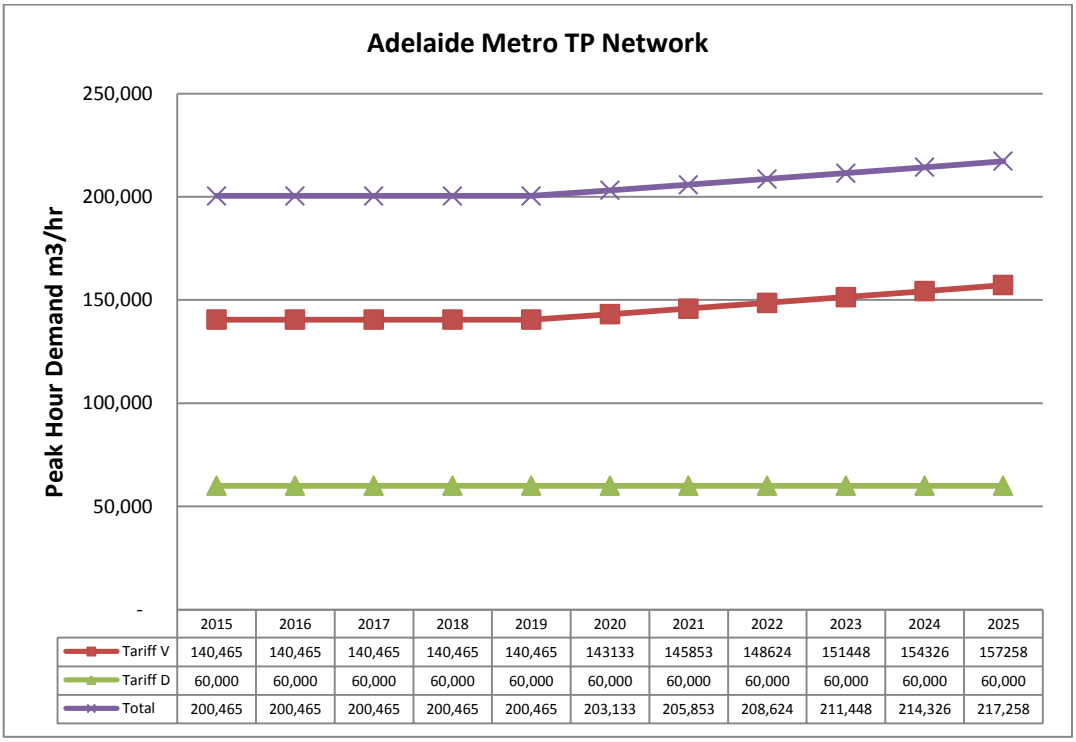
Graph 11 – Tariff V Peak Hour Demand

At some point this reducing trend is expected to be reversed, as a baseline load is reached, and thereafter an increase is expected in line with the increase in number of connections.

For design purposes the 95% UCL (corresponding to a 1:20 year event) has been used as a base line load for the next 5 years, then increasing in line with the annual increase of about 1.9% or about 2,500 m3/hr (commensurate with the long term trend in Tariff V connections).

2.4.3 Adelaide TP Network Peak Hour Demand Forecast

The following graph summarises the forecast design peak demand for the Adelaide Metro TP network



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Tariff V	140,465	140,465	140,465	140,465	140,465	143133	145853	148624	151448	154326	157258
Tariff D	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000
Total	200,465	200,465	200,465	200,465	200,465	203,133	205,853	208,624	211,448	214,326	217,258

Graph 12 – Adelaide TP Network Forecast Peak Hour Demand

Based on the above assumptions, network modelling has confirmed that the Adelaide TP network will have adequate capacity to service the forecast demand. Augmentation may be brought forward should major point loads eventuate at the northern or southern extremities of the network.

2.5 Network Performance

Based on the information presented in the previous sections, the following table summarises the key network performance and capacity issues. The 2014 peak day network capacity analysis has been detailed in the South Australian Networks 2014 DSPR.

Network	Location	Priority	Comments
TP	Adelaide South & Central	2	The 1:25 year capacity design criterion for the Adelaide Metro network has been revised down. The net effect has been for a lower margin applied for a cold winter and coincident customer demand. Extension of the River Road TP main is planned for 2015/16 to address capacity issues at the southern extremity of the HP network (Seaford-Aldinga). No further augmentation of the TP network is envisaged over the next regulatory period. Extension of the TP main in West Terrace completed in 2015 has provided additional capacity to feed the new RAH + major city developments expected in the north west corner of the CBD. Supply to the southern extremities of the network could be impacted by major failures of the Flagstaff Hill and River Road TP mains. An impact assessment will be undertaken in H2 of 2015 to identify options to mitigate the risk.
TP	Adelaide Northern(Elizabeth)	3	Closure of GMH at Elizabeth is expected to free up spare capacity from 2017. A major residential development has been considered for the Roseworthy precinct with over 4,000 homes over the next 25 years. The current outlook is for housing construction to commence around 2017-2018. It is expected that the Roseworthy development will extend from the northern extremity of the current Gawler HP network in the vicinity of main North Road and Sturt Highway. There is capacity to meet demand for several years beyond which major augmentation will be required. This may involve extending the TP main from Kudla to Willaston (approx. 11 km) or a new gate station and supply main off either the MAP or SEAGas Pipeline. The latter could be used to provide future security of supply to AGN's TP pipeline feeding the northern region. Customer growth will be monitored over the next few years. Supply to the northern extremity of the network is vulnerable to a major failure of the TP main supplying Gawler. Options for mitigating risks will be assessed during H2 of 2015 Supply to networks fed from the Yatala Vale TP main could be vulnerable in event of a major failure. Options for mitigating risks will be assessed during H2 of 2015
TP	Adelaide West (LeFevre Peninsula)	N/A	Adequate capacity for at least the next 5 -10 years

Network	Location	Priority	Comments
TP/HP	Virginia Gate station	3	Planned augmentation for this regulatory period (project S34) has been deferred pending the upgrade of the Virginia gate station. This is now expected to proceed during the next regulatory period. The upgrade of the Virginia Gate station will provided additional capacity to meet expected growth in the hydroponic market in this area. Based on forecast growth, augmentation of the HP network will be required circa 2018/19. Duplication of the main ex the gate station is planned. Refer to project business case SA 17 for details.
HP	Gawler	3	Further augmentation is not expected to be required until post the next regulatory period.
HP	Murray Bridge	3	Supply to the Murray Bridge town regulator is by 2km of DN50mm steel main which is approaching its maximum capacity. Augmentation of this pipeline is forecast to be required by the 2019 winter. Refer to business case SA 71 for details.
HP	Seaford Aldinga	3	Ongoing growth in the southern suburbs has required staged augmentation. Stage 4 (SA25) of the current regulatory period augmentation is planned for completion prior to the 2016 winter. Further augmentation is forecast during the next regulatory period. Refer to business case SA 15 for details.
HP/MP	Mt Gambier	N/A	Network augmentation proposed for this regulatory period (project S36) has been cancelled. Mains renewal has improved capacity. New residential developments are opening up towards the north eastern corner of the network, closer to the existing district regulator and trunk infrastructure than had been expected. No further augmentation is expected over the next regulatory period.
MP	Salisbury	3	Augmentation planned for this regulatory period (project S35) has been cancelled as capacity issues have been resolved through the mains replacement program.
MP	Whyalla	N/A	Analysis has shown growth has not materialised as previously expected. The proposed augmentation for this regulatory period (project S30) has been deferred indefinitely - network to be assessed annually.
LP	Adelaide Metro	3	Mains replacement has significantly reduced capacity related issues with this network. No major augmentation required. A nominal amount of reactive augmentation may be required over the next regulatory pending completion of the mains replacement program. Refer to business case SA 14 for details
HP	McLaren Vale	N/A	Supply main extension to township is planned for 2015/16. Supply mains to connect to the Seaford Aldinga network
	Mount Barker	N/A	Plans for residential development within the area for 7,000 additional homes, will increase the population in the area to 35,000 over the next 20 years. Options to supply this township include: • Extending the TP main from Greenhill Rd Tusmore • New supply main from Murray Bridge • CNG/LNG FEED study in 2016

Table 5 – Network Augmentation and Growth Projects

2.6 Network Augmentation Summary

Where network augmentation is required business cases have been developed detailing the scope, drivers, options, risks and costs. These have been referenced in the following table.

Augmentation timing for individual projects has been based on the best available forecast. There will always be a degree of uncertainty associated with the number and location of consumer connections, changes to existing consumer load profiles, and the addition or loss of major I&C consumer loads. To this end the timing and scope of all projects are reviewed annually.

Planned network augmentation projects for the next financial year and next regulatory period have been summarised in the following table.

$'000 (Real 2014/15)									
Ref No	Activity/Project Description	Priority Rating	*FY* 15/16	FY 16/17	FY 17/18	FY 18/19	FY 19/20	FY 20/21	Total AA
SA71	326 TP Murray Bridge Augmentation	3			494	2,517	0	0	3,011
SA14	Reactive Augmentation	3		170	120	75	50	0	415
SA15,	305 HP Seaford Aldinga Augmentation	3		0	0	0	1,336	0	1,336
SA 25	305 HP Seaford Aldinga Augmentation		5,600						0
SA17	325 HP Virginia Augmentation	3		0	0	809	0	0	809
	Total		5,600	170	614	3,401	1,386	0	5,571

Table 6 – Network Augmentation Projects

SECTION 3 - APPENDICES

Appendix 1 – South Australia Networks

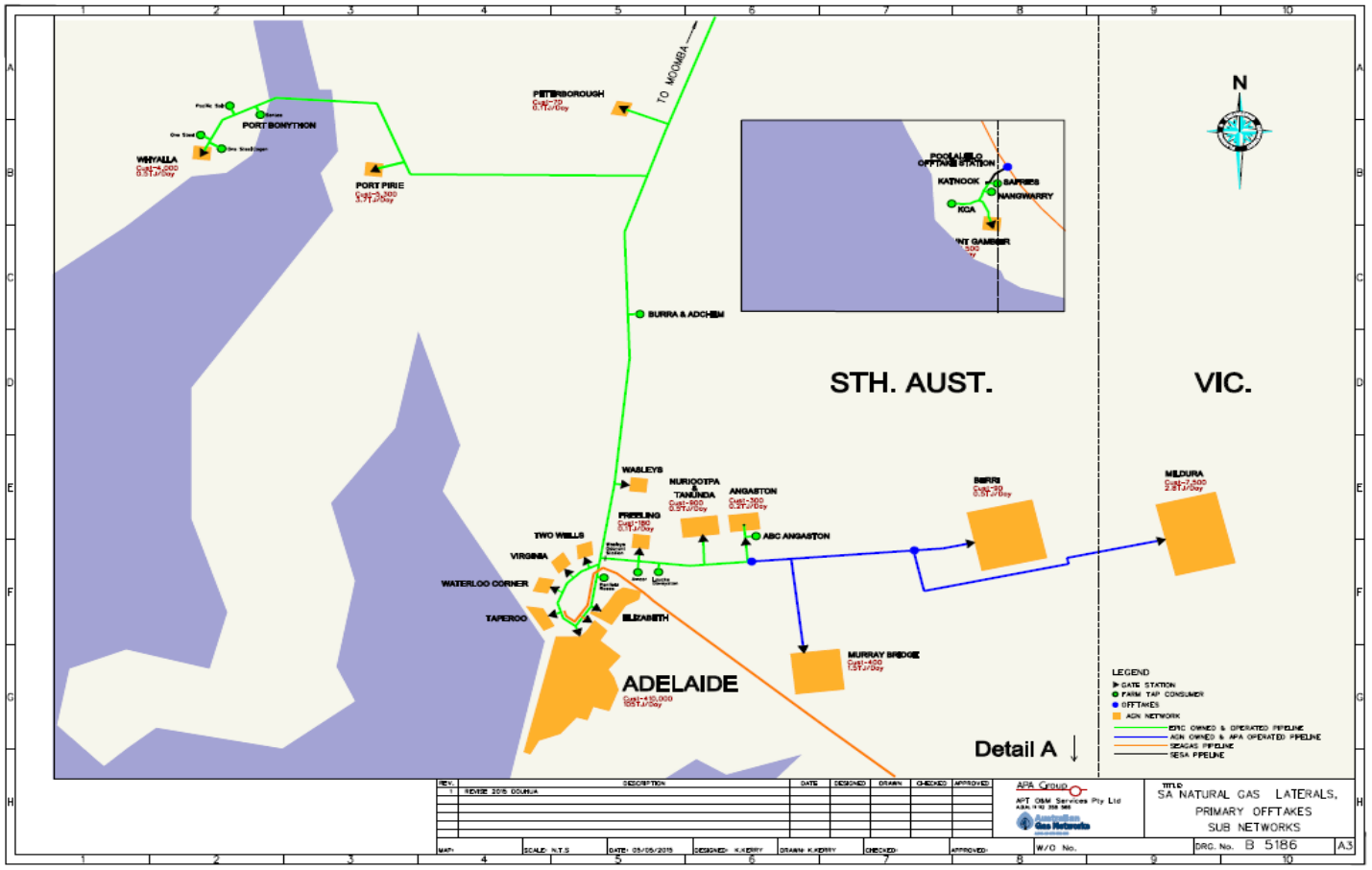


Figure 2 – South Australian Network Location Map

Appendix 2 – Gate Station Locations

No.	Pipeline	Pipeline Owner	Gate Station Location	Gate Station Address	Gate Station Owner	Distribution Network
1	Moomba to Adelaide	Epic	Elizabeth	Corner Mill and Greyhound Rd, Waterloo Corner	Epic	Adelaide Metro
2	Moomba to Adelaide	Epic	Taperoo	Mersey Rd, Taperoo	Epic	Adelaide Metro
3	Moomba to Adelaide	Epic	Gepps Cross	Magazine Rd, Dry Creek	Epic	Adelaide Metro
4	SEAGas	SEAGas	Cavan	Un-named road (formerly Magazine Rd, north of Salisbury Highway – delivery point at Valve 1491)	SEA Gas	Adelaide Metro
5	Moomba to Adelaide (Angaston Lateral)	Epic	Nuriootpa	Barossa Valley Highway, Nuriootpa – delivery point at Valve 1497)	Epic	Nuriootpa Township
6	Moomba to Adelaide (Angaston Lateral)	Epic	Freeling	Gawler Rd, Freeling (south of Nurse Rd)	Epic	Freeling Township
7	Moomba to Adelaide (Angaston Lateral)	Epic	Angaston	Stockwell Rd, Angaston	Epic	Angaston Township
8	Moomba to Adelaide	Epic	Pinkerton Plains	Pinkerton Rd, Pinkerton Plains	Epic	Ridley Agriproducts, Wasleys Piggery Management and Wasleys Piggery Sow Shed Heating
9	Moomba to Adelaide	Epic	Waterloo Corner	Corner Tozer Rd and Symes Rd, Waterloo Corner	Epic	Various I&C customers
10	Moomba to Adelaide	Epic	Virginia	Corner Supple Rd and Park Rd, Virginia	Epic	Virginia Township
11	South East Pipeline System	Epic	Mount Gambier	Nick Lyons Rd, Mount Gambier	Epic	Mount Gambier Township
12	Riverland Pipeline (Murray Bridge Lateral)	AGN	Murray Bridge	Lagoon Rd, Murray Bridge	AGN	TR Meat, National Foods and Murray Bridge Township
13	Moomba to Adelaide	Epic	Peterborough	Cotton Rd, Peterborough	Epic	Peterborough Township
14	Moomba to Adelaide (Port Pirie/Whyalla Lateral)	Epic	Port Pirie	Warnertown Rd, Solomontown	Epic	Port Pirie Township
15	Moomba to Adelaide (Port Pirie/Whyalla Lateral)	Epic	Whyalla	Lincoln Highway, Whyalla	Epic	Whyalla Township
16	Riverland Pipeline	AGN	Berri	Winkie Rd, Glossop	AGN	Berri Township and Various I&C customers

Table 7 – SA Network Gate Stations