# Attachment 8.1

Asset Management Plan

**2016/17 to 2020/21 Access Arrangement Information**

Australian Gas Networks

# SOUTH AUSTRALIA NETWORKS

# ASSET MANAGEMENT PLAN

**June 2015**

**ACCESS ARRANGEMENT INFORMATION Attachment 8.1**

**Prepared By**

National Manager, Asset Strategy & Planning, APA [redacted]

**Approved By:**

General Manager, South Australian Networks, APA [redacted]

**Approved By:**

Manager, Operations & Engineering, AGN [redacted]

**Distribution List**

| Manager | Title |
|---|---|
| [redacted] | Group Executive Networks |
| [redacted] | General Manager, SA Networks |
| [redacted] | Manager, Planning & Engineering |
| [redacted] | Manager, System Operations |
| [redacted] | Manager, Network Expansion |
| [redacted] | National Manager, Asset Strategy & Planning |
| [redacted] | South Australian Asset Planning Manager |
| [redacted] | National Manager, Mains Replacement |
| [redacted] | Operations and Engineering Manager – AGN |

**Reference Documents**

| Version | Title |
|---|---|
| | SA Networks 2015 Mains Replacement Plan |
| | SA Networks 2015 Capacity Management Plan 2015 |
| | SA Networks 2014 Distribution System Performance Review |

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**Abbreviations**

| Abbreviation | Definition |
|---|---|
| AEMO | Australian Energy Market Operator |
| AMP | Asset Management Plan |
| CAPEX | Capital Expenditure |
| CI | Cast Iron |
| CMP | Capacity Management Plan |
| CP | Cathodic Protection |
| DCVG | Direct Current Voltage Gradient |
| DRS | District Regulator Stations |
| DSPR | Distribution System Performance Review |
| ESAA | Energy Supply Association of Australia |
| ESCOSA | Essential Services Commission of South Australia |
| GIS | Geospatial Information System |
| FRC | Full Retail Contestability |
| FEED | Front End Engineering Design |
| HP | High Pressure |
| HSE | Health Safety and Environment |
| I&C | Industrial and Commercial |
| ICCP | Impressed Current Corrosion Protection |
| ILI | Inline Inspection (also known as pigging) |
| IRR | Internal Rate of Return |
| KPI | Key Performance Indicator |
| LP | Low Pressure |
| MAOP | Maximum Allowable Operating Pressure |
| MinAOP | Minimum Allowable Operating Pressure |
| MAP | Moomba to Adelaide Pipeline |
| MP | Medium Pressure |
| MRP | Mains Replacement Plan |
| NPV | Net Present Value |
| OPEX | Operating Expenditure |
| OTR | Office of the Technical Regulator |
| PE | Polyethylene |
| ROI | Return on Investment |
| SA | South Australia |
| SCADA | Supervisory Control and Data Acquisition |
| SIB | Stay In Business |
| SMS | Safety Management Study |
| SP | Protected Steel |
| TP | Transmission Pressure |
| UAFG | Unaccounted for gas |
| UPS | Unprotected Steel |
| WMS | Works Management System |

## PREFACE

This Asset Management Plan (AMP) provides the South Australian Networks business a consolidated view of network asset lifecycle issues and associated expenditure requirements. The AMP is derived from number of key operational and technical plans and is a key input into the development of the business plans, including regulatory submissions.

The AMP is structured into 9 Sections:

- ***Section 1 Executive Summary*** - Overall summary of network performance, integrity and growth
- ***Section 2 General*** - Scope and organisation structure
- ***Section 3 Asset Management*** - Overview of asset; management processes, drivers and performance objectives
- ***Section 4 Network Description*** - Overview of the physical network.
- ***Section 5 Regulatory Compliance*** – Overview of regulatory framework, reporting and audits
- ***Section 6 Asset Performance*** - Summary of asset performance and condition
- ***Section 7 Supply and Demand***- Summary of consumer demand and network capacity issues
- ***Section 8 Asset Life Cycle Plans*** – Overview of network asset lifecycle key issues, risks and actions
- ***Section 9 CAPEX and OPEX Plan*** – Summary of growth, replacement and stay in business requirements

Data tables presented in this AMP have been aggregated from a number of different sources and may be a mix of financial year and calendar year statistics.

# Section - 1 EXECUTIVE SUMMARY

The following section summarises key network asset performance, integrity, operational and growth issues.

Details of CAPEX and OPEX expenditure addressing asset lifecycle issues have been summarised in Section - 9 of this document.

## 1.1 Asset Condition & Integrity

*Mains & Services*

1. Replacement of predominately CI and UPS LP mains over the first three years of the current regulatory period has exceeded the regulatory benchmark length by 25 km. Planned replacement for 2014/15 and 2015/16 will result in a replacement of 1172[1] km over this current period, 100 km higher than the regulatory benchmark.

   The higher level of replacement at the end of the current period reflects recent risk analysis that has seen a need to commence replacement of vintage PE pipe.

2. The CI and UPS replacement program has been effective in improving the integrity and reliability of the network as summarised by the following key performance indicators:

   - 50% reduction (1055) in CI and UPS mains and service leaks since 2010;
   - 36% reduction (136) in CI mains breaks since 2010;
   - 34% reduction (730 TJ) in the Adelaide network UAFG since 2010; and
   - 60% reduction in customer reported supply complaints related to water in mains.

[redacted]

[1] Includes 69 km of HDPE replacement planned over 2014/15 and 2015/16

[redacted]

3. The key elements of the mains replacement program over the next regulatory period will be:
    - Replacement of all remaining CI and UPS mains (approximately 862 km of predominately LP CI and UPS mains);
    - Replacement of about 1300, predominately UPS, multi-user inlet services;
    - Replacement of all remaining 260 km of MP Class 250 HDPE; and
    - Replacement of 151 km MP and HP Class 575 HDPE identified as being at highest risk.
4. Significant corrosion underneath heat shrink sleeves used on transmission pressure (TP) mains has been detected at a number of locations within the Adelaide metropolitan area. As a result the following actions are being taken:
    - Replacement of a section of TP mains from Port Stanvac to Port Noarlunga; and
    - Additional dig ups and remediation of the TP main to Flagstaff Hill.
5. Coating defects categorised as "low level" through DCVG surveys have shown significant corrosion activity beneath the coating at a number of locations on TP mains. Additional DCVG surveys and investigation are planned across all coated steel mains.
6. A corrosion inspection program of TP sleeved steel pipe crossings commenced in this current regulatory period with a further 55 sites to be inspected over the next regulatory period. These sites are vulnerable to water ingress and corrosion as they cannot be effectively protected by the cathodic protection system.
7. A program has commenced to grit blast and paint key below ground network isolation valves in this current regulatory period with a further 80 valves to be completed over the next regulatory period.
8. Six TP network primary isolation valves have become inoperable. A replacement program is planned over the next regulatory period.

### *Network Facilities*

1. The TP below ground regulator replacement program commenced this regulatory period will continue into the next regulatory period. These facilities are subject to water ingress and corrosion issues as well as maintenance HSE hazards. In total, 36 facilities will be replaced with a modern and safer design.
2. A grit blast and painting program has commenced to address corrosion of pipework and valves at many I&C metering facility sites with about 500 to be completed over the current period and a further 300 planned over the next regulatory period.

## 1.2 Network Performance, Growth & Development

1. The replacement of the CI and UPS LP networks is having a significant impact on network reliability with a reduction in water in main related consumer supply issues as well as a reduction in reactive network augmentation projects.

2. The cessation of operations at GMH's Elizabeth plant in 2017 will release capacity in the northern TP network deferring augmentation of this network until after the next regulatory period.

3. The peak hour and annual network demand within the Adelaide network has been trending down over the last 10 years. 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.

   As a result the 1:25 Adelaide TP network demand design criterion has been revised downwards. This reduces the design "margin" to a less conservative level, deferring augmentation that otherwise may have been required.

4. Shippers faced significant 'imbalance' costs during the 2013 winter due to a physical constraint of delivering SEAGAs gas 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 Victoria to flow into the northern region of the Adelaide network.

5. A major residential development has being 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 initial growth will be serviced from the existing Gawler HP network with potential for significant augmentation required post the next regulatory period.

6. Tariff V growth in the Seaford-Aldinga HP network has triggered augmentation involving a 1.5 km extension of the transmission main, a TP-HP regulator and 1.8 km HP PE trunk main planned to be completed by the 2016 winter. Further growth is forecast with the next stage of augmentation (2 km DN280 HP PE) planned over the next regulatory period.

7. The TP supply main to the Murray Bridge Township is approaching its capacity limit with growth triggering augmentation (2km DN 150 TP Steel Main) over the next regulatory period.

8. Growth of demand from hydroponic market garden producers in the Virginia HP network is expected to trigger augmentation (2km DN180 PE) of the supply main to this network over the next regulatory period.

9. Two step out developments are progressing with gas to Tanunda expected to be completed by mid-2015 and a plan to extend a trunk supply main to McLaren Vale planned to commence during FY 2015/16.

10. A step out development north of Two Wells requiring a 4.9 km trunk supply main is forecast over the next regulatory period.

11. A front end engineering design (FEED) study is planned during the next regulatory period to assess supply options and viability of gas supply to a step out development in Monarto.

## 1.3 Operational Risks/Issues

1. Details of inlet services for major I&C and unit development sites are not readily available to operation and maintenance personnel. This information is not forwarded through to dial before you dig (DB4YD) leaving these assets susceptible to 3rd party damage. A program has commenced and will continue over the next regulatory period to capture and record these assets.

2. Potential for fire to damage the above ground facilities at domestic meter facilities exacerbating the fire risk. A program to install thermally activated shut off valves and replacement of above ground PE services and fittings has been planned over the next regulatory period to reduce the risk.

3. A number of TP district regulator facilities have inadequate over pressure protection and/or where components no longer supported by the manufacturer. A program to install OPSO valves and replace obsolete components is planned over the next regulatory period.

4. A program to provide real time "health" check of TP regulators via SCADA pressure monitoring has commenced with 26 sites to be completed over the current regulatory period and a further 24 over the next period planned.

5. Some HP domestic regulators may not have adequate relief capacity. A program has commenced with about 13,000 to be replaced over the current regulatory period and a further 10,000 over the next period planned.

6. A number of odorant facilities at gate stations and farm taps are at risk to vandalism or potential terrorist attack. A program to install high security fencing is planned over the next regulatory period.

7. A number of customer metering facilities do not comply with location standards as result of changes at the consumer's premises or are located in vulnerable positions, exposed to third party damage. A program to relocate meter from inside buildings and vulnerable positions is planned over the next regulatory period.

8. Some older SCADA telemetry modems will be incompatible with the planned shutdown of Telstra's 2G and move to 4G communication protocol. A program of modem replacement is planned over the next regulatory period.

9. A program to install impressed current corrosion protection units, to provide more effective corrosion control on key steel trunk mains, is progressing with an additional 6 units required over the next regulatory period to complete the program.

# Section - 2 GENERAL

## 2.1 Scope

This plan covers the asset lifecycle of AGN's South Australian networks. The lifecycle of assets relates to the cycle of planning, creating, operating and maintaining assets throughout their period of service, through to replacement or removal from service.

This plan covers assets in two core operating regions:

1. Adelaide Metropolitan
2. Regional South Australia covering:
    a. Mount Gambier
    b. Whyalla
    c. Port Pirie
    d. Peterborough
    e. Murray Bridge
    f. Berri
    g. Virginia
    h. Angaston

Refer to Appendix 1 for network map overview.

The network assets covered by this plan include:

- Transmission Mains
- Transmission Facilities
    - Gate Stations
    - Odorant Facilities
- Distribution Mains and Services
- Distribution Facilities
    - District Regulator Stations
    - Network Valves
    - Cathodic Protection System
- Consumer Metering Facilities
    - Residential
    - Industrial and Commercial
    - Demand Interval
- Network SCADA Monitoring Facilities

## 2.2 AGN and APA Relationship

AGN is the holder of the gas transmission and distribution licences for the South Australian natural gas assets. AGN has contracted APT Operation & Maintenance Services (referred to in this document as "APA") to install, operate and maintain its gas infrastructure assets. In doing so APA must comply with all applicable laws and authorisations. APA is responsible for all aspects of the operation and management of the networks in accordance with prudent and accepted industry standards.

## 2.3 Key Stakeholders

The AMP is required to address the different requirements of the key stakeholders that have a vested interest in the management of the assets.

| | |
|---|---|
| • AGN | Owner of the network assets |
| • APA | Asset Manager |
| • Office of the Technical Regulator (OTR) | Technical regulator of the assets |
| • Australian Energy Regulator (AER) | Economic regulator of the assets |
| • Essential Services Commission SA (ESCOSA) | Licensor |
| • Retailers and consumers | Users of the services provided by the asset |

The key asset management requirements of each stakeholder are summarised as follows:

- AGN - as owner of the assets, requires that APA adopts appropriate asset management practices based on regulatory obligations, accepted industry codes and standards, consistent with those of a prudent network operator, and ensures that the network assets are managed in a safe, efficient and economic manner.

- APT O&MS (APA) - as the entity responsible for the day-to-day operation and management of the network assets, is required to ensure that AGN's requirements as described above are fulfilled, which in turn means fulfilling all regulatory and technical requirements.

- The Office of the Technical Regulator (OTR) - requires compliance with legislative and industry safety, reliability and maintainability standards.

- Australian Energy Regulator (AER) - requires economically efficient operating costs and seeks to ensure that network charges are reflective of prudent capital investment; requires compliance national codes and guidelines.

- Retailers and Consumers – require that a safe, secure and reliable supply of gas is provided at a reasonable cost, and a high level of service is delivered in response to gas supply problems and associated issues.

## 2.4 Organisation

### *2.4.1 AGN*

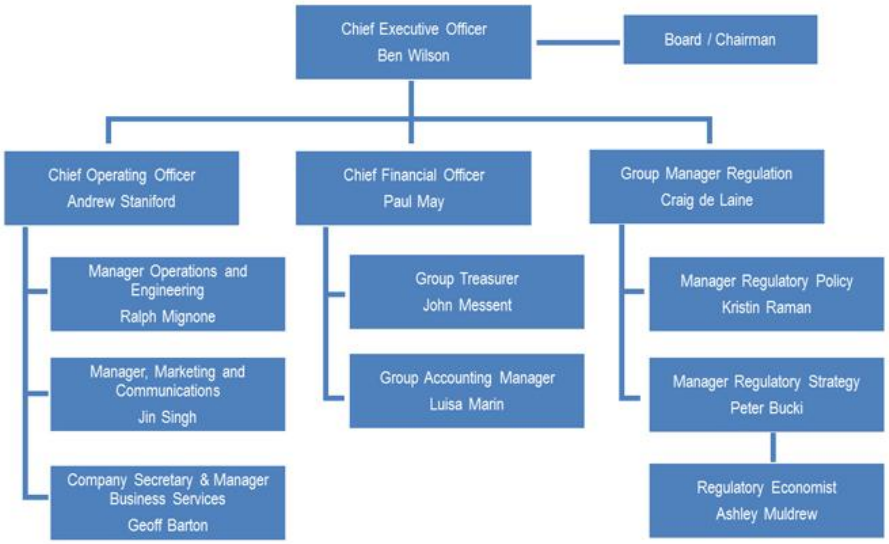



Figure 1 – AGN Organisation Structure

### *2.4.2 APA*

APA manages the network and is responsible for the safety, reliability and integrity of the network. All day to day, installation, operation and maintenance activities associated with AGN networks are carried out by APA.

The key positions and functions of the APA organisation are shown below.

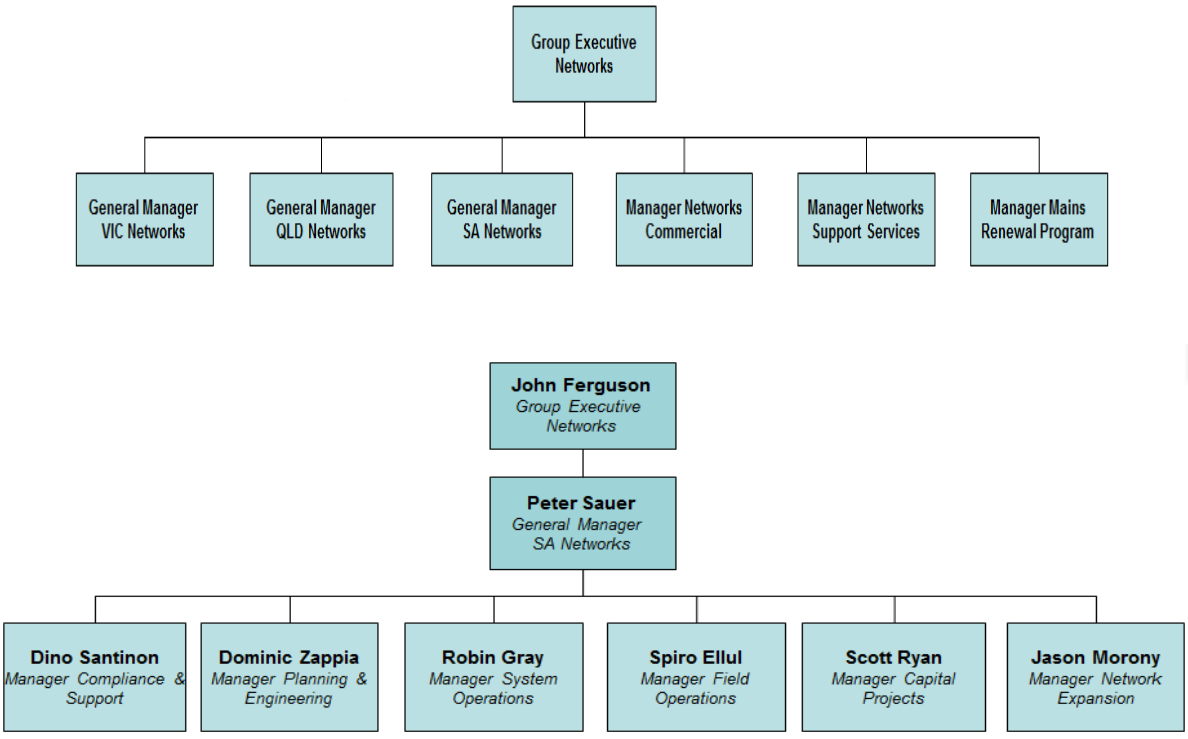



Figure 2 - APA Organisation Structure

## 2.5 Asset Management Vision

The following figure summarises APA's philosophy to delivering optimal outcomes for the asset owner, regulators and consumers.

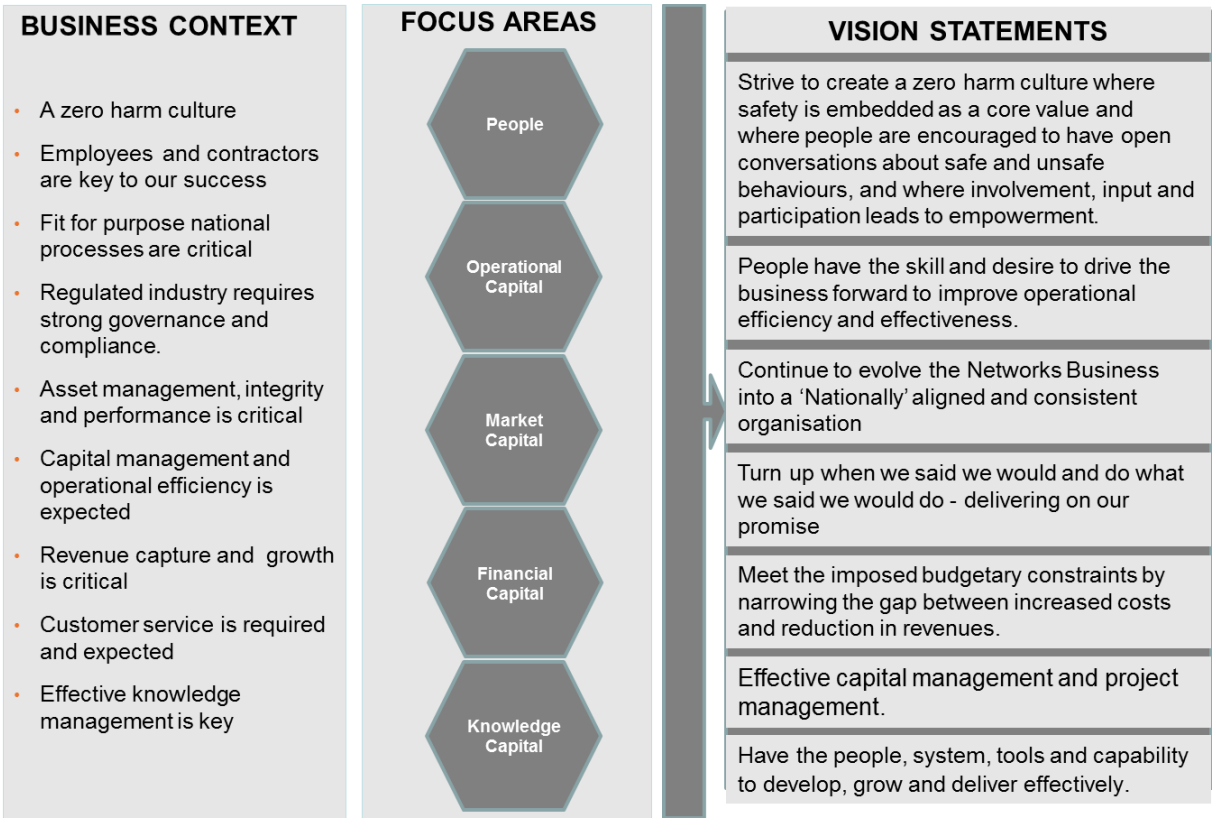



Figure 3 - APA Asset Management Vision

## 2.6 Safety

APA's operational activities are underpinned by its Health, Safety and Environment (HSE) Policy and safety Management System "Safeguard", which has been developed to deliver on its HSE commitments, including providing a zero harm work environment.

APA Group

**Health, Safety and Environment (HSE) Policy**

**At APA we aspire to provide a safe place of work. We are committed to the effective implementation of our HSE policy and to the continual improvement in our HSE performance.**

To achieve this APA Group will:

- Provide leadership and direction to drive accountability for our HSE performance.
- Document, implement and maintain an appropriate Safety Management System.
- Comply with applicable HSE legislation and best practice requirements to which APA Group subscribes.
- Establish and regularly monitor measurable objectives and targets to ensure continued improvement against established standards.
- Communicate HSE commitments and information to employees, contractors and other relevant stakeholders.
- Proactively reduce the risk of injury by investigating all reported accidents, incidents and near misses promptly and taking appropriate actions to prevent a reoccurrence.
- Provide appropriate training, supervision, specialist support and other resources to HSE matters.
- Consult and engage with our employees and other stakeholders to build relationships based on our values for meeting the goals of our HSE Policy.
- Partner with companies having similar HSE standards and values as APA Group.
- Ensure processes are in place for the prevention of pollution.

**General Responsibilities for Health, Safety & Environment**

**Every employee** (permanent or temporary) has an obligation to look after their own health and safety and the safety of those who may be affected by their acts or omissions. They must comply with the group's HSE policies and procedures. They must report all accidents, incidents and near misses.

**All managers and supervisors** are responsible for managing HSE in accordance with the group policy and our Safety Management System as an integral and mandatory duty of their position.

**Contractors and sub-contractors** have an obligation to look after their own health and safety and the safety of those who may be affected by their acts or omissions. They must have a system that complies with all applicable health, safety and environmental legislation and local site rules or with the APA Group HSE policies and procedures.

Mick McCormack – Managing Director / CEO

APA safeguard

Document: APA HSE POL 001 Version: 4.00 Date: 06/07/2012 Page 1 of 1 pages

The policy is subject to review every three years. Next review is due by 06/07/2015

Figure 5 - APA HSE Policy

# Section - 3 ASSET MANAGEMENT PROCESSES

## 3.1 Overview

APA's asset management processes follow a Plan, Do, Check, Act cycle, supported by a continuous improvement culture. This is in line with good asset management practice as defined in PAS55 2008 and ISO 55000.


Figure 4 - Asset Management Cycle

.

**Plan** Annual and 5 year Capex and Opex Plans are developed based on assessment of cost, risk, performance, reliability, condition and asset owner objectives.

**Do** Projects and activities are executed in accordance with approved budgets.

**Check** Key performance safety, finanancial, regulatory, reliability, condition and service indicators are reviewed monthly by the senior Network Management team.

**Act** Issues and risks that arise are assessed, with risk mitigation actions implemented as required. These are used in the development of the next cycle of the AMP that supports the annual and 5 year business and financial plans.

## 3.2 Risk Management

APA Group uses a formalised and systematic approach to risk management.

This risk management system recognises that some element of risk will always be present within the business. The aim is to eliminate risk where practicable, or alternatively put in place processes and procedures to manage and/or minimise the consequences.

For operational purposes, the process of Risk Analysis within AGN's networks involves identification of risks and evaluating likelihood and consequence referencing risk management protocols outlined in:

1. APA Group Risk Management Policy;
2. AS/NZS 4360 – Risk Management;
3. AS2885 – Pipelines Gas & Liquid Petroleum;
4. AS 4645.1:2008 Gas Distribution Networks – Network Management;
5. AS 4645.2:2008 Gas Distribution Networks – Steel Pipe Systems;
6. AS 4645.3:2008 Gas Distribution Networks – Plastic Pipe Systems.

The risk management process is summarised in the following diagram:

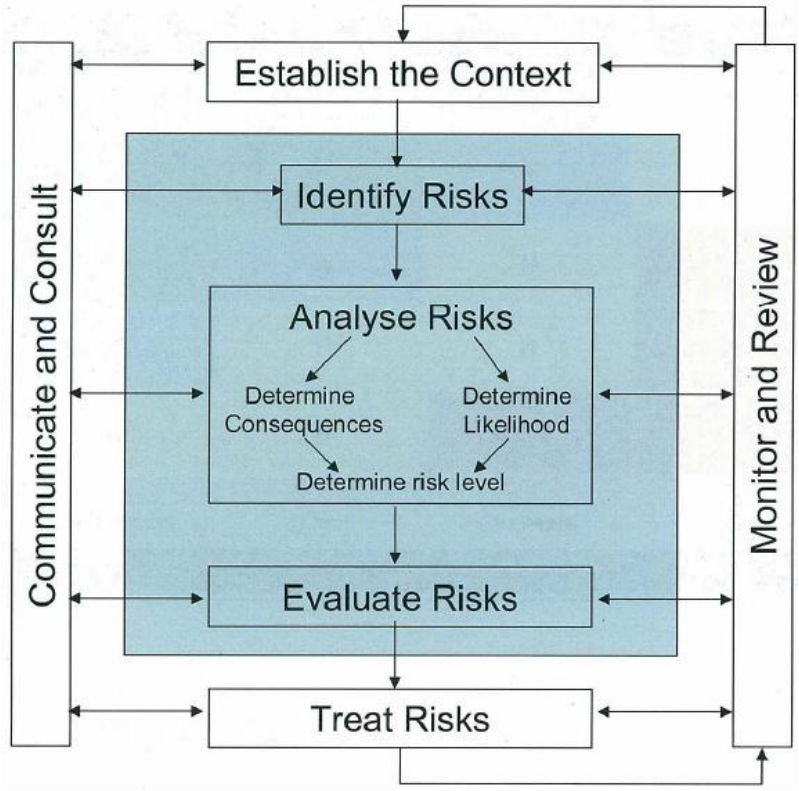



Figure 6 - Risk Management Process

Risks are assessed and prioritised within AGN's networks based on the following risk matrix, likelihood and consequence criteria.

| Likelihood | Insignificant | Minor | Medium | Significant | Major | Catastrophic |
|---|---|---|---|---|---|---|
| Almost Certain | Low 11 | Moderate 19 | High 27 | Extreme 31 | Extreme 34 | Extreme 36 |
| Likely | Low 09 | Moderate 17 | High 23 | High 28 | Extreme 32 | Extreme 35 |
| Occasional | Low 07 | Low 10 | Moderate 18 | High 24 | High 29 | Extreme 33 |
| Possible | Negligible 04 | Low 08 | Moderate 14 | High 20 | High 25 | High 30 |
| Unlikely | Negligible 02 | Low 05 | Moderate 12 | Moderate 15 | High 21 | High 26 |
| Rare | Negligible 01 | Negligible 03 | Low 06 | Moderate 13 | Moderate 16 | High 22 |

| Risk Level | Risk Management Actions |
|---|---|
| Extreme | Immediate action required and risk monitored at Board level |
| High | Shall be brought to the immediate attention of Executive Management. |
| Moderate | Shall be assigned for responsibility of specific Manager. |
| Low | Shall be managed by routine procedure. |
| Negligible | Review Periodically to ensure risk has not increased |

Figure 7 - Risk Matrix

| Level | Descriptor | Description | Frequency |
|---|---|---|---|
| 6 | Frequent | Is currently occurring, and can be expected to occur on a regular and repeating basis | More than once in any 1 year (1:1) |
| 5 | Likely | Can be expected to occur in many circumstances | No more than once in 2 years (1:2) |
| 4 | Occasional | Has been known to occur when certain circumstances prevail | No more than once in 5 years (1:5) |
| 3 | Possible | May occur when certain circumstances prevail | No more than once in 25 years (1:25) |
| 2 | Unlikely | Unlikely to occur unless arising from abnormal circumstances | No more than once in 100 years (1:100) |
| 1 | Rare | Conceivable, but has not been known to arise previously | Less than once in 100 years (<1:100) |

Table 1- Risk Likelihood

| Consequence Categories | Impact (Consequence) Rating | | | | | |
|---|---|---|---|---|---|---|
| | Insignificant | Minor | Medium | Significant | Major | Catastrophic |
| Health & Safety | [1]First aid treatment only with the ability to return to work immediately | External medical treatment but excluding hospitalisation with the ability to return to work the next work day | Injury or illness requiring hospitalisation and resulting in the inability to return to work the next day (LTI) | Permanent partial disability | Fatality OR life threatening injuries OR permanent total disability | Multiple fatalities |
| Environmental | Limited impairment to minimal area of low significance | Short-term (less than 12 months) temporary impairment to the biological or physical environment of a very localised area (<0.1ha) | Prolonged (more than 12 months but less than 2 years) reversible impairment to the biological or physical environment of a localised area (<1ha) which is easily rectified and which does not affect ecosystem function | An uncontrolled off-site release or event resulting in reversible prolonged (more than 2 years but less than 5 years) impairment to the environment but which does not affect ecosystem function | An uncontrolled off-site release or event in wide area resulting in reversible long-term environmental impairment of ecosystem function | Uncontained, long-term serious environmental degradation OR permanent impairment to ecosystem function or habitat |
| Operational | Temporary delay in service delivery with no material effect to operations | • Temporary delay to service with minimal effect to operations in which the business would return to normal almost immediately OR<br>• Loss or interruption to services to less than 100 tariff consumers/day OR parameters not met to 1 contract customer of the Networks Business OR<br>• Short-term (less than 12 months) temporary partial impairment to operational efficiencies | • An interruption of less than 7 days and restriction of operations but with shortfall met from other sources OR<br>• Loss or interruption to services to more than 100 but less than 1,000 tariff consumers/day OR more than 1 but less than 5 contract customers of the Networks Business OR<br>• Prolonged (more than 12 months but less than 2 years) temporary partial impairment to operational efficiencies | • An interruption of more than 7 days but less than 1 month and restriction of operations with shortfall substantially met from other sources OR<br>• Loss or interruption to services to more than 1,000 but less than 10,000 tariff consumers/day OR more than 5 but less than 10 contract customers of the Networks Business OR<br>• Permanent partial impairment to operational efficiencies | • An interruption of more than 1 month but less than 1 year and restriction of operations with shortfall only partially met from other sources OR<br>• Loss or interruption to services to more than 10,000 but less than 100,000 tariff consumers/day OR with Network area growth Affected OR more than 10 but less than 20 contract customers of the Networks Business OR<br>• Permanent substantial impairment to operational efficiencies | • An interruption of more than 1 year and restriction of operations with shortfall unable to be met from other sources OR<br>• Loss or interruption to services to more than 100,000 tariff consumers/day OR more than 20 contract customers of the Networks Business OR<br>• Permanent loss of operational efficiencies |

| Consequence Categories | Impact (Consequence) Rating | | | | | |
|---|---|---|---|---|---|---|
| | Insignificant | Minor | Medium | Significant | Major | Catastrophic |
| Customers | Complaint received from a small number of commercial consumers in the Networks Business | Short-term (i.e., over a single financial period) impairment to the relationship with 1 or more Non-Major Customers[2] | Long-term (i.e., over multiple financial periods) impairment to the relationship with 1 or more Non-Major Customers (as defined) | ▪ Short-term (i.e., over a single financial period) impairment to the relationship with 1 or more Major Customers[3] OR<br>▪ Loss of 1 or more Non-Major Customer (as defined) | Long-term (i.e., over multiple financial periods) impairment to the relationship with 1 or more Major Customers (as defined) | Loss of 1 or more Major Customers (as defined) OR loss of 2 or more Material Contracts for the provision of services to 1 or more Major Customers (as defined) |
| Reputational | Isolated adverse comments from stakeholders[4] | Isolated adverse local media coverage | Short-term impairment to reputation as perceived by stakeholders (as defined) OR prolonged adverse local media coverage | One-off negative report by financial analyst/s OR isolated adverse national media coverage | Long-term impairment to reputation as perceived by stakeholders (as defined) OR repeated negative reports by financial analyst/s OR extended adverse coverage in national media | Prolonged condemnation by stakeholders (as defined) and/or in the national or international media |
| Compliance | Immaterial non-compliance with an operational license OR a legal/regulatory obligation OR a contractual obligation which can be resolved internally without the involvement of an external party or negotiation between the counterparties OR informally with the regulatory authority or counterparties | Immaterial non-compliance with an operational license OR legal/regulatory obligation or a debt covenant which must be reported to a regulatory authority or lender OR an immaterial non-compliance with a contractual obligation which can only be by negotiation between the counterparties | Material non-compliance with an operational license OR legal/regulatory obligation or a debt covenant in respect of which a regulatory authority or lender requires a formal explanation and a corrective action plan OR a material non-compliance with a contractual obligation which can be resolved through arbitration between the counterparties | Material non-compliance with an operational license OR a legal/regulatory obligation or a debt covenant which results in an independent investigation by a regulatory authority or lender OR a material non-compliance with a contractual obligation which results in litigation between the counterparties | Material non-compliance with an operational license OR a legal/regulatory obligation or a debt covenant which results in prosecution, fines and/or the imposition of restrictions on the operation of the business and/or the temporary loss of a credit rating OR a material non-compliance with a contractual obligation which results in the temporary cessation of a contract | Material non-compliance with a license OR a legal/ regulatory obligation OR a debt covenant which results in the loss of operational licenses OR in gaol terms for executives and/or the permanent loss of a credit rating or the permanent cessation of a contract |
| Financial | A negative impact (cumulative) of up to A$1M | A negative impact (cumulative) of more than $1M but less than $5M | A negative impact (cumulative) of more than $5M but less than $10M | A negative impact (cumulative) of more than $10M but less than $20M | A negative impact (cumulative) of more than $20M but less than $75M | A negative impact (cumulative) of more than $75M |

Table 2 – Risk Consequence

[2] Customers which are not in the top 20% of customers as measured by revenue generated
[3] Customers which are in the top 20% of customers as measured by revenue generated)
[4] Includes employees, customers, suppliers, financiers, regulators, special interest groups (e.g., Australian Shareholders' Association), security-holders, financial analysts, credit-rating agencies, etc.

## 3.3 Asset Management Objectives

The key asset management objectives are:

1. Safety – To maintain and operate assets to the extent that the risks to employees, contractors and the public are maintained as low as reasonably practicable.

2. Regulatory Compliance – To meet all regulatory requirements associated with the Gas Distribution Licence.

3. Environmental - To maintain and operate assets so that the risks to the environment are kept as low as reasonably practicable.

4. Economic – To ensure that costs are prudent, efficient, consistent with accepted industry practices and necessary to achieve the lowest sustainable cost of providing gas distribution services.

5. Customer Service – To maintain and operate assets consistent with meeting customer and industry expectations (connections, meter reading, reliability of supply).

## 3.4 Asset Performance Objectives

*Transmission & Distribution Mains*

1. Capacity sufficient to maintain supply under 1 in 25 year conditions.
2. Pressure maintained above recommended minimum values at network extremities.

*Network Integrity*

1. No harm to persons or property due to network failure.
2. Total mains and service leaks reported per km of main reduce over time.
3. The moving annual 12-month UAFG reduces over time up to the point where the level is considered acceptable for the characteristics of the network.
4. The number of 3rd party damages per km of main reduces over time.
5. Networks do not exceed their MAOP.
6. Supply pressures are reliably controlled to maintain adequate end of mains pressures, above recommended minimums, with no loss of supply.

*Metering*

1. Metering accuracies are maintained within tolerances specified in the Gas Metering Code.
2. Timeframes for installation, upgrading and maintenance are in accordance with the Gas Metering Code.
3. Metering data is supplied within the timeframes specified by the Retail Market Procedures and in accordance with the Gas Metering Code.

*SCADA Facilities*

1. Sufficient monitoring and control is in place to enable efficient planning and emergency response.
2. Demand customer data is accurate, validated (estimated/substituted) and supplied in accordance to the Retail Market Procedures and the Gas Metering Code.

*Odorisation Facilities*

Control the injection of odorant such that natural gas can be detected at 20% of the LEL.

## 3.5 Asset Service Life

The following table summarises the expected useful life of network assets.

| Asset | Years |
|---|---|
| **Mains & Services** | 60 |
| **Pressure Regulating Facilities** | 40 |
| **Meters** | 15 |
| **SCADA Facilities** | |
| Field Based Hardware | 10 |
| Base Station Hardware | 5 |
| Software | 5 |

Table 3 - Asset Life

## 3.6 Asset Lifecycle Processes

This section describes the key processes, procedures and controls associated with the lifecycle management of AGN's network assets. The asset life cycle has been defined as:

- Planning and Creation
- Operation and Maintenance
- Refurbish/Replace

### *3.6.1 Planning & Creation*

Planning and creation looks at current and future customer growth and load demands, asset performance and service needs and securing the necessary approvals for network augmentation expenditure. Once approved, producing specifications and undertaking the construction, installation and commissioning of network assets.

*Planning Horizons*

An annual rolling 5-year Asset Management Plan is maintained. Year 1 of the plan represents firm requirements for the next financial year, while subsequent year forecasts are indicative reflecting forecast consumer growth and utilisation rates, network performance and condition.

Mains replacement is based on a 10-20 year outlook of risk, performance and condition/integrity.

Extending mains to new estates or major industrial consumers is based on cost-benefit analysis using a 20-year horizon.

Major network augmentation projects are evaluated based on a 10-20 year horizon.

*Key Financial Controls*

Network asset creation, like in any business, must be subject to appropriate cost controls. The following financial controls ensure that creation of assets only occurs in accordance with established prudential approval processes:

1. All domestic mains extensions, I&C connections and mains replacement projects are based on documented customer requirements and evaluated using a NPV based model that compares cost and benefit over time.
2. Standard Financial Models, controlled by the Commercial Group, are used for assessment of all network growth CAPEX projects.
3. All CAPEX projects are subject to the preparation of a formal business case/justification requiring senior APA management approval.
4. Projects less than $500k are approved by the APA General Manager on behalf of AGN, provided the projects are in the approved annual budget and satisfy the required rate of return criteria.
5. All projects in excess of $500k require AGN approval.
6. Projects in excess of $5m require AGN Board approval.
7. APA reports to AGN monthly on progress against capital budget and progress for all capital projects approved. In addition to this, AGN's internal auditors periodically audit the CAPEX approval process.

### *3.6.2 Operation & Maintenance*

AGN's approach to network operation and maintenance is detailed in the SRM&T Management Plan.

Operation and Maintenance involves three principal sub-processes:

1. Surveillance & Monitoring
2. Preventative Maintenance
3. Corrective Maintenance

The following data collection occurs in each sub process to assist in making asset management decisions:

1. Network Surveillance & Monitoring
    - Telemetry pressure point and demand customer monitoring
    - Pressure monitoring using chart recording
    - Pipeline patrol and inspection
    - Cathodic protection monitoring
    - Coating survey
    - Leak Survey
    - Inspection of special crossings
    - Odorant monitoring
    - Gas quality monitoring

2. Preventative maintenance to reduce the probability of failure:
    - Regulator maintenance
    - Valve maintenance
    - Cathodic protection maintenance
    - Telemetry system maintenance
    - Meter maintenance (I&C)
    - Periodic Meter Changes

3. Corrective maintenance in response to failures:
    - Repairing leaks
    - Repairing 3rd party damages
    - Clearing water ingress and system blockages
    - Providing standby and emergency callout

- Resolving metering problems/failures
- Repairing cathodic protection system faults
- Repairing pipe coating failures/faults
- Fault-finding on pressure regulating installations

Maintenance of assets is undertaken to ensure that physical assets continue to fulfil their intended functions (performance levels) within an expected life time. To ensure these are maintained, maintenance standards for differing asset types are determined using the following criteria:

- Asset type and age
- Location and operating environment
- Importance of function
- Manufacturers recommendations
- Asset history
- Industry experience
- Condition monitoring
- MHQ of metering facilities

The APA Operating Procedures Manuals detail minimum requirements for the maintenance and condition monitoring of the following:

- Transmission Pressure Pipelines
- High pressure mains and services
- Medium and low pressure mains and services
- Gate stations
- Pressure reducing stations
- Meter Stations

They detail the frequency and scope of work to be carried out and are used in conjunction with the relevant codes of practice and equipment manufacturer's instructions.

These procedures also cover:

1. Monitoring the condition of pipeline easements, signage and above ground facilities.
2. Identifying threats to the safety of the pipeline and its ongoing reliable operation.
3. Controlling corrosion in accordance with applicable standards.
4. Monitoring the condition of coatings for both buried and above ground pipe work and structures.
5. Identifying leaks.
6. Ensuring accuracy and reliability of instrumentation associated with measurement of gas flow, monitoring of pipeline conditions, and controlling operation.
7. Ensuring reliable operation of pressure control and pressure relief equipment, Emergency Shut Down and Slam Shut Valves, isolation valves, heaters, filters and other ancillary equipment to design specifications.
8. Testing the effective operation of electrical protection equipment and the adequacy and condition of electrical earthing systems.
9. Inspecting pressure vessels and pig traps for both internal and external corrosion and defects, and the condition of quick acting closure mechanisms and seals.

10. Carrying out special inspections of underwater pipelines, tunnels, casings, foreign crossings, and special zones identified as requiring specific inspection and monitoring.

Operation & Maintenance practices are audited from time to time by AGN's external auditors and the Office of the Technical Regulator. Regional licensed pipelines and networks are regularly audited by APA and the OTR for compliance with the licence conditions and AS2885.3 and AS4564 requirements.

### *3.6.3 Refurbish/Replace*

The processes associated with assets that have reached the end of their technical or economic lives include removal from service and disposal or refurbishment to extend their useful lives.

Examples of this are:

1. Replacing mains and services
2. Replacing or refurbishing meters and meter assemblies
3. Replacing or refurbishing pressure regulating installations
4. Replacing or refurbishing ancillary equipment (telemetry, anodes, etc.)

The process of network asset replacement is driven by the prudent balance between 'avoided future cost of maintenance', current replacement cost, risk, regulatory compliance and levels of service.

Those assets which are approaching the end of their technical lives or experience unanticipated deterioration in condition are identified for replacement and prioritised in a manner that ensures an efficient and cost effective allocation of resources. The principal asset groups that are systematically replaced include distribution mains (cast iron, and unprotected steel) and associated services, domestic and industrial/commercial meters.

The monitoring of trends in maintenance requirements allows the replacement rate to be adjusted as required. Long-life assets such as pipelines deteriorate slowly allowing time to identify priorities and undertake renewals.

The following controls are associated with refurbishing/replacing assets:

1. A project proposal/business case approved for each major asset refurbishment/replacement.
2. Annual Mains Replacement Plan with AGN approval of annual budgets and award of major contracts.
3. Annual integrity and performance reviews (DSPR).
4. Periodic Meter Changeover schedules are managed through the Works Management System (Maximo).

## 3.7 Stay in Business (SIB) Projects

### *3.7.1 Overview*

Network assets are designed, constructed, operated and maintained to ensure that they will continue to meet the required level of service, at efficient life-cycle cost.

The functionality and performance requirements of existing assets (and their components) are continually reviewed to reflect changing demands of services, conditions of assets, operational risks, technological opportunities for improvement and AGN's business strategies.

Potential SIB projects are identified via the lifecycle planning reviews, as a part of the Asset Management Plan.

There are two groups of projects with different justification drivers:

- Efficiency improvements
  - Capex projects that reduce operational costs and Opex projects that aim to modify the ways assets are being managed, hence improving business profitability.
- Risk mitigation – Capex projects associated with:
  - Capex Projects associated with:
    - Capacity Development; consisting of projects that aim to improve reliability of contracted services.
    - Renewal and Upgrade; consisting of projects that aim to maintain targeted levels of compliance, safety, reliability and "shine".
- Risk Mitigation – Opex projects associated with planning, operating and maintenance initiatives that aim to mitigate risk with non-capex solutions.

### *3.7.2 Prioritisation of Proposed Expenditure*

The prioritisation of proposed expenditure ensures more effective allocation and use of funding resources. It also provides APA and AGN with a balanced overview of risks and opportunities across their business – enabling the best informed investment decision making.

*SIB Efficiency Projects*

The prioritisation of projects in this group will be based on NPV calculations, with higher priority given to the better NPV returns.

*SIB Risk Mitigation Projects*

Every project in this group is analysed for untreated risk and residual risk, with ratings of Likelihood, and Consequence as per the risk matrix detailed in Section 3.2.

Untreated risk is the current risk exposure and residual risk is the risk after that the proposed project has been implemented.

The risk level of the project will determine the allocation of that project into one of four priority groups.

**Priority 1**

Any project, where Risk Level of at least one risk area falls into Extreme must be included in Priority 1. These projects are regarded as non-discretionary, as their justification is to mitigate the risk level that is not acceptable to APA or AGN.

**Priority 2**

Any project, where Risk Level of at least one risk area falls into High must be included in Priority 2. The non-inclusion of these projects may expose APA, AGN, or third party asset owner to potential short and long-term business damage.

**Priority 3**

Any project, where Risk Level of at least one risk area falls into Moderate must be included in Priority 3. The non-inclusion of these projects may affect reliability of assets; as well it may affect operating efficiency and compliance.

**Priority 4**

Any project, where Risk Level of at least one risk area falls into Low must be included in Priority 4. The non-inclusion of these projects may affect opportunity for overall company risk reduction and operating efficiencies.

## 3.8 Monitoring & Review

Effective asset management requires the gathering of a wide range of information to ensure sound management decisions are made. Information is gathered through a range of audit, monitoring, reporting and review functions essential for day-to-day operation and maintenance activities and to ensure the organisation has and maintains the required asset management processes, knowledge and expertise in the longer term.

The key inputs to the management role that are achieved through this process are:

Monitoring/Reporting Processes

- Operational and KPI reporting
- Expenditure against budget

Review Processes

- Asset condition and KPI trends
- Training needs/Skills and competencies assessments
- Site and activity management planning
- Procedural controls / operating manuals
- Records management processes

Audit Processes

- Internal audits
- External audits

### *3.8.1 Audit Processes*

Auditing ensures that all activities and processes comply with required industry standards.

The results of both internal and external auditing are reported to management.

Key internal audits include:

- **Supervisor monitoring audits** - To ensure field activities are performed in accordance with internal requirements and relevant legislation.
- **Verification audits** - Conducted by trained quality and safety auditors, under a certified ISO 9001 management system, independent to the operating function. The purpose of these audits is to verify that the audits of task related activities provide credible and consistent results.
- **Technical facility audits** - Performed by trained quality and safety auditors under an ISO 9001 management system, since the level of exposure of the business tends to be greater with critical gas facilities. Findings from these audits are reported to management through detailed reports.
- **HSE Management system audits -** provide evidence that the APA HSE system is and effective. These audits are conducted by trained safety auditors and reported to management through documented reports.

Key external audits include:

- **AGN audits** - Performed on an "as required" basis to provide confidence that APA is conducting the operational function with due diligence and in compliance with legal requirements. The results of these audits are communicated to the APA management team.
- **Regulatory audits -** Conducted by applicable government safety and commercial regulators as a means of ensuring that activities performed within APA conform to legislative requirements. Audit results form an important input to management improvement processes.
- **Safety Plan audits –** external auditors may be engaged by APA to conduct audits on particular aspects of safety or operating plans.

A software package known as the Management of Audits, Regulatory Compliance and Incidents System (MARCIS) is used to track audit scheduling and all audit actions through to completion.

### *3.8.2 Reporting Processes*

**Business reporting -** Is largely hierarchical in nature with the key principal of ensuring that the business is meeting its goals and objectives. Reports may be categorised as compliance reports, operational reports, exception reports and financial reports. In general, the vertical reporting structure has the following levels**:**

- **Corporate governance compliance report** is a high level acknowledgement that activities and functions provided by the business conform to all legislative and industry expectations. The report is produced 6 monthly for AGN's Board and audit committee.
- **AGN operational report** is produced monthly and draws together key operating criteria, system performance, HSE performance, financial measures, internal and external audits, and other predictive measures into a single, extensive document.
- **Departmental reports** are produced monthly for the General Manager, APA and provide key operational performance information and HSE performance.
- **Section reports,** are also produced monthly, and keep departmental managers informed of the activities under their control.
- **HSE committee reports** are produced by each operating unit to keep all staff informed of the issues that affect their area of operation and control.

In some situations, the vertical reporting structure is augmented by horizontal reporting methods. Examples of such reporting include: hazard alerts, technical bulletins, management presentations, emails, notice boards, etc.

**Budget planning and monitoring** - Is undertaken to ensure planned work is performed efficiently and within economic constraints. Detailed budgets are prepared annually and monitored on a monthly basis.

**Regulatory Reporting –** An annual report covering the financial year is filed with the Office of the Technical Regulator (OTR) and the Essential Services Commission of SA (ESCOSA) in accordance with the Gas Regulatory Information Requirements – Distribution System Gas Industry Guideline No.1. This guideline prescribes various operation reports covering:

- Major Interruptions
- Statistical Information
- Technical Information
- Complaints
- Key performance indicators
- UAFG
- Mains replacement progress

### 3.8.3 *Measuring Network Reliability*

The reliability of the Network is continually monitored and assessed from the two perspectives of asset performance and consumer impact:

- **Asset Performance** - The performance of the Network is monitored utilising a number of systems and Key Performance Indicators (KPI) which are tracked, monitored and reported on. An annual Distribution System Performance Review (DSPR) is undertaken covering: system capacity; condition and integrity; and network changes.

- **Consumer Impact -** AGN participates in the Ombudsman schemes which allow consumers to raise complaints in relation to service levels or procedures to an independent authority for follow up.

A procedure for handling network-related customer complaints in a courteous, timely and effective manner is in place. The procedure has been prepared in accordance with Australian / International Standard AS ISO 10002 (2006) "Customer Satisfaction – Guidelines for Complaints Handling in Organisations".

Complaints are managed and resolved in accordance with the processes outlined in the complaints handling procedure.

A complaint tracking database is used to monitor and report on complaints.

### 3.8.4 Review Processes

Formal and informal reviews undertaken throughout the organisation form a vital input into the planning and management processes. The following sections outline key areas used to assist in planning and management decision making:

*Asset Condition and KPIs*

Asset KPIs detailed in Section 3.10 are the primary measures of asset performance, condition and integrity. These are reviewed on a monthly basis in the APA monthly operating and management report and annually through the DSPR.

Generally, gas distribution networks are fairly stable with well-established underlying trends allowing corrective actions or required changes to be planned well in advance of failure points.

*Skills and Competencies*

Skills and competencies of staff and contractors are viewed as critical in the effective management of the assets.

Activities in the business have been assessed for risk, and where ranked as critical, are managed through a robust method of individual certification. Critical activities may only be performed by operators who can demonstrate their competence to nationally registered assessors and have been issued with an 'authorisation to operate'. These critical skills are reassessed each two years to ensure that competence is maintained and to provide an opportunity to assess the effectiveness of training.

*Business Risk Management Planning*

A business risk assessment management process, conducted in a collaborative approach with staff, is utilised.

The business risk assessment process provides a framework to:

- Identify the key risks, likelihood and effect.
- Assess the effectiveness of current controls for those risks.
- Develop action plans for improving the effectiveness of risk controls in each site or activity.
- Provide a sound basis for developing and improving risk management plans for each site or activity, and the implementation of audit and inspection findings.

*Procedural Controls / Operating Manuals*

Intellectual knowledge documentation forms the basis of skill and competency development in future generations involved in the management of the assets through:

- **Procedures** describing what outcomes are expected from the process.
- **Work instructions** stepping through and explaining how the outcome is to be achieved.
- **Competency standards** capturing the key skills required of an operator performing the function.
- **Training programs** which are developed to address the training needs required to meet the competency standards. Such programs are flexible in delivery and content, and developed to meet the needs of participants.

These documents are reviewed on a scheduled basis to ensure the contents reflect changing regulatory requirements, risk mitigation strategies and industry best practice.

## 3.9 Key Asset Drivers

This section describes the key factors that influence the extension, replacement, modification and or refurbishment of network assets.

### *3.9.1 Economic Regulation*

Rules underpinning economic regulation of the Gas Distribution industry are contained within the National Gas Rules. Asset lifecycle expenditure is governed by Rule 79 (Capex) and Rule 91 (Opex).

Rule 79 outlines new capital expenditure criteria stating that:

1. Conforming capital expenditure is capital expenditure that conforms with the following criteria:
   (a) 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;
   (b) 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); or

   (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).

Rule 91 outlines the operating expenditure criteria stating that:

1. Operating 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 delivering pipeline services.

### *3.9.2 Network Growth*

On-going growth drives expansion of the network into new areas as well as additional mains and pressure control facilities to augment network capacity. Historically approximately 15,000 new connections are made to the network every year giving rise to additional network mains, services and new meters.

### *3.9.3 Asset Condition*

A major component of OPEX relates to locating and repairing leaks associated with the old CI and UPS mains and services.

Leaks from the CI mains are predominantly from mechanical joints, a legacy of the dry nature of natural gas compared to the "wet" reformed gas produced from coal gasification when CI mains were first installed. CI mains are also susceptible to fracture which can pose a risk to maintenance personnel and the public.

Leaks from UPS mains are due to external corrosion of the pipe. These mains were installed without any external protective coating or cathodic protection. Invariably leak excavations on UPS pipes reveal extensive pitting corrosion along the pipe length, with (reactive) replacement rather than repair the only option.

A programme of replacement to reduce risks from these mains has been developed with the objective of replacing all residual CI & UPS mains by 2021.

### *3.9.4 Security of Supply*

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 installed where considered appropriate.

### *3.9.5 Meter Replacement*

In accordance with ESCOSA's Gas Metering Code (GMC/04) consumer meters are required to be replaced either on a time expiry basis or as determined by representative sampling. This gives rise to around 35,000 meter replacements (referred to as Periodic Meter Change or PMC) per year.

### *3.9.6 Third Party Capital Works Programs*

Capital works programs by other utilities and road authorities require that from time to time, gas mains have to be moved, modified and/or replaced. The cost of such works is recouped from the requesting authority.

## 3.10 Asset Performance Indicators

The following table summarises a range of Performance Indicators (PIs) used for the various asset groups. Performance Indicators are used by the relevant operating departments with Key Performance Indicators (KPIs) reported to senior management and the technical regulator.

| Asset Group | Performance Indicators (PIs) | KPIs |
|---|---|---|
| Transmission Pipelines | • % of pipeline patrolled<br>• No. of coating faults/km<br>• No. leaks reported & repaired<br>• Intelligent Pigging Survey Results<br>• CP Survey Readings<br>• Coating Survey Results<br>• Emergency exercises completed | • No. of 3rd party damages<br>• No. of 3rd party damage near misses |
| Pressure Regulating Installations | • % PM Schedule Complete | • No. of PM jobs scheduled but more than 1 month overdue |

| Asset Group | Performance Indicators (PIs) | KPIs |
|---|---|---|
| Distribution Mains & Services | • No. leaks reported & repaired<br>• No. of outstanding leaks<br>• No. of services replaced<br>• Poor supply incidents/outages<br>• No. of over pressurisations<br>• No of 3rd party locations<br>• CP Survey Readings<br>• Km of mains laid<br>• Km of mains replaced<br>• No of services Laid<br>• No of services replaced | • Leaks/km main surveyed<br>• No. 3rd Party Damage.<br>• Supply Outages to 5 or more consumers<br>• No. of gas in building incidents<br>• No. of fires as result of gas leak<br>• Onsite response to emergency within prescribed time |
| Meters | • No. of inaccurate meters detected<br>• No. of meter failures<br>• No. of time-expired meters replaced<br>• No. of meter leaks<br>• % of PM Schedule complete<br>• No. of meters replaced per annum | • No. of PM jobs scheduled but more than 1 month overdue |
| Telemetry Systems<br><br>Corrosion Prevention Systems<br><br>Odorant Facilities | • Availability of telemetry systems<br><br>• % TP Protected by CP<br>• % HP/MP/LP Network Protected by CP | • % of CP test points checked<br>• % of test points outside tolerance<br>• % of regulatory odorant surveys conducted<br><br>• Odorosity detectable < 20% LEL |

Table 4 - Asset KPIs

# Section - 4 NETWORK DESCRIPTION

## 4.1 Overview

The schematic below provides an overview of the network and key network components.
Connections between pipelines at different pressures are achieved through the use of pressure reducing installations.

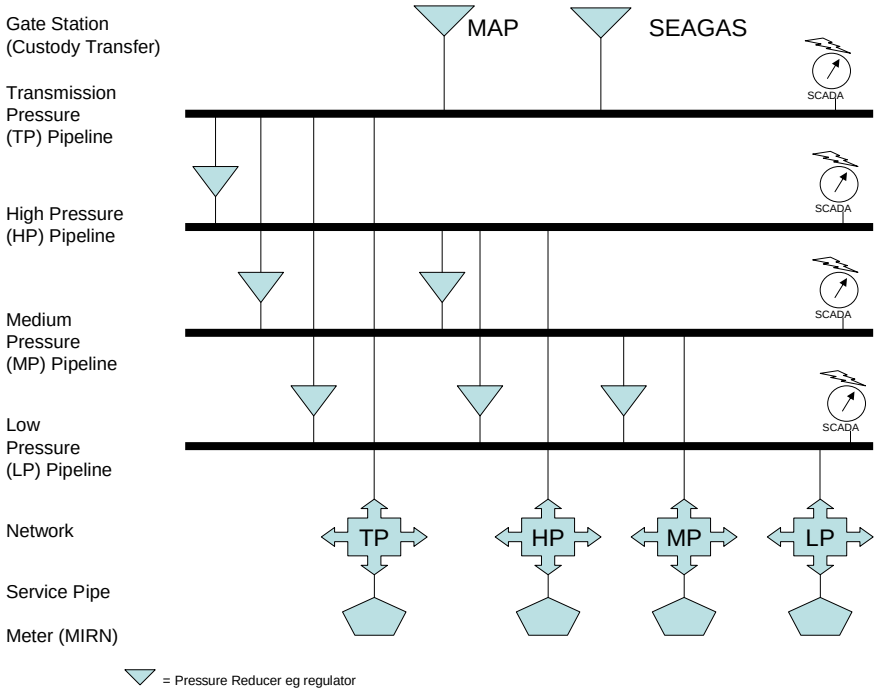



Figure 8 - Network Schematic

## 4.2 Sources of Supply

The South Australia distribution network is supplied with natural gas from three sources.

1. Moomba to Adelaide Pipeline ("**MAP**")

   The MAP features 1,185 kilometres of high pressure gas pipelines (including 326 km of laterals). The MAP supplies gas to regional centres as well as to Adelaide. A pipeline lateral running from the mainline to Port Pirie and Whyalla has a maximum capacity of approximately 24 TJ/d. A second pipeline lateral to Angaston has a capacity of 20 TJ/d and delivers gas to industrial users and into AGN's Riverland Pipeline that, in turn, supplies gas users in Berri, Murray Bridge and Mildura.

   In addition to delivering gas from the Cooper Basin into the South Australian market, the MAP can receive gas from southeast Queensland through the APA Group owned 'QSN Link'. From mid-2015, the MAP will also have the ability to received gas from the SEAGas Pipeline.

   This pipeline is owned and operated by Epic Energy South Australia Pty Ltd ("**Epic**").

2. SEAGas Pipeline

   The SEAGas pipeline is a 680km, 455mm diameter pipeline which runs from Port Campbell in Victoria to Adelaide in South Australia. The SEAGas pipeline has off-takes located at Cavan, Torrens Island Power Station and Pelican Point Power Station and is developed, owned and operated by South East Australia Gas Pty Ltd ("**SEAGas**"). The pipeline consists of two pipes for approximately half of its length.

3. South East South Australia (**SESA**) Pipeline

   In May 2005 Origin Energy Retail Limited completed construction and commissioning of the 45 km South East South Australia ("**SESA**") Pipeline to link the SEAGas pipeline to the Epic pipeline which supplies gas to customers in the South East region of South Australia, including those customers connected to AGN's Mount Gambier distribution network. Gas was previously supplied to Mt Gambier from Katnook, but this production source has not been in operation since 5 October 2011. The SESA Pipeline is now owned and operated by APA Group.

## 4.3 Principal Distribution Networks

Gas is delivered into AGN's networks via gate or custody transfer stations owned by either Epic Energy or SEAGas. These stations consist of facilities that control the delivery pressures and or measure and report on the quantity and quality of gas delivered into AGN's networks. Through interface agreements AGN has access to data and equipment calibration witnessing rights. Refer to Appendix 2 for gate station details.

The natural gas distribution networks in South Australia are identified as follows:

1. Adelaide Metropolitan Area
2. SA Regional Networks consisting of:
   - Angaston
   - Berri
   - Freeling
   - Mount Gambier
   - Murray Bridge
   - Nuriootpa
   - Peterborough
   - Port Pirie
   - Virginia
   - Wasleys
   - Whyalla
   - Waterloo Corner

A map detailing geographical locations of each of these networks is included in Appendix 1.

## 4.4 Operating Pressure Regimes

The distribution network is categorised into four distinct pressure regimes as defined in the following table.

| Pressure Regime | Definition |
|---|---|
| TP - Transmission Pressure | MAOP between 1050 kPa and 1750 kPa |
| HP - High Pressure | MAOP between 250 kPa and 1050 kPa |
| MP - Medium Pressure | MAOP between 7 kPa and 250 kPa |
| LP - Low Pressure | MAOP between 0 kPa and 7 kPa |

Table 5 - Pressure Regimes

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

Each network has its own defined operating range depending on the network configuration and capacity requirements. Operating pressures may vary depending on seasonal load demand. Changes to operating pressures are managed through a formal change management process to ensure compliance within nominated limits.

Typically supply pressures are set at: 1.7kPa (Low Pressure); 80-100 kPa (Medium Pressure); 250-350 kPa (High Pressure); and 1750 kPa (Adelaide Metropolitan Transmission Pressure).

## 4.5 Distribution Network Composition

| Adelaide 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 |

Table 6 – Adelaide Network Installed Mains

| Regional 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 |

Table 7 – Regional Networks Installed Mains

| **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** |

Table 8 – SA Networks Installed Mains Summary

# Section - 5 REGULATORY COMPLIANCE

## 5.1 Regulatory Framework

The diagram below shows the framework for the South Australian jurisdiction in terms of key regulating bodies and documents.

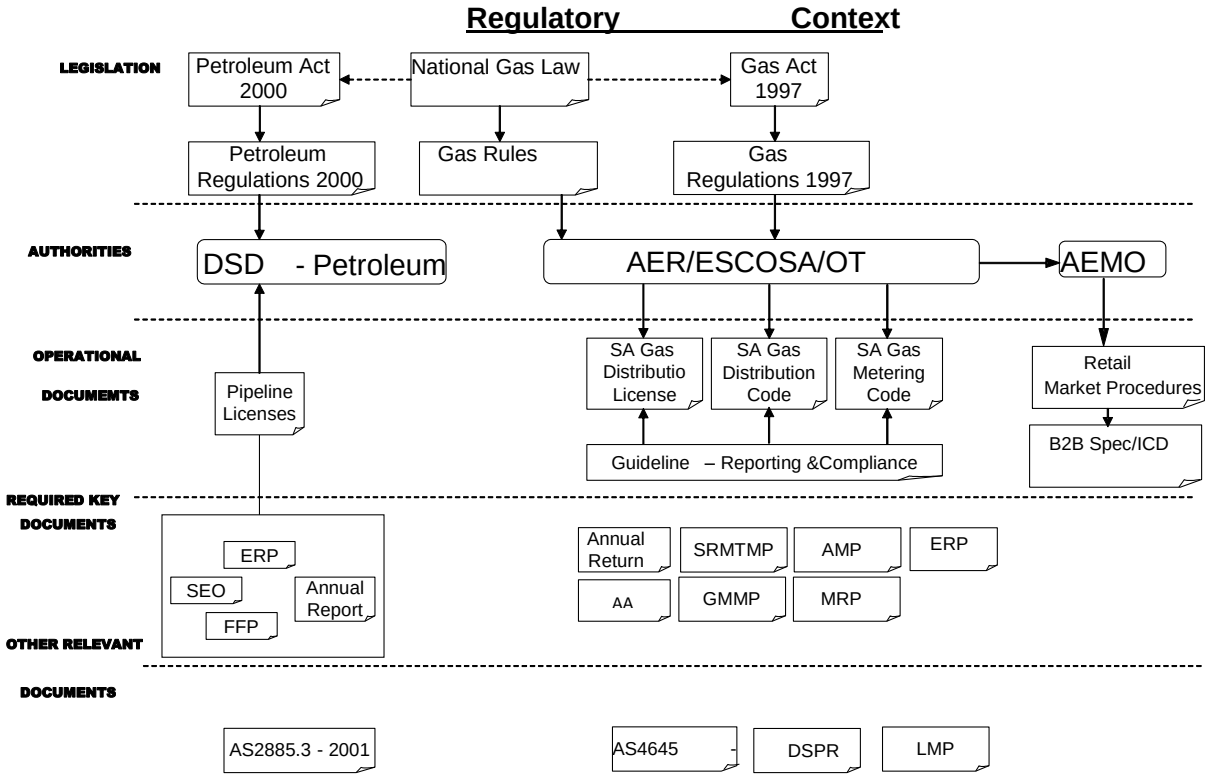



Figure 9 - Regulatory Framework

DSD - Department of State Development (Petroleum Division)

ESCOSA - Essential Services Commission of South Australia

AER - Australian Energy Regulator

OTR - Office of the Technical Regulator

AEMO - Australian Energy Market Operator

B2B Spec/ICD - Business to Business Specification/Interface Control Document

ERP - Emergency Response Plan

SEO - Statement of Environmental Objectives

FFP - Fitness For Purpose

SRMTMP - Safety, Reliability, Technical and Maintenance Plan

GMMP - Gas Measurement Management Plan

AS2885.3 - Australian Standard for Pipelines Operations and Maintenance

AS4645 - Australian Standard for Gas Distribution Network Management

DSPR - Distribution System Performance Review

LMP - Leak Management Procedure

The key regulatory instruments with which AGN must comply are:

- Gas Act 1997 and Regulations 1997
- National Gas Law and Rules
- ESCOSA Codes and Guidelines
- Occupational Health, Safety and Welfare Act 1986 and Regulations
- Environment Protection Act 1993 and Regulations
- Dangerous Substances Act 1979 and Regulations

## 5.2 Applicable Regulations, Codes and Standards

### *5.2.1 Gas Distribution Code*

The Gas Distribution Code applies to gas distributors operating in South Australia. Specific provisions relate to:

- Operation of the distribution system
- Connection of a customer's supply address to the distribution system
- Disconnection and reconnection
- Illegal use of gas
- Curtailment and interruptions
- Emergencies and Safety
- Customer dispute resolution

### *5.2.2 Gas Metering Code*

The Gas Metering Code regulates standards for metering installations at customer delivery points. It covers the following:

- Provision of metering installations
- Minimum Standards of Accuracy
- Metering installation testing
- Meter testing
- Meter reading and data
- Gas Measurement Management Plan

### *5.2.3 Australian Codes and Standards*

AGN's networks are designed, constructed, operated and maintained in accordance with Australian Codes and Standards.

The principal codes and standards used are Standards and codes as per the Regulations under the Gas Act, Regulation 10 – General requirements for gas infrastructure:

- AS 4645-2005 Gas Distribution Network Management
- AS 4568-2005 Preparation of a Safety and Operating Plan for Gas Networks
- AS 2885.1-2007 Pipelines – Gas and liquid petroleum – Design and construction
- AS 2885.2-2007 Pipelines – Gas and liquid petroleum – Welding
- AS 2885.3-2001 Pipelines – Gas and liquid petroleum – Operation and Maintenance

- AS 2885.5-2003 Pipelines – Gas and liquid petroleum – Field Pressure Testing
- AS 1697-2005 Installation and Maintenance of Steel Pipe Systems for Gas
- AS 3723-1989 Installation & Maintenance of Plastic Pipe Systems for Gas

In addition the following standards and codes are applied:

- AS 4130-2003 Polyethylene (PE) Pipes for Pressure Applications
- AS 4041-2006 Pressure Piping
- AS 2832.1-2004 Cathodic Protection of Metals - Pipes and Cables

### *5.2.4 Regulatory Reporting*

An annual operational report is submitted to ESCOSA and OTR, which provides information on:

- The quantity of each type of gas entering the distribution system from each source
- The specifications of each type of gas entering the distribution system
- A summary of the results of testing of metering accuracy
- The total estimated amount of unaccounted for gas lost from the distribution system as a result of leakage
- The condition and composition of the distribution system
- The number of certificates of compliance received on connection of a gas installation to the distribution system
- The quantity and type of gas distributed to small consumers and other consumers
- The number of small and other consumers connected to the distribution system
- The number of connections and disconnections of consumers to or from the distribution system
- The number and type of complaints received in respect of gas odour, poor supply pressure etc.
- Details of any failure to comply with the Act, SRMTMP or GMMP
- Performance Indicators
- Information on interruptions

The following Key Performance Indicators are reported on an annual basis and aid in determining the effectiveness of risk management:

- Number of over-pressurisations
- Number of instances of 3rd party damage (mains and inlets)
- Number of locations provided to third parties
- Number of leaks entering a building from mains and inlets
- Number of fires sourced by a gas leak from the network
- Number of instances of out of specification gas entering the network
- Number of public reported leaks (mains and inlets)
- Number of training hours per SA Networks employee/contractor
- Number of unplanned outages (of greater than 5 consumers)
- Number of leaks detected by Leakage Surveys per km of surveyed mains per year
- Number of regulator failures (including active) per year
- Number of completed emergency plan exercises
- Number of evacuations (CBD or other) directly attributed to a gas leak from mains or inlet
- Number of incidents involving attendance of the Fire Brigade related to a gas leak

### 5.2.5 *Regulatory Audits*

Regulatory audits of the SA Network are undertaken annually by staff from the Office of the Technical Regulator (OTR). The last audit was carried out during the period April to July 2014.

The OTR auditors carried out a series of desktop and field audits of AGN's Safety, Reliability, Maintenance and Technical Management Plan ('SRMTMP'). This included a review of the Unaccounted for Gas ('UAFG') Plan comprising of a Leakage Management Plan ('LMP') and Mains Replacement Plan ('MRP'), and Gas Measurement Management Plan ('GMMP').

The audits were carried out in areas that directly affect consumers, the public, and/or the safety, reliability, maintenance and integrity of the distribution network.

The purpose of the audits was to obtain assurance that these above Plans are adequately implemented and that they meet the requirements prescribed by the *Gas Act 1997, Gas Regulations 2012*, AGN's Distribution Licence Conditions and Gas Distribution and Metering Codes.

The OTR audits found in general that the implementation of AGN's SRMTMP, LMP, MRP and GMMP (in the audited areas) met the minimum requirements prescribed by the Gas Act 1997, the Gas Regulations 2012, AGN's Distribution Licence conditions, safety and technical standards, and industry codes.

The auditors concluded that APA have sound and well-developed systems in place to ensure that risks related to operating the distribution networks to the South Australian community are managed to an acceptable level. In addition, adequate evidence was provided to demonstrate that APA staff and contractors are competent to carry out their duties safely.

Details of audit areas and outcome summary are provided in the following table. .

| Item | OTR Audit Area | OTR Audit Outcome Summary |
|---|---|---|
| 1 | Gas Quality and Odorising Management System – review current implementation and effectiveness of APA's processes in relation to gas quality and odorisation, including the implementation of the odorising sampling schedule, accuracy verification testing and analysis – (Section 4.5.8 and Appendix 8 of SRMTMP and Section 9 of GMMP). | APA have demonstrated that:<br>• They have and use appropriate personnel and systems to deal with the gas quality and odorising issues.<br>• Their gas quality and odorising field works are carried out in a competent and professional manner to ensure all necessary functions are correctly performed. |
| 2 | Systems and procedures to fulfil APA's obligations with respect to installations, operations, maintenance and emergency preparedness of the regional gas distribution networks in Berri and Murray Bridge – (Section 4.5 of SRMTMP). | APA and their contractors in Berri and Murray Bridge have demonstrated that:<br>• They have and use appropriate systems and procedures to operate and maintain the gas distribution network in the both regions.<br>• Their field activities are conducted in a competent and professional manner to ensure the safe and reliable operation of the gas distribution network.<br>• They have adequate systems in place to deal with incidents ranging from a gas escape to a full–scale emergency. |

| Item | OTR Audit Area | OTR Audit Outcome Summary |
|---|---|---|
| 3 | Materials and Components Control Process – review of the processes that exist within APA to assess new materials for inclusion on the SA gas distribution networks. Review of how APA ensures that materials and components in the networks are fit for purpose e.g. pipes, valves, regulators etc. – (Section 4.3 of SRMTMP). | APA has demonstrated that they use an appropriate process and people to ensure that materials and components used in the gas distribution network are fit for purpose. |
| 4 | Field processes and practices for installation, joining and squeeze-off of polyethylene (PE) pipes – review of how APA manage the processes to ensure that the long term integrity of the gas distribution is maintained – (Sections 4.2, 4.3, 4.4 and 4.5 of SRMTMP). | APA has demonstrated that they have and use appropriate systems and procedures to carry out installation and maintenance of plastic mains and services.<br><br>They also demonstrated that they use competent and appropriately trained people to carry out the jobs in an appropriate professional and safe manner. |
| 5 | Connection and commissioning processes of new and existing industrial, commercial and residential customer connections ('Meter Fix' process) – review the contractors' role, examination of contractor training and accreditation, APA's internal auditing of the connection practices, response time, commissioning completion and customer-builder satisfaction etc. – (Section 4.4.3 of SRMTMP and Sections 2-5 of GMMP). | The implementation of new inlet connections and meter fix processes is well organised and coordinated within APA.<br><br>APA has demonstrated that all requests for new inlet connections and meter fixes are processed in a professional and timely manner by competent APA personnel. |
| 6 | Mains Replacement Plan (MRP) and Leakage Management Plan (LMP) – review APA's compliance for 2013-14 (e.g. rates, resources, reporting etc.) with the approved MRP and preparation for compliance with the MRP for the next 12 months (2014-15). Review of the impact of APA's mains replacement activities on the UAFG level over the last 12 months. Review response times for the leak reports over the 12 months and any changes to the LMP procedures, if applicable. | APA have demonstrated that they:<br>• Are capable of achieving their mains replacement targets as forecasted in the MRP.<br>• Continue effectively implement the LMP.<br>• Respond in a timely and appropriate manner to gas leaks as reported by the public.<br>• Use competent and trained personnel to carry out all gas leak related activities. |
| 7 | Systems and procedures used by APA for contractor management and compliance – review APA's induction and training of mains replacement contract crews and how APA's contractors manage their workforce to ensure that they are adequately trained, experienced and drilled in the appropriate procedures. Review of the level of supervision of contractor crews by their own team leaders, and in turn by APA supervisors – (Section 4.7 of SRMTMP). | APA have demonstrated that they:<br>• Have and use appropriate processes for management of their contractors involved in the mains replacement program.<br>• Select and use competent and trained contractors to ensure that the mains replacement work is carried out in accordance with the appropriate procedures and in a timely manner. |

Table 9 – OTR Audit Summary

# Section - 6 ASSET PERFORMANCE SUMMARY

## 6.1 Introduction

This section summarises key asset performance and service levels, reflecting the outcome of asset management policies, processes and plans.

## 6.2 Supply Reliability & Quality

### *6.2.1 Gas Outages*

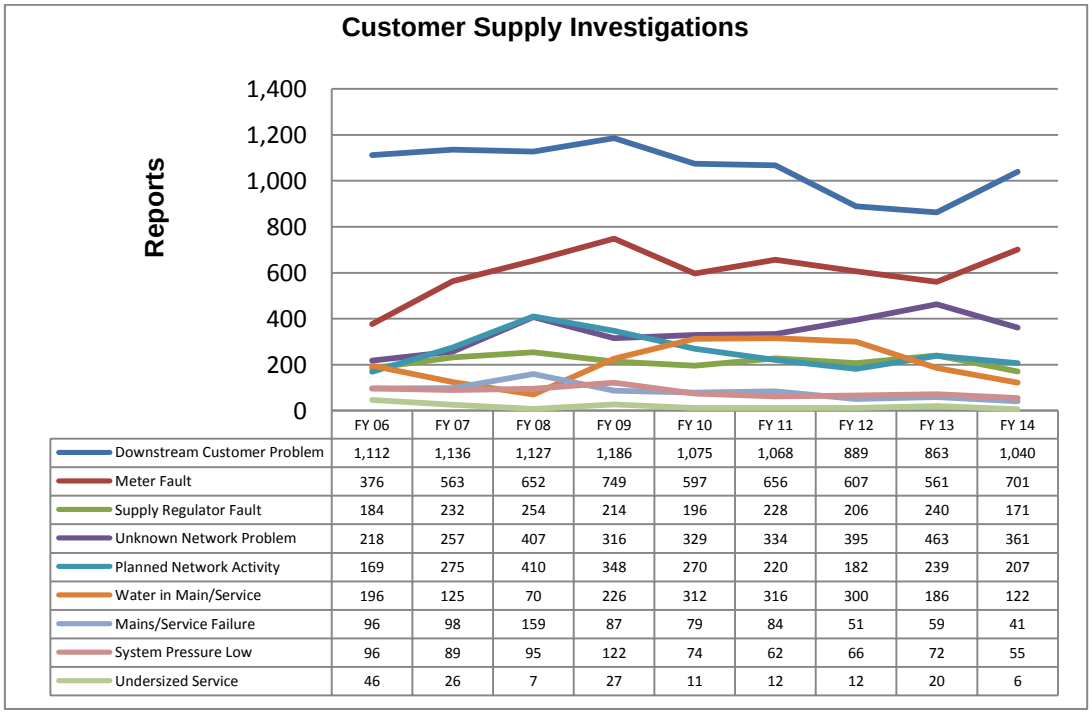
The following table summarises incidents of major unplanned interruption to customer supply. A major interruption is defined here as an unplanned interruption affecting the supply of gas to 5 or more customers.

| | FY 10 | FY 11 | FY 12 | FY 13 | FY 14 |
|---|---|---|---|---|---|
| Number of Major Interruptions | 22 | 5 | 21 | 11 | 17 |
| Number of Customers Affected | 352 | 66 | 3871 | 1111 | 379 |
| Total Outage Duration - Minutes | 6078 | 3258 | 21331 | 3285 | 5415 |
| Average Outage - Minutes Per Customer | 17.3 | 49.4 | 5.5 | 3.0 | 14.3 |

Table 10 – Supply Interruptions

- There were no incidents in the past year of gas outage because of inadequate system capacity.
- 3rd party damage accounted for 7 of the incidents in FY 14 with 10 related to network repair and replacement activities.

### *6.2.2 Customer Initiated Supply Investigations*




| | FY 06 | FY 07 | FY 08 | FY 09 | FY 10 | FY 11 | FY 12 | FY 13 | FY 14 |
|---|---|---|---|---|---|---|---|---|---|
| Downstream Customer Problem | 1,112 | 1,136 | 1,127 | 1,186 | 1,075 | 1,068 | 889 | 863 | 1,040 |
| Meter Fault | 376 | 563 | 652 | 749 | 597 | 656 | 607 | 561 | 701 |
| Supply Regulator Fault | 184 | 232 | 254 | 214 | 196 | 228 | 206 | 240 | 171 |
| Unknown Network Problem | 218 | 257 | 407 | 316 | 329 | 334 | 395 | 463 | 361 |
| Planned Network Activity | 169 | 275 | 410 | 348 | 270 | 220 | 182 | 239 | 207 |
| Water in Main/Service | 196 | 125 | 70 | 226 | 312 | 316 | 300 | 186 | 122 |
| Mains/Service Failure | 96 | 98 | 159 | 87 | 79 | 84 | 51 | 59 | 41 |
| System Pressure Low | 96 | 89 | 95 | 122 | 74 | 62 | 66 | 72 | 55 |
| Undersized Service | 46 | 26 | 7 | 27 | 11 | 12 | 12 | 20 | 6 |

Graph 1 – Customer Supply Investigations

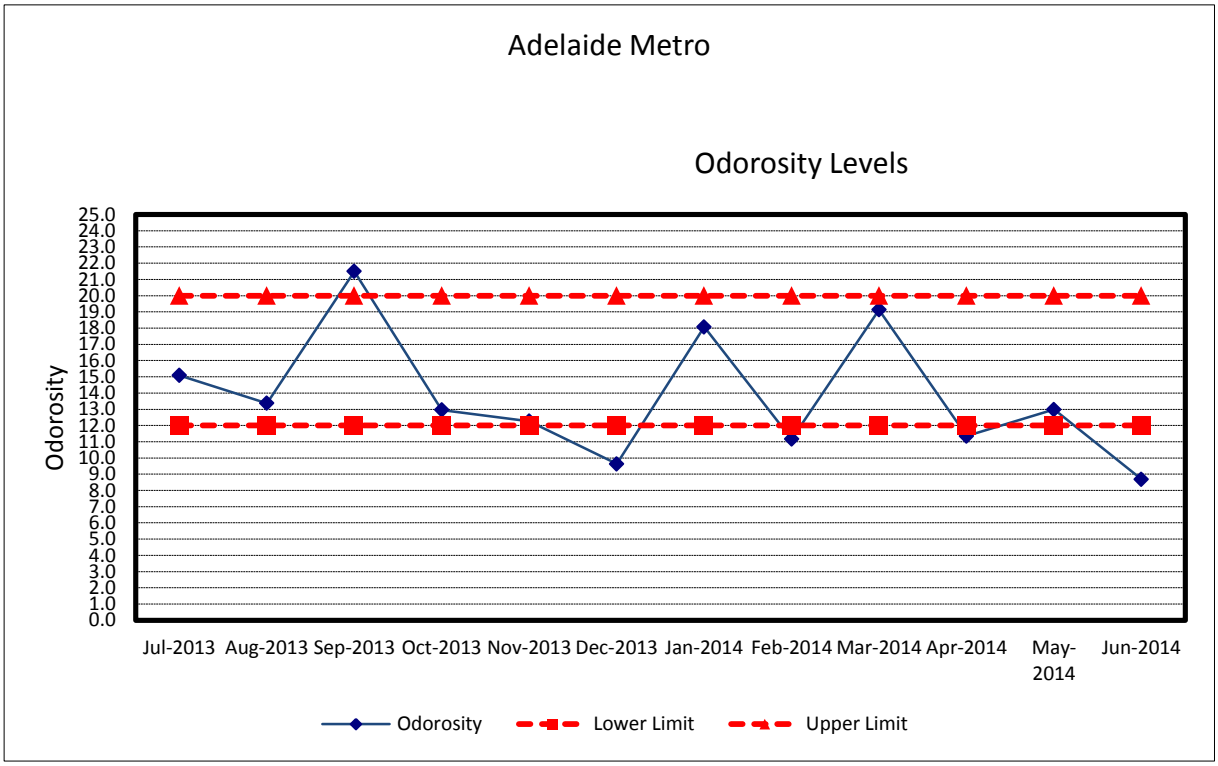
- There has been a 62% reduction in "water in mains/services" since FY 11 attributable to the mains replacement program. The majority of supply investigations are related to issues downstream of the meter.

### *6.2.3 Gas Quality*

Under the Gas Regulations 1997, Part 4, Division 2 "Quality of Gas Supply", the distribution system operator is required to ensure that the gas within its networks must contain sufficient odorant such that it is detectable at 20% of the lower explosive limit in air. A level above 20% means there is insufficient odorant and non-compliance with the regulations.

Odorosity in AGN's networks is targeted between 12% and 18% of the LEL. Measurements below 12% means there is more odorant than necessary.

The graph below shows the historic average odorosity levels in the Adelaide metropolitan network.

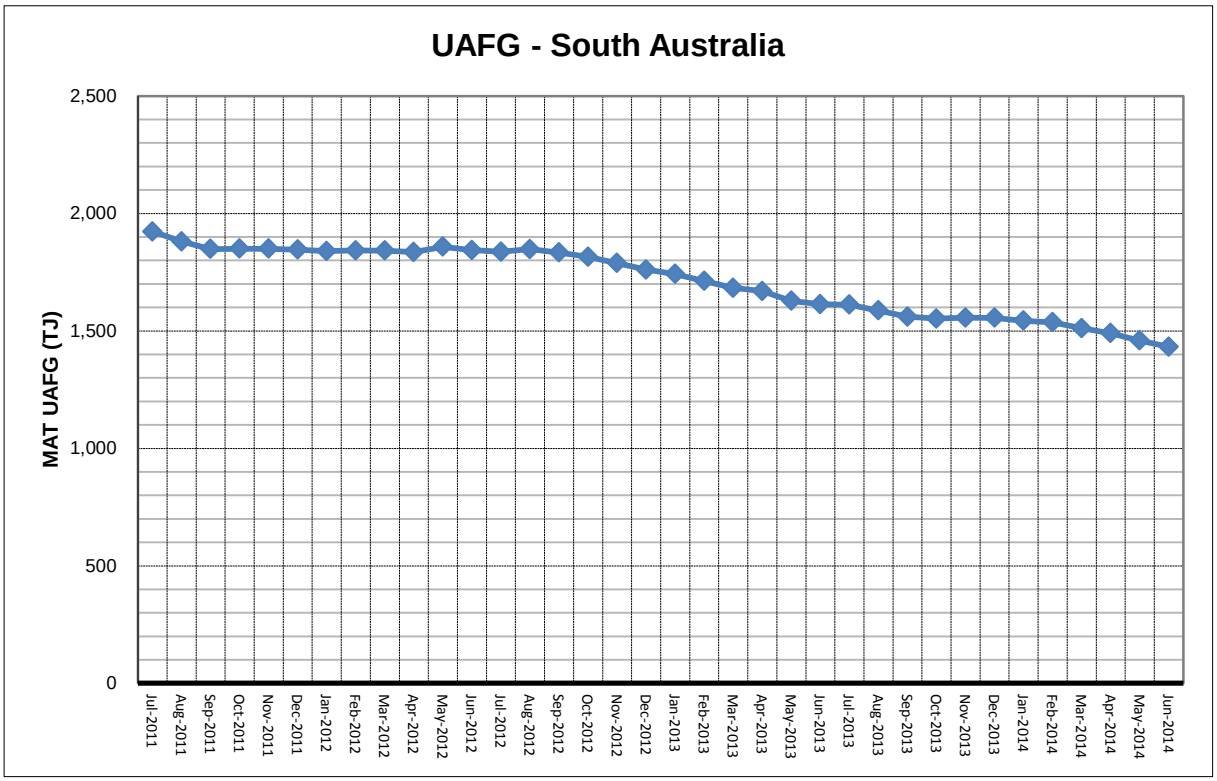



Graph 2 – Adelaide Network Odorosity

[redacted]

## 6.3 Asset Performance & Integrity

### *6.3.1 UAFG History*




Graph 3 – South Australia MAT UAFG

- UAFG for South Australia decreased by 250TJ over the year with almost all of this attributed to a reduction in the Adelaide Metropolitan network. This reduction is largely attributed to the mains replacement program.
- Mildura UAFG has reduced by 30% (11 TJ) over the last year. This has been associated with replacement of a faulty Tariff D meter. An ongoing downward trend is expected over the next 12 months.
- Mount Gambier has continued to show a consistent decrease with a 38% (14.7TJ) reduction since FY10. Replacement of UPS MP mains over the last few years is believed to have contributed to this reduction.

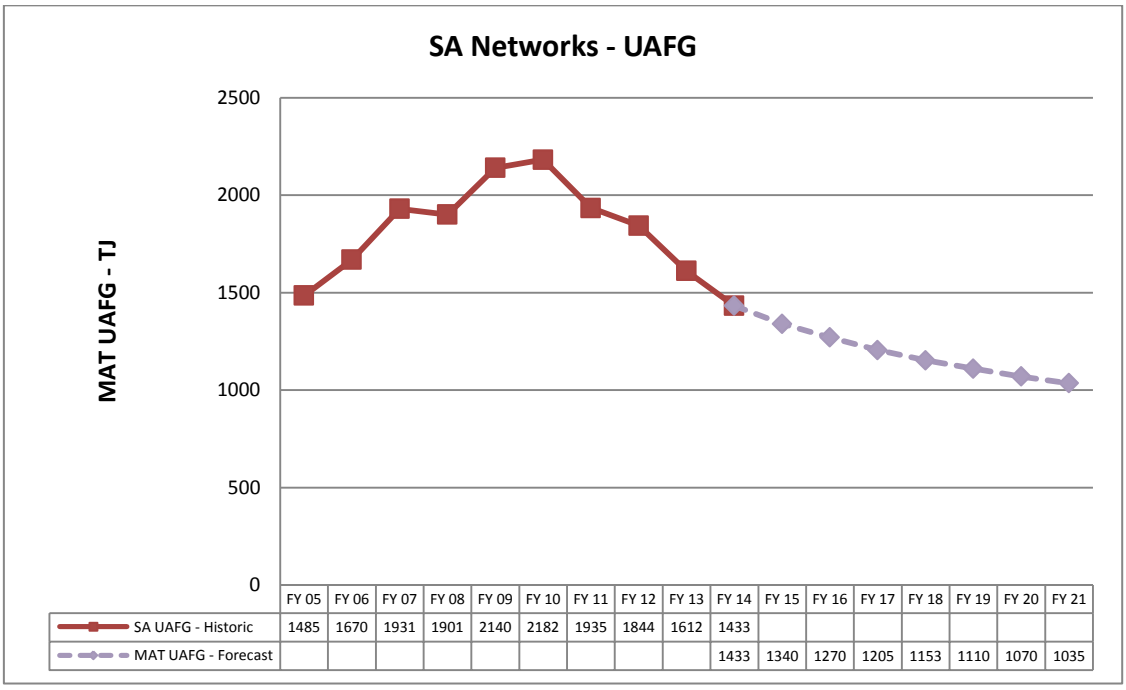
### *6.3.2 UAFG Forecast*

AGN engaged Asset Integrity Australasia Pty Ltd (AIA) to undertake an independent analysis of the Network's UAFG at a point in time (30 June 2014) and to prepare a UAFG forecast for the 2016 to 2021 Access Arrangement period.

AIA previously undertook UAFG analysis for Victorian gas distributors, which was provided to the Essential Services Commission of Victoria to assist in the determination of UAFG forecasts for those

distributors. AIA analysis uses a bottom-up approach, whereby elements of a distribution network are allocated emissions factors and factors of uncertainty, which is then combined with a top-down approach to enable an estimate of the contribution to UAFG of all of the contributing elements.

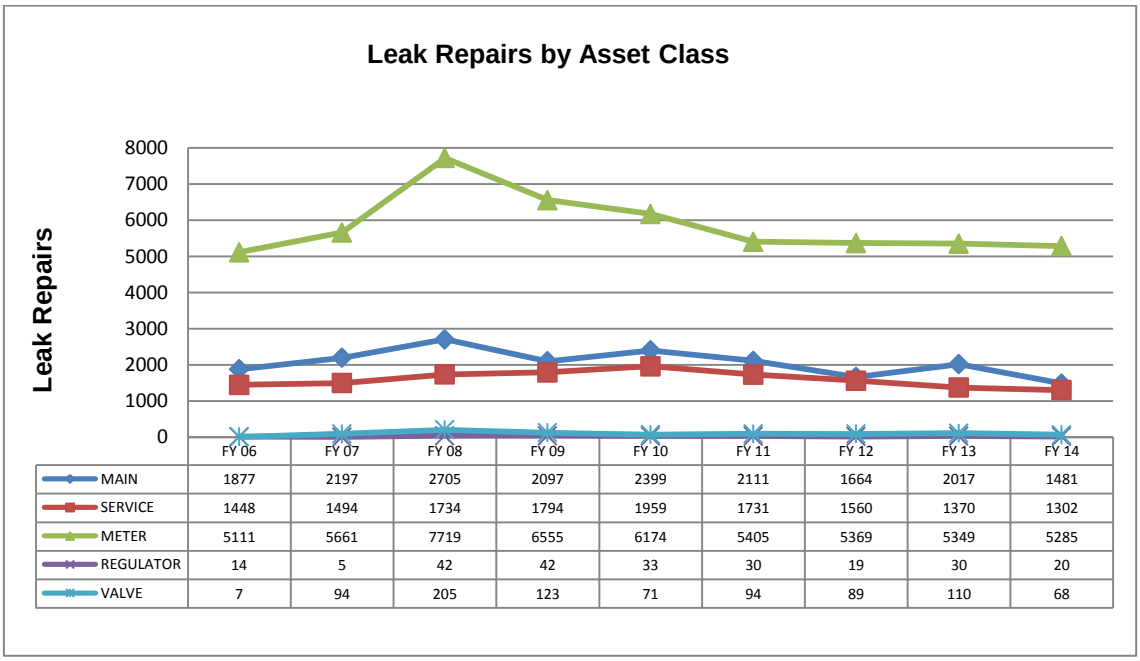
AIA used AGN's planned annual replacement levels over the 2016 to 2021 regulatory period to forecast the annual level of UAFG. The resultant forecast UAFG is shown below.




| | FY 05 | FY 06 | FY 07 | FY 08 | FY 09 | FY 10 | FY 11 | FY 12 | FY 13 | FY 14 | FY 15 | FY 16 | FY 17 | FY 18 | FY 19 | FY 20 | FY 21 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SA UAFG - Historic | 1485 | 1670 | 1931 | 1901 | 2140 | 2182 | 1935 | 1844 | 1612 | 1433 | | | | | | | |
| MAT UAFG - Forecast | | | | | | | | | | 1433 | 1340 | 1270 | 1205 | 1153 | 1110 | 1070 | 1035 |

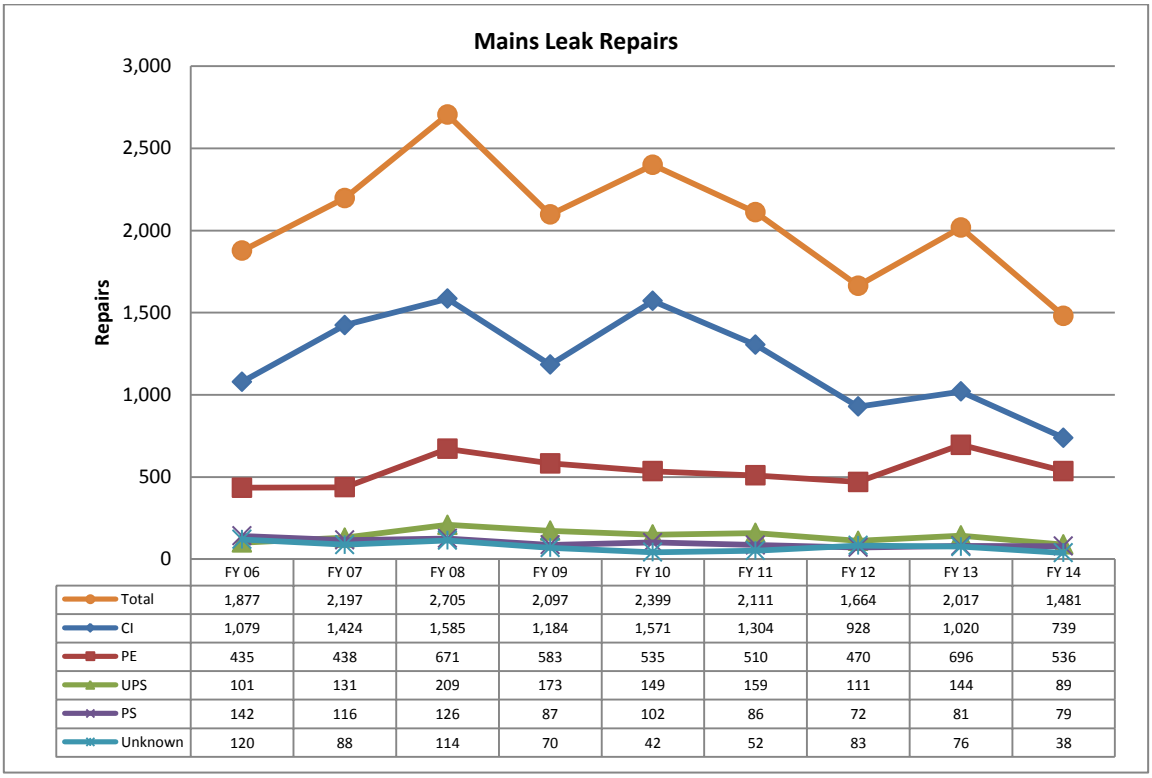
Graph 4 – UAFG Forecast

### 6.3.3 *Distribution Network Leaks*



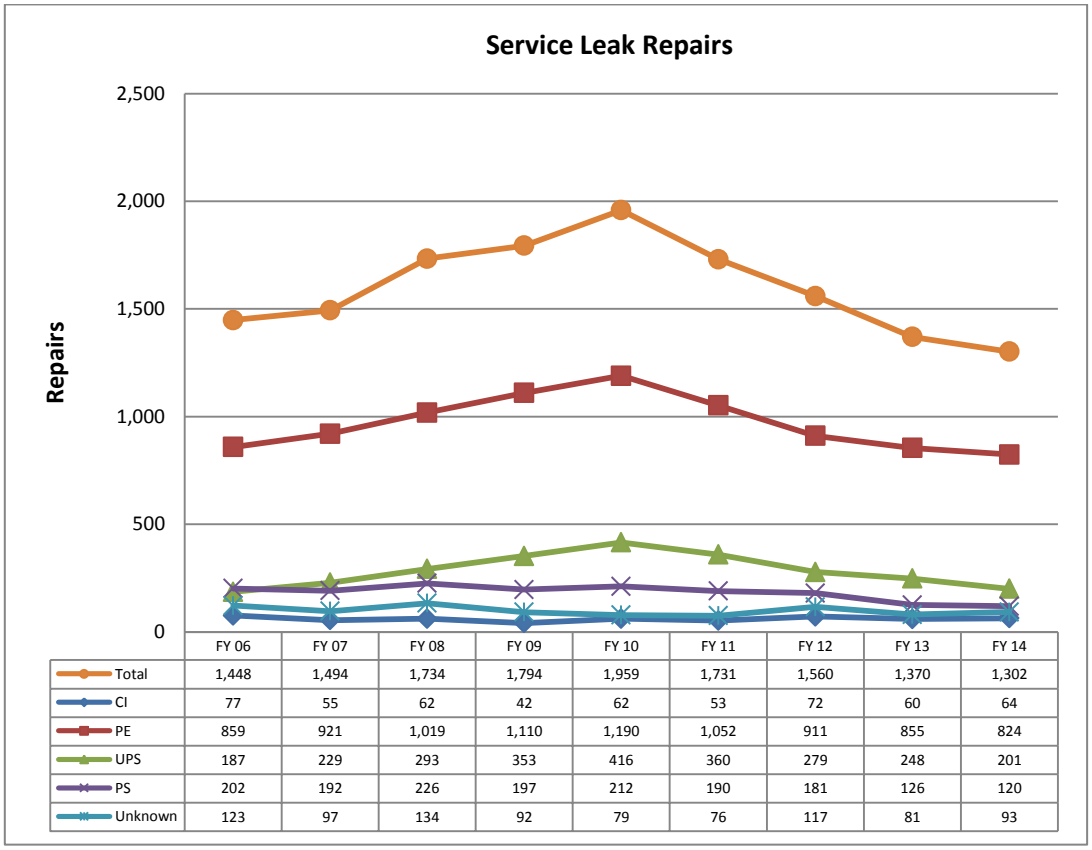

| | FY 06 | FY 07 | FY 08 | FY 09 | FY 10 | FY 11 | FY 12 | FY 13 | FY 14 |
|---|---|---|---|---|---|---|---|---|---|
| MAIN | 1877 | 2197 | 2705 | 2097 | 2399 | 2111 | 1664 | 2017 | 1481 |
| SERVICE | 1448 | 1494 | 1734 | 1794 | 1959 | 1731 | 1560 | 1370 | 1302 |
| METER | 5111 | 5661 | 7719 | 6555 | 6174 | 5405 | 5369 | 5349 | 5285 |
| REGULATOR | 14 | 5 | 42 | 42 | 33 | 30 | 19 | 30 | 20 |
| VALVE | 7 | 94 | 205 | 123 | 71 | 94 | 89 | 110 | 68 |

Graph 5 – Network Leaks by Asset Class




| | FY 06 | FY 07 | FY 08 | FY 09 | FY 10 | FY 11 | FY 12 | FY 13 | FY 14 |
|---|---|---|---|---|---|---|---|---|---|
| Total | 1,877 | 2,197 | 2,705 | 2,097 | 2,399 | 2,111 | 1,664 | 2,017 | 1,481 |
| CI | 1,079 | 1,424 | 1,585 | 1,184 | 1,571 | 1,304 | 928 | 1,020 | 739 |
| PE | 435 | 438 | 671 | 583 | 535 | 510 | 470 | 696 | 536 |
| UPS | 101 | 131 | 209 | 173 | 149 | 159 | 111 | 144 | 89 |
| PS | 142 | 116 | 126 | 87 | 102 | 86 | 72 | 81 | 79 |
| Unknown | 120 | 88 | 114 | 70 | 42 | 52 | 83 | 76 | 38 |

Graph 6 – Mains Leaks by Material




| | FY 06 | FY 07 | FY 08 | FY 09 | FY 10 | FY 11 | FY 12 | FY 13 | FY 14 |
|---|---|---|---|---|---|---|---|---|---|
| Total | 1,448 | 1,494 | 1,734 | 1,794 | 1,959 | 1,731 | 1,560 | 1,370 | 1,302 |
| CI | 77 | 55 | 62 | 42 | 62 | 53 | 72 | 60 | 64 |
| PE | 859 | 921 | 1,019 | 1,110 | 1,190 | 1,052 | 911 | 855 | 824 |
| UPS | 187 | 229 | 293 | 353 | 416 | 360 | 279 | 248 | 201 |
| PS | 202 | 192 | 226 | 197 | 212 | 190 | 181 | 126 | 120 |
| Unknown | 123 | 97 | 134 | 92 | 79 | 76 | 117 | 81 | 93 |

Graph 7 – Service Leak repairs by Material

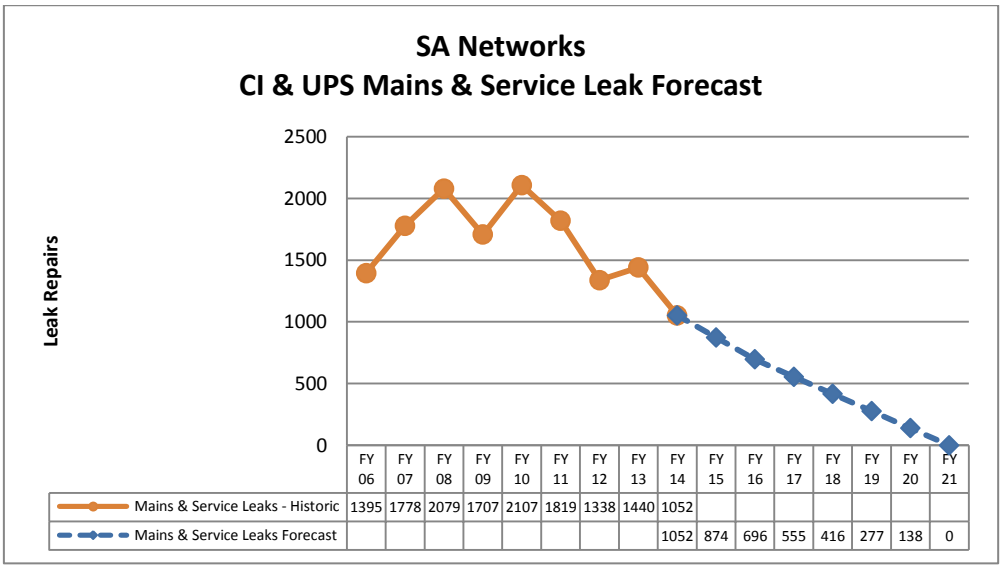
- Meter leaks have stabilised over the last 2 years at about 5,500, down from a high of 7,723 in FY 08.

- There has been 25% reduction in mains leaks since FY 08 due mainly to a reduction in CI and UPS mains leaks. This reduction has been driven by the mains replacement program.

- There has been 22% reduction in service leaks since FY 09. This has been driven by a reduction in both PE and UPS leaks with the latter attributed to the mains replacement program during this period.

### 6.3.4 Leak Forecast

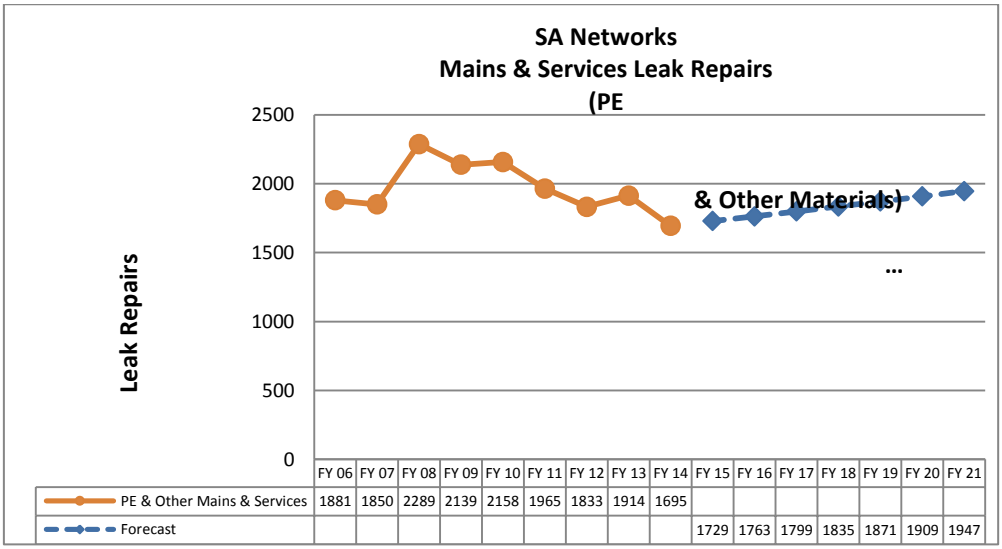
*CI & UPS Mains & Services*




Graph 8 – CI &UPS Mains and Services Leak Forecast

The forward forecast is based on replacement of CI and UPS as per schedule detailed in the 2015 MRP.

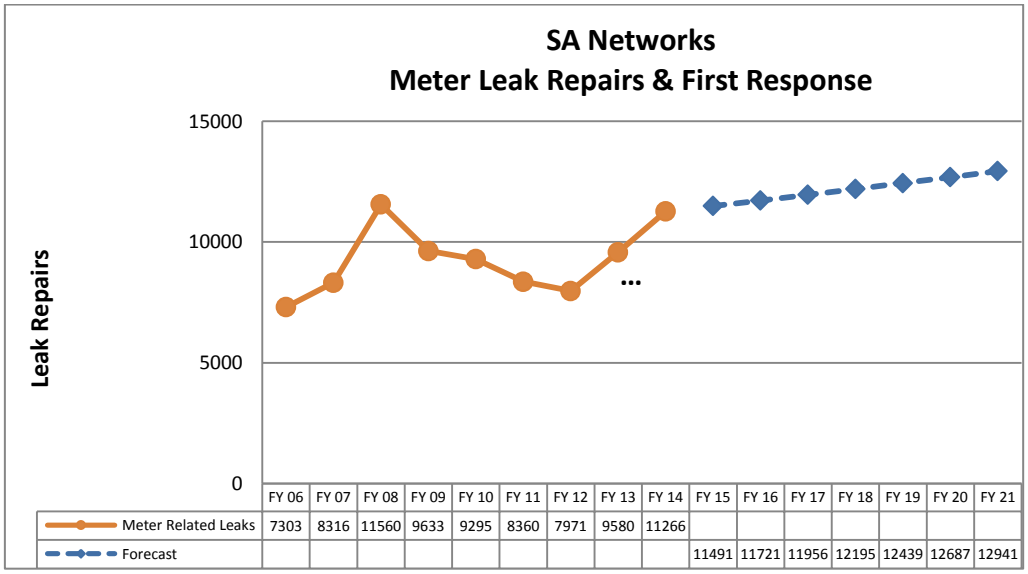
*PE and Other Materials*




Graph 9 – PE and Other Materials Leak Forecast

The forward forecast is based on leaks escalating at the annual network growth rate of 2%.

*Meter Related Leaks and First Response*




Graph 10 – Meter Leaks & First Response Forecast

The forward forecast is based on leaks escalating at the annual network growth rate of 2%.

## 6.4 Emergency Management

### *6.4.1 Leak First Response*

In accordance with the Leak Management Plan it is aimed to attend to all public reported leaks within 2 hours. The target is for a compliance of greater than 95%.

| | FY 08/09 | FY 09/10 | FY 10/11 | FY 11/12 | FY 12/13 | FY 13/14 |
|---|---|---|---|---|---|---|
| % Response within 2 hrs | 97.5 | 97 | 95 | 92 | 95 | 100 |

Table 11 – Leak First Response

### *6.4.2 Network Incidents*

| INCIDENT | FY 10/11 | FY 11/12 | FY 12/13 | FY 13/14 | FY 11/12 |
|---|---|---|---|---|---|
| 3rd Party Damage - Mains | 186 | 145 | 152 | 214 | 204 |
| 3rd Party Damage - Services | 741 | 665 | 566 | 534 | 466 |
| 3rd Party Damage - Total | 927 | 810 | 718 | 748 | 670 |
| 3rd Party Damage/km | 0.13 | 0.12 | 0.10 | 0.11 | 0.08 |
| Gas in Buildings | 6 | 8 | 2 | 1 | 3 |

Table 12 – Gas Incidents

- Third party damages per km of main have remained relatively constant over the last 5 years.

[redacted]

### 6.4.3 *Significant Environmental Incidents*

There have been no significant environmental incidents reported over the last 5 years.

| | FY 08/09 | FY 09/10 | FY 10/11 | FY 11/12 | FY 12/13 | FY 13/14 |
|---|---|---|---|---|---|---|
| Significant Environmental Incidents | 0 | 0 | 0 | 0 | 0 | 0 |

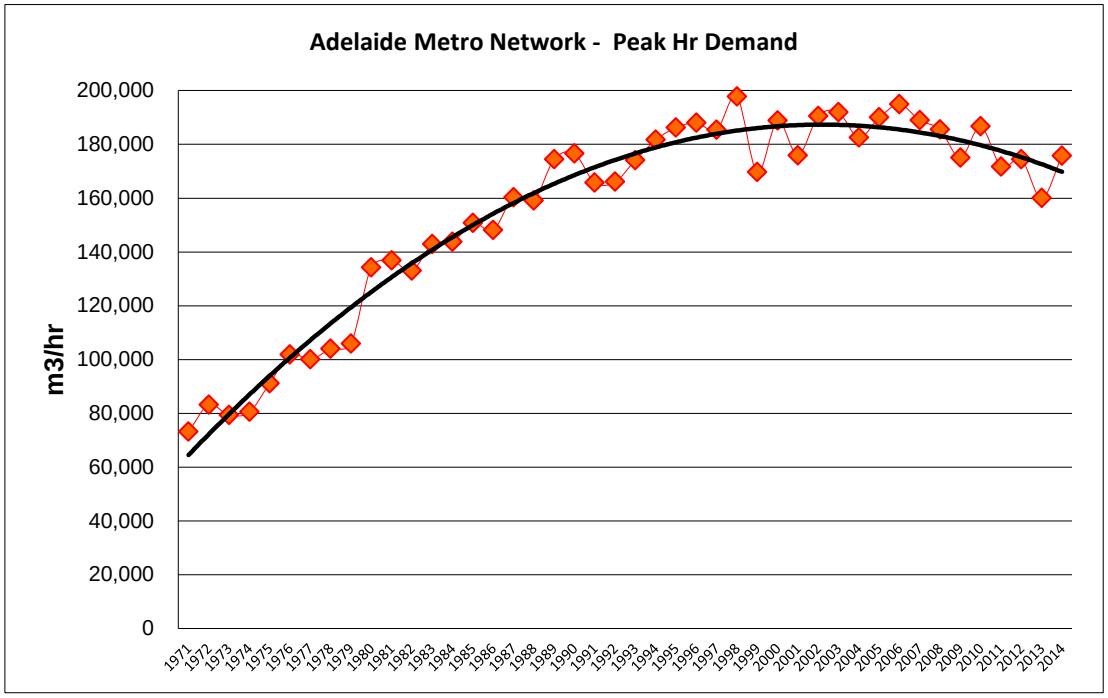
Table 13 – Environmental Incidents

# Section - 7 NETWORK SUPPLY AND DEMAND

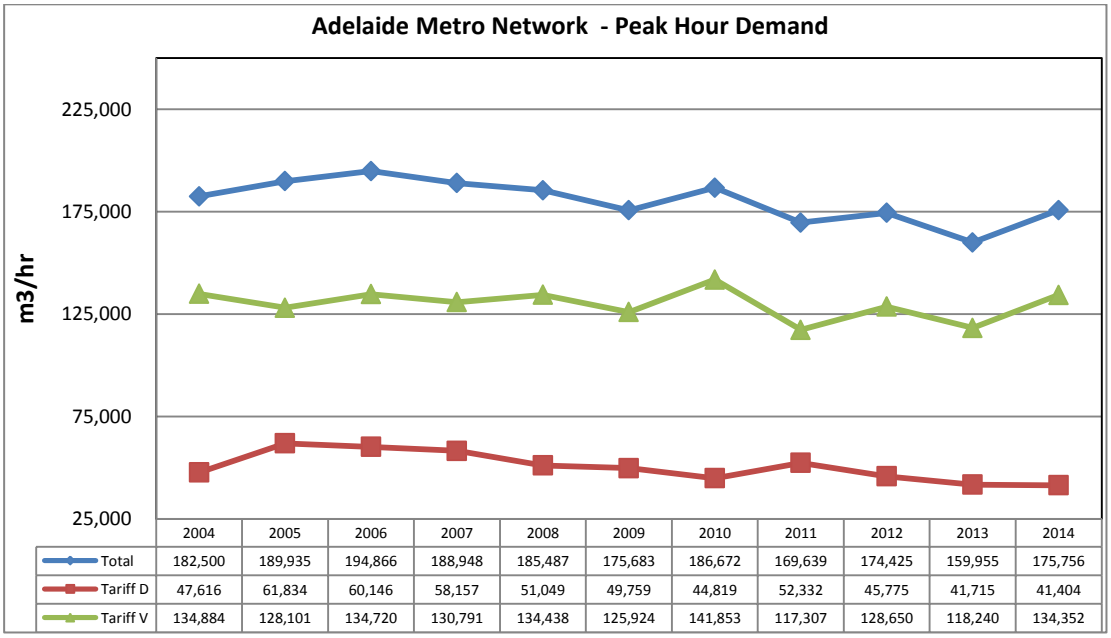
This section provides an overview of network supply and demand issues. Details of network performance (peak day analysis) are detailed in the 2014 South Australian networks Distribution System Performance Review (DSPR).

## 7.1 Peak Hour Demand

### *7.1.1 Adelaide Network Peak Hour Demand*




Graph 11 – Adelaide Metro Network 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 12 – Adelaide Metro Network 10 Yr. 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.

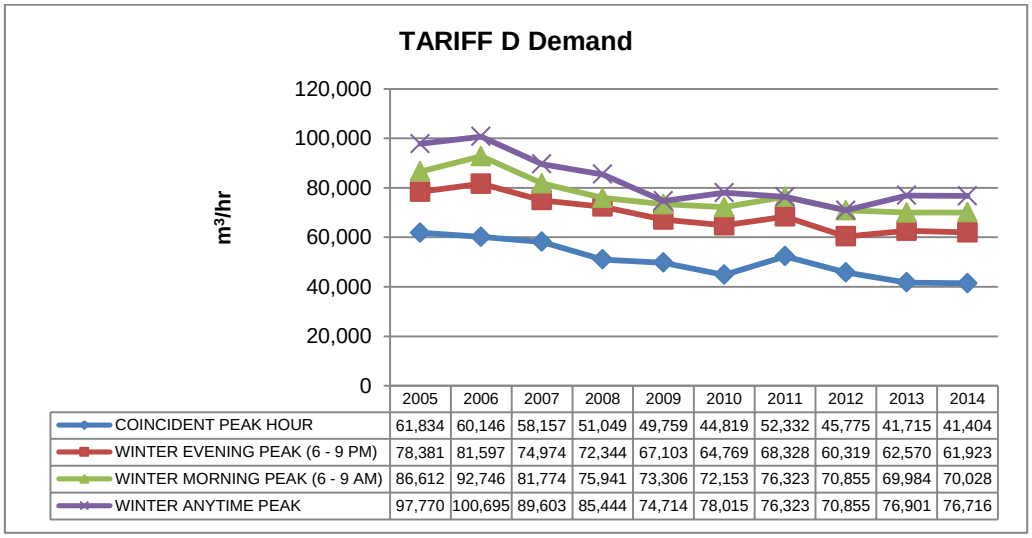
  As a result of the decrease in peak hour demand, the 1:25 network demand design criterion has been revised downwards. This has effectively reduced the design "margin" to a less conservative level, extending the capacity life of the network, and deferring augmentation that otherwise may have been required.

- 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.

### *7.1.2 Adelaide 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 13 – Adelaide 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

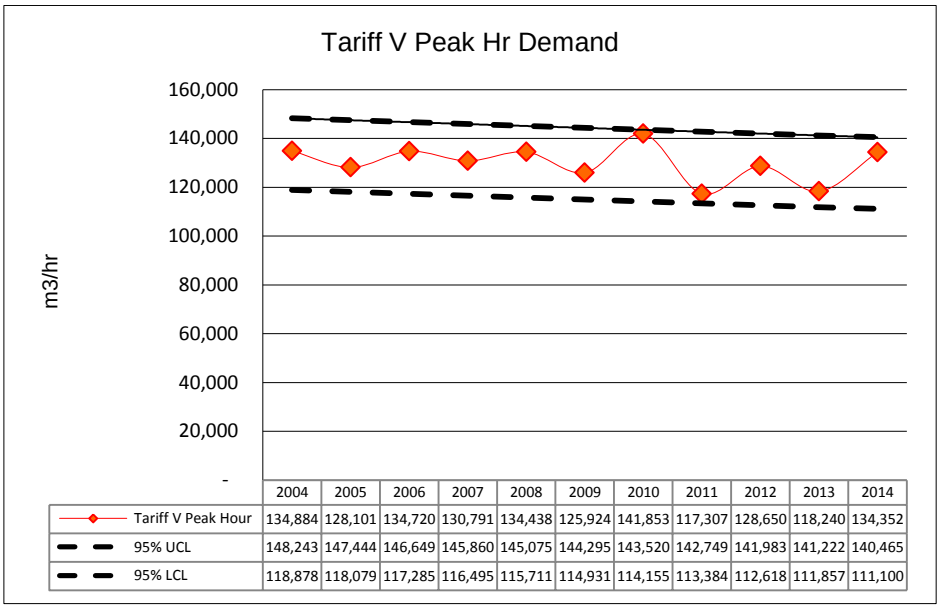
has been relatively flat over the last 5 years, symptomatic of declining manufacturing in South Australia.

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.

### *7.1.3 Adelaide 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 |

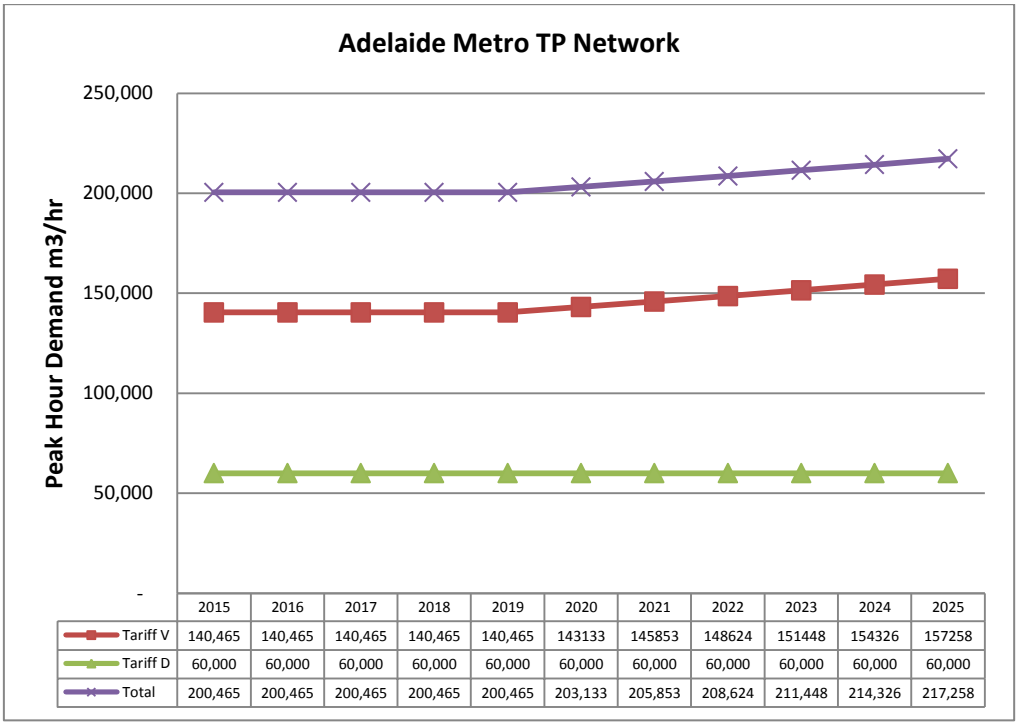
Graph 14 – Tariff V Peak Hour Demand

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).

### 7.1.4 *Adelaide Network Peak Hour Demand Forecast*

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

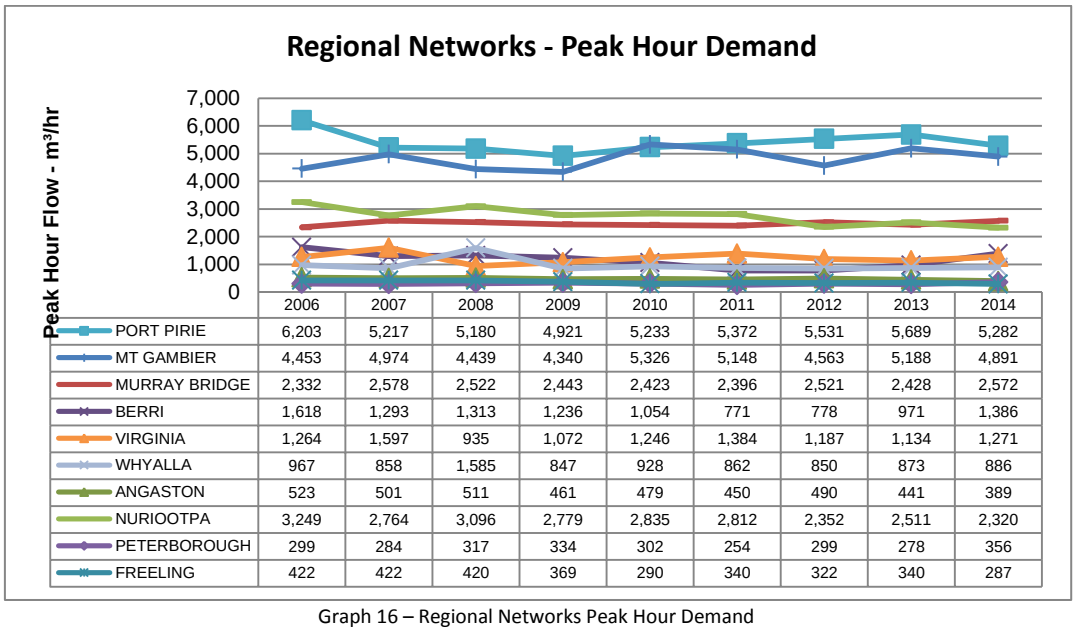



| | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Tariff V | 140,465 | 140,465 | 140,465 | 140,465 | 140,465 | 143133 | 145853 | 148624 | 151448 | 154326 | 157258 |
| Tariff D | 60,000 | 60,000 | 60,000 | 60,000 | 60,000 | 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 15 – 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.

### 7.1.5 *Regional Networks Peak Hour Demand*




| | 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 |

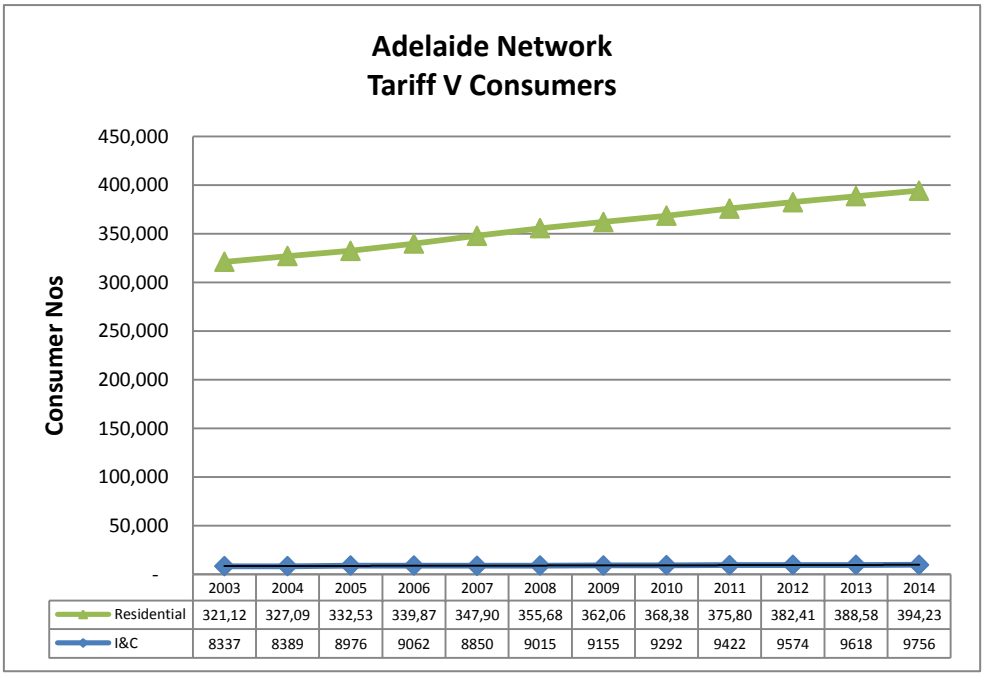
Graph 16 – Regional Networks Peak Hour Demand

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.

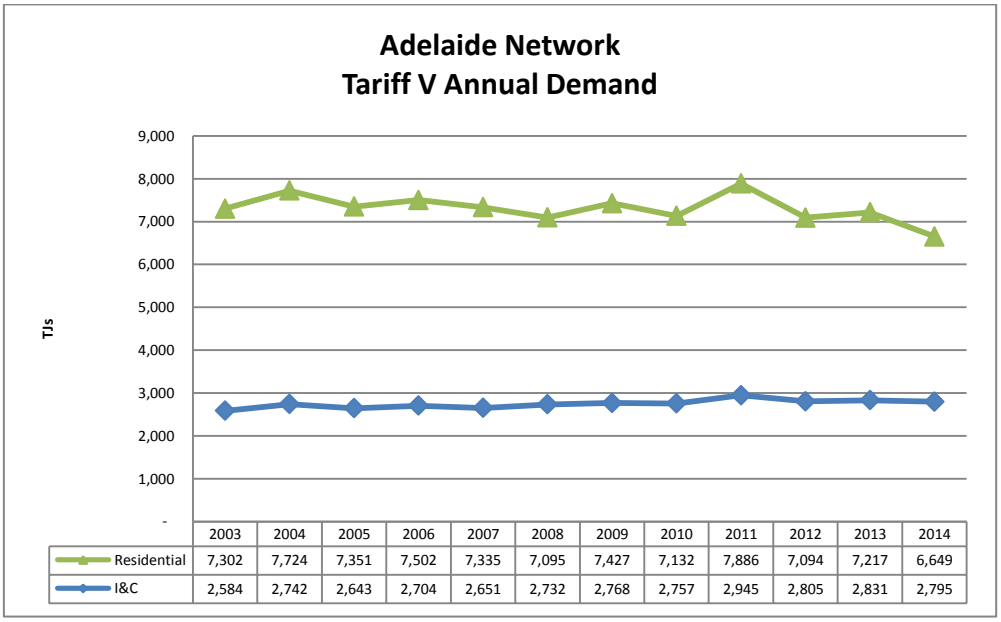
## 7.2 Annual Demand

### *7.2.1 Adelaide Network*



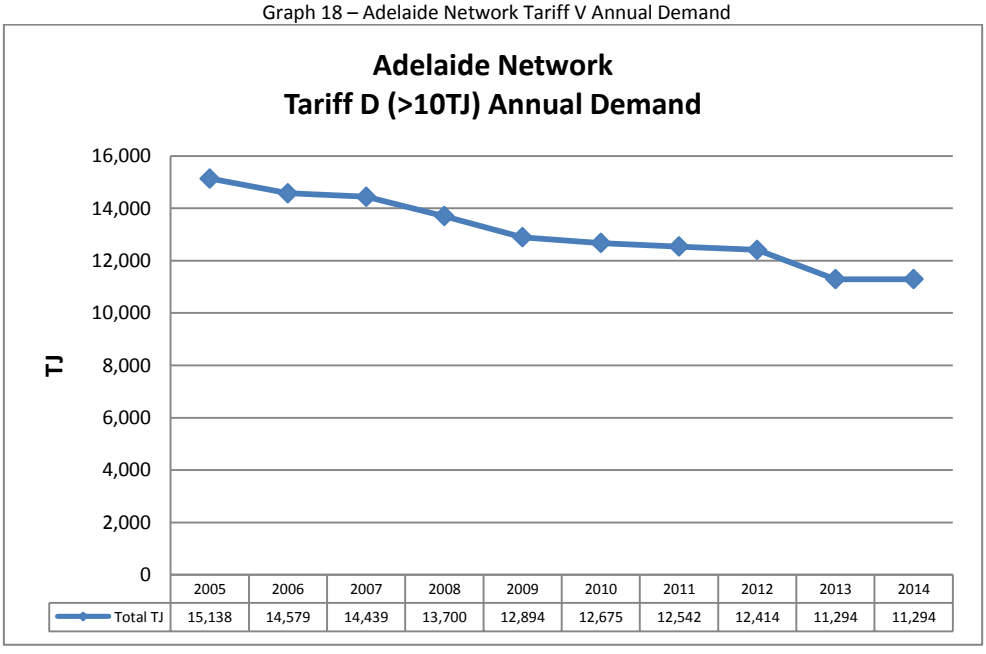

| | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Residential | 321,12 | 327,09 | 332,53 | 339,87 | 347,90 | 355,68 | 362,06 | 368,38 | 375,80 | 382,41 | 388,58 | 394,23 |
| I&C | 8337 | 8389 | 8976 | 9062 | 8850 | 9015 | 9155 | 9292 | 9422 | 9574 | 9618 | 9756 |

Graph 17 – Adelaide Network Tariff V Consumers




| | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Residential | 7,302 | 7,724 | 7,351 | 7,502 | 7,335 | 7,095 | 7,427 | 7,132 | 7,886 | 7,094 | 7,217 | 6,649 |
| I&C | 2,584 | 2,742 | 2,643 | 2,704 | 2,651 | 2,732 | 2,768 | 2,757 | 2,945 | 2,805 | 2,831 | 2,795 |

Graph 18 – Adelaide Network Tariff V Annual Demand



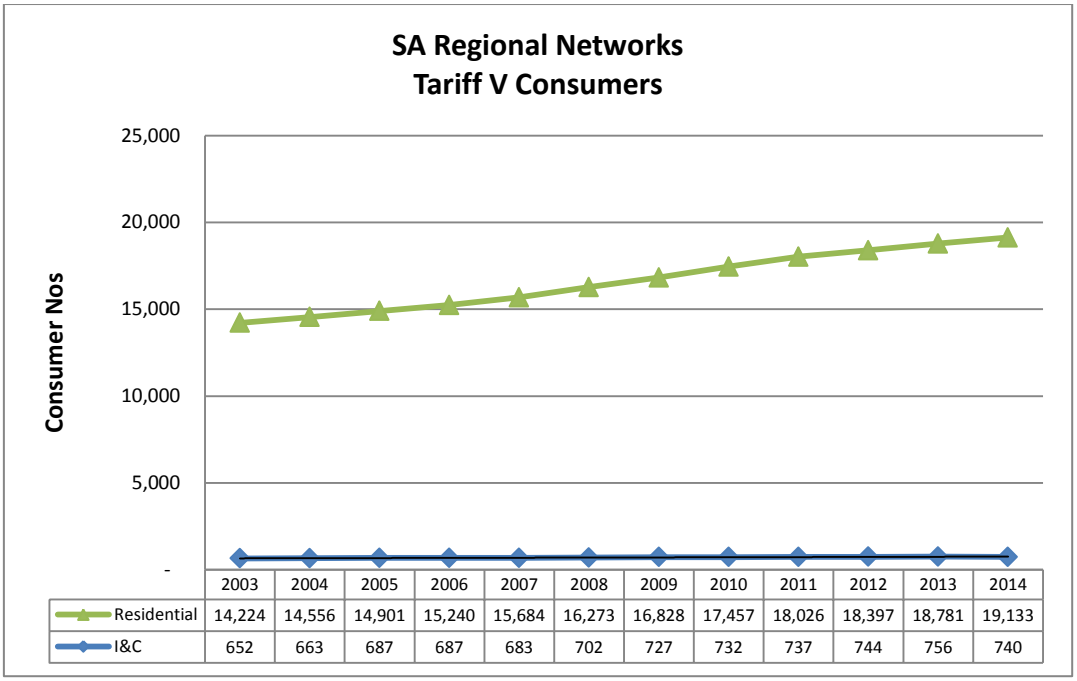

| | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|---|---|---|---|---|
| Total TJ | 15,138 | 14,579 | 14,439 | 13,700 | 12,894 | 12,675 | 12,542 | 12,414 | 11,294 | 11,294 |

Graph 19 – Adelaide Network Tariff D Annual Demand

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

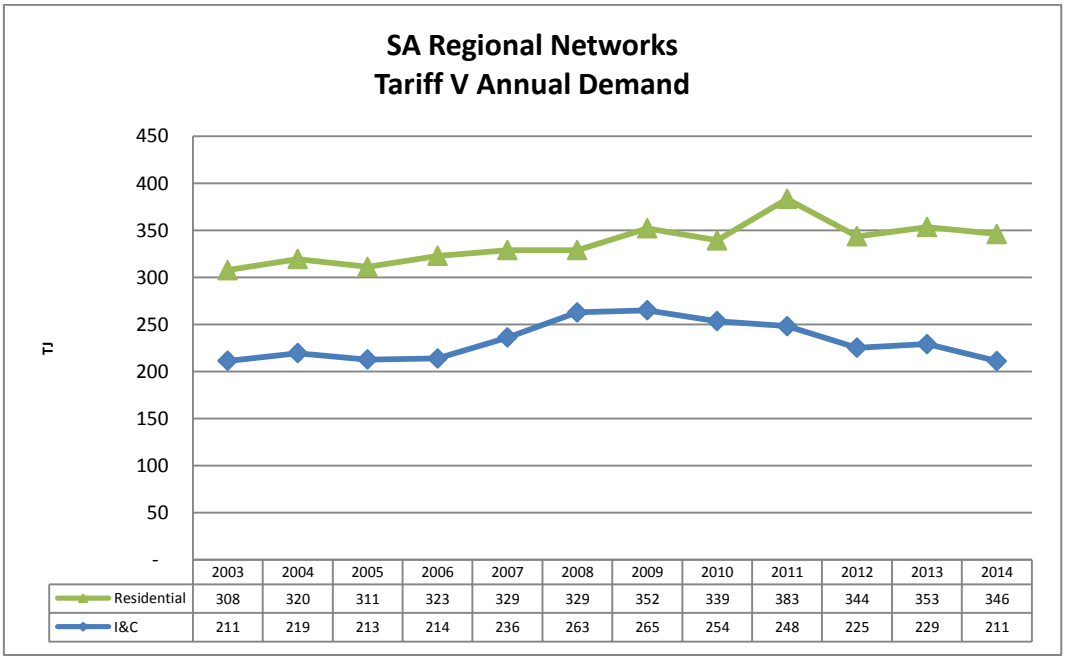
- Tariff V customer growth has been very consistent over the last 10 years with an annual growth rate of about 1.9%.
- Tariff V annual demand has fallen by 10% over the last 10 years despite a 20% increase in consumer numbers over that period. The falling consumption is due to declining average consumption 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.

### 7.2.2 *Regional Networks*



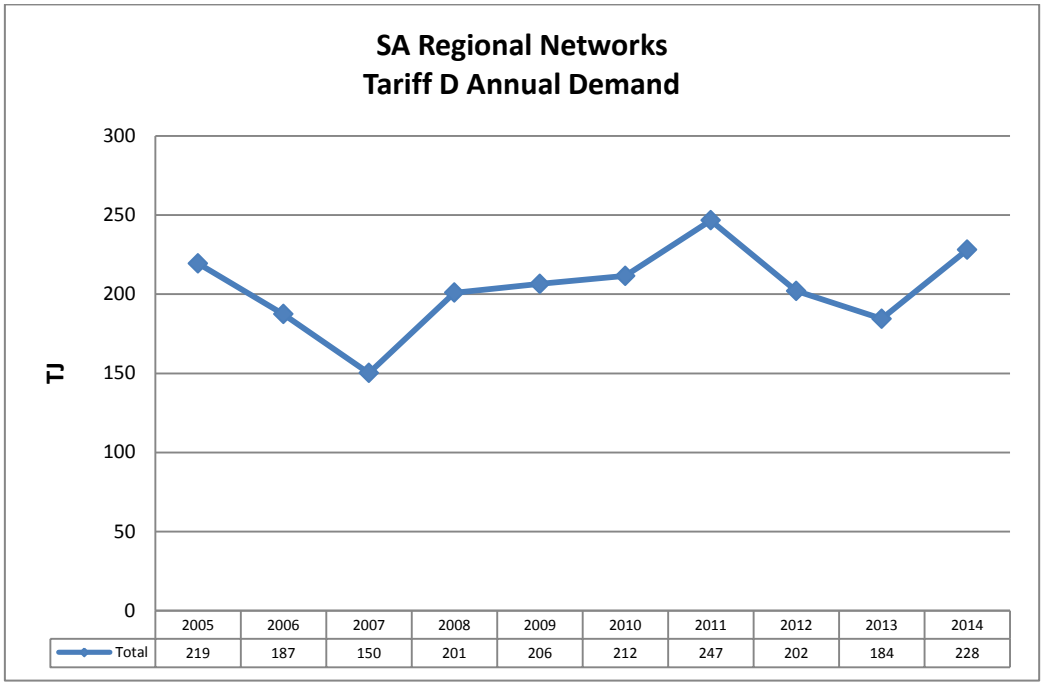

| | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Residential | 14,224 | 14,556 | 14,901 | 15,240 | 15,684 | 16,273 | 16,828 | 17,457 | 18,026 | 18,397 | 18,781 | 19,133 |
| I&C | 652 | 663 | 687 | 687 | 683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

Graph 20 – 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 21 – Regional Tariff V Annual Demand




Graph 22 – 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.

## 7.3 Customer Connections

### *7.3.1 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 14 – Tariff V MIRN Count

### 7.3.2 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 15 – Tariff D MIRN Count

### 7.3.3 Forecast Connections

The following table sets out the forecast new service connections (gross connections). These are offset 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 16 – Forecast New Service Connections.

### 7.3.4 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 SA77 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 SA24 for details.

## 7.4 Network Capacity

Network capacity and performance issues are detailed in the 2015 Capacity Management Plan and the 2014 Distribution System Performance Review. The following summarises the network capacity to deliver forecast current and forecast demand.

Network augmentation projects have been summarised in Section 9.3.

| 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.<br><br>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.<br><br>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.<br><br>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.<br><br>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.<br><br>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.<br><br>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<br><br>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 (Le Fevre Peninsula) | N/A | Adequate capacity for at least the next 5 years |
| 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.<br>The upgrade of the Virginia Gate station will provided additional capacity to meet expected growth in the hydroponic market in this area.<br><br>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.<br><br>Refer to project business case SA17 for details. |

| Network | Location | Priority | Comments |
|---|---|---|---|
| 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 project business case SA71 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.<br><br>Further augmentation is forecast during the next regulatory period. Refer to business case SA15 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.<br><br>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.<br><br>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 SA14 for details |
| HP | McLaren Vale | N/A | Supply main extension to township is planned for FY 15/16 |
| | 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.<br>Options to supply this township include:<br>• Extending the TP main from Greenhill Rd Tusmore<br>• New supply main from Murray Bridge<br>• CNG/LNG<br>FEED study in 2016 |

Table 17 – Networks Capacity Summary

# Section - 8 ASSET LIFE CYCLE PLAN

This section provides a summary of the network asset life lifecycle and associated asset issues and risks.

## 8.1 Transmission Mains

### *8.1.1 Transmission Mains Overview*

AGN's Adelaide network transmission mains are the principal supply to the distribution networks (HP, MP and LP) and some industrial customers. These mains operate at a MAOP > 1050 kPa with design, construction, operation and maintenance governed by Australian Standard AS2885.

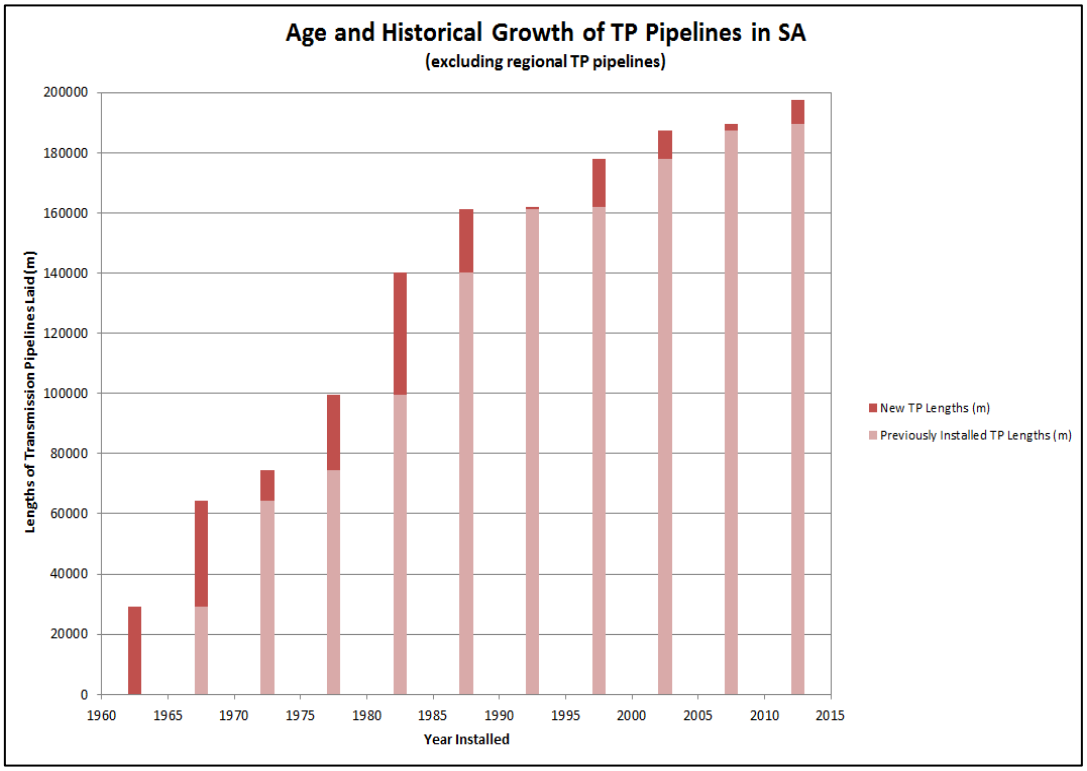
These mains are steel, externally coated with either coal tar enamel or yellow jacket PE, and cathodically protected with impressed current or galvanic anodes. The following tables and graph summarise the quantity and age profile of these assets.

| SA Networks Transmission Pipelines | | |
|---|---|---|
| | NETWORK | Total km |
| Adelaide | Adelaide Metro | 189.9 |
| Regional | Berri | 10.3 |
| | Murray Bridge | 1.9 |
| | Nuriootpa | 0.4 |
| | Port Pirie | 5.6 |
| | Total Regional | 18.2 |
| | Total | 208 |

Table 18 – SA Networks TP Mains

| Age | Km's | % |
|---|---|---|
| 50-60 | 0 | 0% |
| 40-50 | 27 | 14% |
| 30-40 | 57 | 30% |
| 20-30 | 59 | 31% |
| 10-20 | 17 | 9% |
| 0-10 | 26 | 14% |
| Total | 190 | 100% |

Table 19 – Adelaide Metro TP Mains Age Profile




Graph 23 – Adelaide Metro TP Mains Age Profile

### *8.1.2 Asset Performance, Condition & Integrity*

#### *Performance*

The performance of the Adelaide transmission mains is assessed annually with the latest performance reported in the 2015 South Australia Network Capacity Management Plan. A summary has been provided in Section 7.3.

#### *Condition & Integrity*

The condition and integrity of the transmission pipeline assets are monitored by:

1. Weekly Patrols
2. 5 Yearly location class and safety management studies (formerly Risk Assessments) as per requirements of AS2885.3
3. 5 Yearly DCVG Coating Surveys
4. Remaining Life Reviews every 10 years as per AS2885.3

The integrity of TP pipelines is detailed in the 2014 Pipeline Integrity Plan. The integrity issues are summarised as follows:

1. **Corrosion -** Significant corrosion has been discovered under heat shrink sleeves and at coating defects identified through DCVG surveys. As a result it is planned to:

    - Replace sections M21 and M53 (Port Stanvac – Port Noarlunga). Refer to business case "SA21 M21 and M53 Replacement" for details.
    - Undertake additional inspections of corrosion under heat shrink sleeves across all TP pipelines. Refer to business case "SA21a Corrosion under HSS – General" for details.
    - Undertake coating defect repairs of M36 (Flagstaff Hill). Refer to business case "SA53 M36 Flagstaff Hill Coating Repair" for details.
    - Undertake additional coating DCVG surveys and dig ups to inspect for corrosion. Refer to business case "SA36 TP Pipelines - Additional Coating Dig up & Repair" for details.

2. **Wash away –** Undermining of concrete cover over M53 TP main discovered under Christies Creek (near Morrow Rd, Port Stanvac). To be addressed as part of planned replacement of M21 and M53. Refer to business case "SA21 M21 and M53 Replacement" for details.

3. **Sleeved crossings –** Inspections at a number of sites have been completed with no major issues identified. The program of work will continue over the next regulatory period. Refer to business case "SA10 Railway Sleeve Crossings" for details.

4. **AC interference -** A number of corrosion coupons have been installed to monitor AC interference in the network. An AC interference problem has been detected at a location in the Southern Loop. Work is continuing to establish the size of the problem at this location.

5. **DC interference -** Upgrade of silicone to germanium diode drains is proposed for the medium term.

### *8.1.3 Growth*

Growth of the transmission pipeline is driven by extensions and augmentation to supply residential, industrial and commercial development.

Recent extensions have included:

- 7 km DN300 in Greenhill Rd commissioned in 2013.
- 2.5 km DN300 in West Terrace (supply to new hospital) commissioned in 2015
- 0.7 km DN100 supply main to Tanunda commissioned in 2014.

Future growth in the TP pipelines system is expected in the following area(s):

- Seaford – New TP-HP regulator plus TP extension from River Road to Seaford Road planned for FY 15/16.
- Murray Bridge – Augmentation of TP network required by the 2019 winter.

### 8.1.4 Operation & Maintenance

Maintenance of transmissions main includes:

1. Pipeline Patrols - Weekly
2. Above Ground Mains Inspections - Annual
3. CP Potential Checks – 6 monthly
4. DCVG Coating Survey – 5 yearly
5. Integrity excavations – On Condition
6. Leak Survey – 5 Yearly
7. Vegetation Management – As required

Medium-sized trees have been identified over sections of M90- Western Ring Main. The council has been notified to remove the trees.

Insulation gaskets, installed as part of the cathodic protection system, are susceptible to cracking that result in a major gas leak. Fifteen insulation flanges, located in high risk locations, have been identified for replacement with a monolithic joint design eliminating any chance of a leak developing. Refer to business case "SA37 Replacement of TP Pipeline Insulation Flanges" for details.

A major development (Bowden Residential Precinct Redevelopment) has been proposed by Renewal SA in the Bowden/Brompton area. The land use in the area will be converted from industrial to high density accommodation. A transmission main runs through the proposed redevelopment site, within close proximity to proposed high rise buildings. To maintain safe separation distances it is planned to relocate this main.

### 8.1.5 Replace/Upgrade/Dispose

As result of extensive corrosion discovered under heat shrink coatings inspected over the last few years it is planned to replace sections M21 and M53 (Port Stanvac – Port Noarlunga). Refer to business case "SA21 M21 and M53 Replacement" for details.

The long term strategy for the transmission main from Morphett Road to Flagstaff Hill will be assessed after coating defects are inspected.

### 8.1.6 Risks/Issues/Actions

Key risks, issues and actions associated with transmission mains have been summarised in the following table. Details of associated Capex and Opex projects have been included in Section - 9.

| Ref No. | Risk/Issue | Risk/Issue Detail | Priority | Actions |
|---|---|---|---|---|
| SA10 | Sleeved Rail Crossing Corrosion | Because of sleeve design CP is ineffective Potential for water ingress causing corrosion.<br><br>In some instances, vent pipes had been knocked over or removed during alteration of the associated road and/or rail corridor. | 2 | Inspect and remediate all transmission sleeve crossings.<br><br>Program is underway with 26 site forecast to be completed in the current regulatory period with a further 55 sites to be completed over the next period.<br><br>Refer to business case "SA10 Railway Sleeve Crossings" for details |

| Ref No. | Risk/Issue | Risk/Issue Detail | Priority | Actions |
|---|---|---|---|---|
| SA53 | M36 Coating Defect Corrosion | Significant corrosion discovered beneath relative minor DCVG detected defects. | 2 | Additional DCVG survey and remediation of defects.<br>Refer to business case "SA53 M36 Flagstaff Hill Coating Repair" for details. |
| SA 36 | TP Pipeline Coating Defects | Significant corrosion discovered beneath relative minor DCVG detected coating defects. | 2 | Undertake additional coating DCVG surveys and dig ups to inspect for corrosion.<br><br>Refer to business case "SA36 TP Pipelines - Additional Coating Dig up & Repair" for details. |
| SA21 | TP Pipeline Heat Shrink Sleeve Corrosion | Significant corrosion found beneath heat shrink sleeves on sections of M21 and M53 | 2 | Replace sections M21 and M53 (Port Stanvac – Port Noarlunga).<br><br>Refer to business case "SA21 M21 and M53 Replacement" for details. |
| SA21a | TP Pipeline Heat Shrink Sleeve Corrosion | Based on recent experience with corrosion under heat shrink sleaves on M21 and M53 similar corrosion is suspected across other TP pipelines | 2 | Undertake additional inspections of corrosion under heat shrink sleeve across all TP pipelines.<br><br>Refer to business case "SA21a Corrosion under HSS – General" for details |
| SA37 | Insulation Flanges | Insulation flanges susceptible to cracking with subsequent leak. Repair options are limited in 15 high risk locations. | 2 | Replace with monolithic joint at 15 high risk locations.<br><br>Refer to business case "SA37 Replacement of TP Pipeline Insulation Flanges" for details |
| SA21 | M53 TP Main Christies Creek | Washaway under concrete cover | 2 | Relocate main.<br><br>Refer to business case "SA21 M21 and M53 Replacement" for details. |
| | M114 Southern Loop | High AC interference detected. | 3 | Install corrosion coupons and assess AC density data. |
| | M90 Western Ring Main | Trees planted directly over the pipeline | 3 | Council contacted to remove trees. |
| | Adelaide – TP Network – AC corrosion | A number of TP lines in metro Adelaide are in proximity to HV electricity power lines with potential for AC currents to cause corrosion | 3 | Install corrosion coupons on TP mains located near above ground high voltage power transmission corridor. |
| | DN100 River Rd TP Pipeline Corrosion | Pitting Corrosion at field joints - Condition of pipe makes it susceptible to failure | N/A | A 3.8km section, between Dyson Rd valve-pit & point of tie in with DN300 main on the same Rd was abandoned during FY 15. |
| | TP pipeline in high density development | Bowden Residential Precinct Redevelopment will place high rise buildings in close proximity to the existing pipeline. A risk assessment has recommended relocation of this pipeline | 2 | Relocate pipeline.<br><br>Refer to project business case "SA38b Bowden Redevelopment Mains Alteration" for details. |
| | TP Security of Supply | Supply to the following areas could be vulnerable in event of major failure of the TP supply main.<br>• Flagstaff Hill/Happy Valley<br>• Seaford/Aldinga<br>• Wynn Vale<br>• Gawler | 3 | Undertake cost benefit analysis to improve security of supply |

Table 20 – Transmission Mains Risks and Issues

## 8.2 Transmission Facilities

### *8.2.1 Overview*

Facilities associated with Transmission Pipelines include gate stations and or custody transfer metering stations.

These sites are owned and operated by the upstream companies (i.e. Epic Energy or SEAGas)

AGN is responsible for odorising the gas carried through its networks as part of its haulage service.

There are 14 odorising facilities within the SA Network located at gate station facilities, owned by AGN, and operated and maintained by APA.

| Name | Location | Type | Storage Capacity (Litres) |
|---|---|---|---|
| Gepps Cross | Magazine Rd Dry Creek | Pneumatic Pump | 3000 |
| Katnook | Argyle Rd Penola | Pneumatic Pump | 1000 |
| Whyalla | Port Augusta Rd | Pneumatic Pump | 1000 |
| Elizabeth | Mill Rd | Electric Pump | 1000 |
| Taperoo | Mersey Rd | Electric Pump | 1000 |
| Wasleys | Helps Rd | Electric Pump | 26000 |
| Port Pirie | Warnertown Rd | Pneumatic Pump | 1000 |
| Penfield Roses | Short Rd Penfield | Evaporative | 15 |
| Virginia | Supple Rd | Evaporative | 60 |
| Metro Farms | Pinkerton Plains Rd Wasleys | Evaporative | 15 |
| St Kilda | Tozer Rd Waterloo Corner | Evaporative | 15 |
| Pacific Salt | Port Augusta Rd Whyalla | Evaporative | 15 |
| Peterborough | Cotton Rd | Evaporative | 60 |
| Burra | Linkson St. | Evaporative | 60 |

Table 21 – Odorising Facilities

Gas received from SEAGas is already odorised and hence the Cavan Gate Station does not have an odorising unit.

The odoriser at Wasleys odorises all the gas entering the Angaston and Riverland pipelines. There is a storage tank at Wasleys which holds 26,000 litres of odorant. The odorant is purchased in bulk quantities of 20,000 litres approximately every 3 to 4 years and stored at Wasleys from where it is shipped to the other sites as required using a purposely designed and built odorant transfer trailer.

### *8.2.2 Asset Performance, Condition & Integrity*

#### *Performance*

The performance of gate stations and odorant facilities has been reported in the DSPR. In summary

- The Virginia gate facility capacity is being upgraded to service residential development in Buckland Park and growth areas around Virginia.
- There are no capacity or gas measurement issues with the gate station facilities delivering gas to the Adelaide Metro and other regional networks.
- There are no odorant facilities performance issues.

*Condition & Integrity*

There are no condition or integrity issues with gate station or odorant facilities.

### *8.2.3 Growth*

Residential developments planned in Roseworthy may require an additional gate station either from the SEAGas pipeline or the Epic Angaston lateral to reinforce supply. Growth will be monitored over the next 5 years to establish the scope and timing of any future augmentation.

### *8.2.4 Operation & Maintenance*

TP facilities maintenance includes:

- Witness verification tests on gate station metering – Annually
- Custody transfer instrumentation inspection/calibration - Annually
- Adelaide Metro odorant facilities mechanical inspection – Monthly
- Regional odorant facilities mechanical inspection– 3 Monthly
- Odorant facilities instrumentation calibration – Annually

There are no material issues with operation and maintenance of TP facilities.

EPIC are planning to odorise gas entering the Moomba- Adelaide pipeline (MAP) from June 2015. It is planned to maintain existing AGN facilities pending an assessment that adequate odorant can be maintained within AGN's networks.

A review of the security of above ground gate station and odorant facilities has highlighted that chain wire fences with standard locks do not provide adequate protection from vandalism and terrorism. The following table summarises sites at risk.

| Site Location | Station Type |
|---|---|
| Port Pirie Gate Station | Odorant Station |
| Whyalla Gate Station | Odorant Station |
| Mount Gambier Gate Station | Odorant Station |
| Virginia Gate Station | Farm tap/Odorant |
| Divine Ripe | Farm tap/Odorant |
| Wasleys Piggery | Farm tap/Odorant |
| Burra township | Farm tap/Odorant |
| Penfield Roses | Farm tap/Odorant |
| St Kilda | Farm tap/Odorant |
| Peterborough gate station | Odorant Station |

Table 22 – Transmission Facility Risk Sites

It is planned to install high security fencing at these sites. Refer to business case "SA69 Fencing Critical Infrastructure" for details.

### 8.2.5 Replace/Upgrade/Dispose

Odorant facilities and equipment are regularly maintained and assessed for overhaul/replacement.

### 8.2.6 Risks/Issues/Actions

Key risks, issues and actions associated with transmission facilities have been summarised in the following table. Details of associated Capex and Opex projects have been included in Section - 9.

| Ref No. | Risk/Issue | Risk/Issue Detail | Risk Rating | Actions |
|---|---|---|---|---|
| SA69 | Security farm taps and odorant stations | Sites lack adequate security to prevent vandalism and potential terrorism act | 3 | Install high security fencing. Refer to business case SA69 for details. |

Table 23 –Transmission Facilities Risks and Issues

## 8.3 Distribution Mains & Services

### *8.3.1 Overview*

Distribution mains inventory (June 2014) within the SA Networks are summarised in the table below.

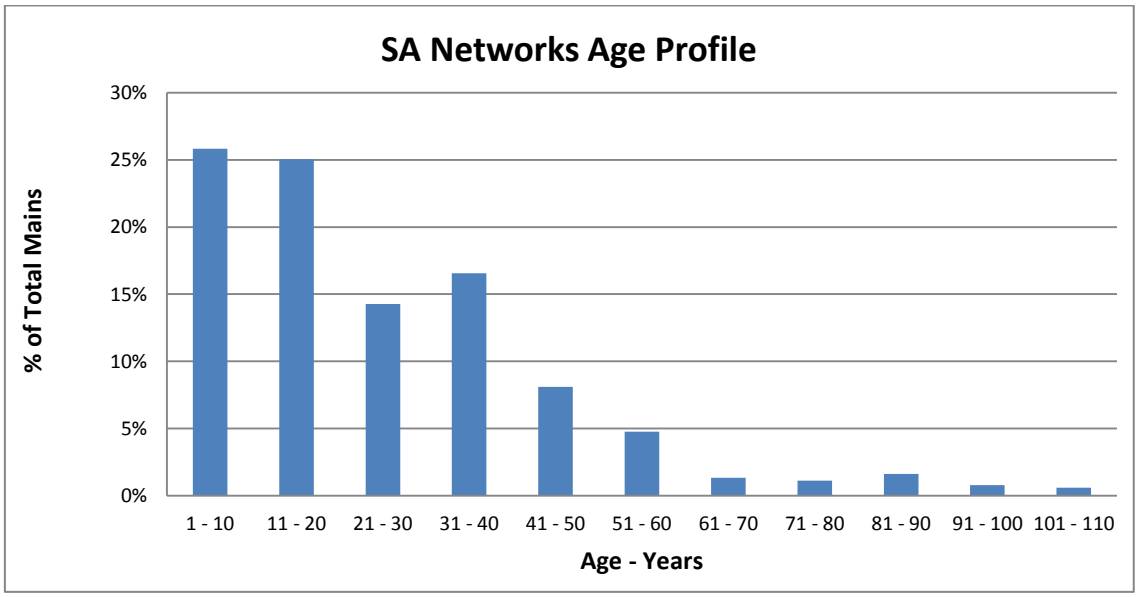
| Adelaide Metro Network - km | | | | | |
|---|---|---|---|---|---|
| Network | PE | Steel | CI | UPS | Total |
| LP | 428 | 37.1 | 763 | 75 | 1,303 |
| MP | 1,918 | 388 | 68 | 11 | 2,385 |
| HP | 2,422 | 1,091 | 0 | 0 | 3,513 |
| TOTAL | 4,768 | 1,517 | 830 | 86 | 7,200 |

Table 24 – Mains inventory, Adelaide Metropolitan area

| SA Regional Networks – km | | | | | |
|---|---|---|---|---|---|
| Network | PE | Steel | CI | UPS | Total |
| LP | 18.9 | 1.7 | 3.4 | 13.9 | 37.9 |
| MP | 163.7 | 103.5 | 0.0 | 13.9 | 281.1 |
| HP | 438.5 | 81.9 | 0.0 | 0.0 | 520.5 |
| TOTAL | 621.2 | 187.1 | 3.4 | 27.8 | 839.5 |

Table 25 – Mains inventory, Regional Centres

The following graph summarises the SA networks mains age profile.




Graph 24 – SA Networks Age Profile

### 8.3.2 Asset Performance, Condition & Integrity

Mains and services condition and integrity has been detailed in the 2015 SA Networks MRP while network capacity performance has been detailed in the 2014 DSPR and 2015 CMP.

Key issues have been summarised in the following section.

#### *Performance*

1. All networks satisfactorily met peak day demand requirements during 2014.

2. Continued residential growth at the southern extremity of the Adelaide network will require network augmentation during the next regulatory period. Refer to project proposal "SA15 - 305 HP Seaford Aldinga Augmentation" for details.

3. Continued commercial growth within the Virginia network will require network augmentation during the next regulatory period. Refer to project business case "SA17 - 325 HP Virginia Augmentation" for details.

4. Continued residential, industrial and commercial growth within the Murray Bridge network will require network augmentation during the next regulatory period. Refer to project business case " Murray Bridge Augmentation" for details.

#### *Condition & Integrity*

1. There has been a significant improvement in the condition and integrity of the LP networks network during the current regulatory period as result of the accelerated CI and UPS mains replacement program. Since 2010 the incidence of CI and UPS mains and services leaks has reduced by 50%, UAFG has reduced by 34% and customer reported supply complaints related to water ingress have reduced by 60%.

2. From 2004 until 2012, LP inlet services (CI and UPS) to multi-user sites (unit developments) were only replaced (in conjunction with the mains replacement program) if they failed a safety (pressure) test. Those services passing a pressure test were fitted with a boundary regulator and were left operating at LP. This process minimised disruption to surrounding consumers and the public.

   The majority of these services are of UPS at the end of useful life due to corrosion. It is planned to replace these assets and align system integrity with that of the inserted and pressure upgraded mains that these assets are connected to.

3. The MP CI and UPS trunk network is considered to be in poor condition with CI having a propensity for crack failures, while UPS mains are subject to extensive external corrosion and are considered at the end of their useful lives.

4. While the current CI and UPS program has been effective in reducing risk, the leak rate per kilometre of main is about three times that of the remaining PE network. A continuation of the replacement program to reduce the leak rate to that of the remaining network is considered prudent.

5. While there has been a significant reduction in UAFG to about 4.3% (total South Australia Networks) it is higher than what is considered a "good" bench mark of about 3%. Analysis by an independent consultant indicates that the remaining CI and UPS network is contributing

about 400 TJ to the MAT. Completion of the CI and UPS replacement program is expected to reduce UAFG to about 1035 TJ or about 3%.

6. The CI and UPS mains are considered at the end of their useful lives with escalating leaks and UAFG if the program is curtailed. This was demonstrated when replacement rates were reduced to an average about 65 km per year over the 2004-2009 period from about 150 km in the preceding 5 year period. As a result UAFG increased by 5% year on year with the overall deterioration of the network calculated at about 12% per year. The relatively high deterioration rate was indicative of the condition of the CI and UPS assets reaching the second point of inflection associated on the asset condition "bath tub" curve. This is the point where accelerated deterioration is experienced as the asset approaches the end of its life.

7. A program of coating surveys (DCVG) across 200 km of coated steel HP mains is planned over the next regulatory period. Based on outcomes of a similar program undertaken recently on coated steel TP mains active corrosion is expected at a number of sites is expected to be found. Refer to project business case "SA49 - DCVG Distribution Trunk Mains Survey" for details.

[redacted]

a. The development of a reliability forecast model (future HDPE integrity management optimisation). While an initial behaviour model has been developed, further work is required to refine the model to include crack failure predictive behaviour, so that asset management strategies can become more targeted. For details refer to business case "SA54 Risk Management of HDPE".

8. A number of above ground PE inlet services and fittings have been identified in MP and HP networks that present a risk as result of:
   - Pipe degradation of the section of pipe exposed to sunlight (ultra violet light damage) leading to failure and major release of gas;
   - Melting of the service pipe in event of a fire, exacerbating an emergency situation;
   - External mechanical interference and subsequent major release of gas; and
   - Susceptibility of plastic compression (Philmac) fittings connecting the service to the regulator to leak over time.

   A program of replacement has been implemented with about 15,000 services to be replaced over the next regulatory period. Refer to business case "SA28 – Above Ground PE Pipe and Fittings" for details.

### *8.3.3 Growth*

Distribution mains growth is related to new domestic, industrial and commercial connections the forecast of which is summarised in Section 7.3.3.

### *8.3.4 Operation & Maintenance*

Key operation and maintenance activities associated with mains and services are:

1. Emergency first response to public reported leaks – It is aimed to attend to all public reported leaks within 2 hours with an internal compliance target of 95%.

2. Leak Survey - A rolling 5-year leak survey program is undertaken of the general distribution network with 6-month and 12-month 'special' surveys of identified high risk areas.

3. Cathodic Protection Monitoring.

4. Winter pressure surveys to identify and confirm pressure and capacity problems.

A SCADA system is used to provide surveillance of network pressures with additional monitoring provided through fixed and mobile data loggers and chart recorders. Network pressure data collected from these is reviewed and analysed to diagnose pressure control equipment faults and network capacity problems.

Chart recorders are being superseded by electronic data loggers which are more reliable, and require less maintenance as they do not have mechanical moving parts. A replacement program has commenced with 38 expected to be replaced in this current regulatory period with a further 32 to be

replaced over the next period. Refer to project business case "SA01 SCADA Network Surveillance" for details.

[redacted]

[redacted]

Emergency gas shut-off of gas supply to individual residential premises, in event of bushfire or house fire has been raised as a risk issue. The difficulty in isolating supply has the potential to exacerbate property damage and potentially impact public safety. It is planned to install thermally activated shut-off valves downstream of the service isolation valve on all domestic premises. Refer to project business case "SA31 – Fire Safety Valves" for details.

The inlet service records for industrial, commercial, and major unit development sites either do not exist, or are not readily available to operations staff and third parties. This has potential to impair emergency leak responses and third party damage mitigation efforts. A program has commenced to capture and electronically record these assets which will continue over the next regulatory period. Refer to project business case "SA44 – Inlet Data Capture for details".

A "Dial Before You Dig" (DBYD) service is maintained to mitigate the risk of 3rd party damage. Third party referrals have remained relatively constant over the last four years with a 2% annual increase in line with network growth forecast going forward.

### *8.3.5 Replace/Upgrade/Dispose*

Details of the mains and service replacement program have been included in the 2015 SA Networks MRP. The key aspects of this plan over the next regulatory period are:

- Replacement of all remaining CI and UPS mains (about 862 km of predominately LP CI and UPS mains);
- Replacement of all remaining MP Class 250 HDPE (about 260 km); and
- Replacement of about 141km of Class 575 HDPE identified as being at highest risk.

A summary of replacement volumes and costs is provided in Section 9.4.

### *8.3.6 Risks/Issues/Actions*

Key risks, issues and actions associated with mains and services have been summarised in the following table. Details of associated Capex and Opex projects have been included in Section - 9.

| Ref No. | Risk/Issue | Risk/Issue Detail | Priority | Actions |
|---|---|---|---|---|
| 2015 MRP | CI & UPS mains and service condition | CI & UPS mains and services have reached the end of their service lives | 2 | Continue with replacement as per MRP. Total replacement by the end of FY 21.<br>Refer to the 2015 MRP for details |
| [redacted] | [redacted] | [redacted] | [redacted] | [redacted] |

| Ref No. | Risk/Issue | Risk/Issue Detail | Priority | Actions |
|---|---|---|---|---|
| [redacted] | [redacted] | [redacted] | [redacted] | [redacted] |
| [redacted] | [redacted] | [redacted] | [redacted] | [redacted] |
| [redacted] | [redacted] | [redacted] | [redacted] | [redacted] |
| [redacted] | [redacted] | [redacted] | [redacted] | [redacted] |
| SA54 | Class 575 HDPE Pipe Condition | Further analysis and material testing is required to establish the future risk profile of HDPE mains to optimise the integrity management of HDPE | 2 | Develop a forecast reliability model for the residual (1300 km) of HDPE mains.<br><br>Refer to business case SA54 Risk Management of HDPE |
| SA49 | HP Coated steel trunk main corrosion | Coating surveys of TP mains have highlighted significant corrosion beneath heat shrink sleeves. Similar corrosion is expected on coated HP steel. | 3 | Undertake DCVG surveys and remediation program |
| SA15 | Aldinga HP Network | Minimum end of main pressures are forecast over the next regulatory period | 3 | Augmentation of network by winter 2020 |
| SA17 | Virginia HP Network | Minimum end of main pressures are forecast over the next regulatory period | 3 | Augmentation of network by winter 2020 |
| SA 44 | Inlet Data Capture | Details of Inlet services for major I&C and unit development sites are not readily available to operation and maintenance personnel. This information is not available through DB4YD leaving these assets susceptible to 3rd party damage | 3 | Capture all major I&C and Multi-dwelling unit development inlets.<br><br>Refer to business case SA 44 Inlet data Capture for details |
| SA31 | Emergency shut-off in case of fire | Potential for fire to damage the above ground facilities at domestic meter facilities exacerbating the fire risk. ` | 3 | Installing fire activated service isolation valves to domestic premises.<br><br>Refer to business case SA31 Fire Safety Valves for details |

| Ref No. | Risk/Issue | Risk/Issue Detail | Priority | Actions |
|---|---|---|---|---|
| SA 01 | Fixed Chart Pressure Recording | Chart pressure recorder technology has been superseded by electronic data loggers | 3 | Replace 70 fixed chart recorders with data loggers. 38 forecast for the current regulatory period with 32 in the next.<br>Refer to project business case "SA01 SCADA Network Surveillance" |
| SA28 | Above ground PE | Past procedures have resulted in PE inserted into above ground service pipework. This creates a risk of material degradation and pipe melting, exacerbating damage, in event of a house fire. | 2 | Replace all above ground plastic pipe and fittings.<br><br>Refer to business case SA28 Above Ground PE Replacement |

Table 26 – Distribution Mains and Services Risks and Issues

## 8.4 Distribution Facilities Lifecycle Plan

### *8.4.1 Overview*

The distribution facilities comprise of:

1. District Regulator Stations (DRS)
2. Network isolation valves
3. Cathodic protection (CP) facilities.

*District Regulator Stations*

DRSs control the delivery of gas into the HP, MP, LP distribution networks within allowable operating pressure of the downstream network.

These facilities consist of filters, isolation, bypass and pressure control valves that are located either in below ground vaults (TP) or above ground kiosks (HP, MP)

Various configurations are used with past designs predominately consisting of single stream active-monitor arrangements. A new standard was implemented in 2012, with a twin stream design now providing additional security of supply.

The following table summarises DRS installations as of 30 June 2014.

| | Outlet Pressure | | | |
|---|---|---|---|---|
| Inlet Pressure | High | Medium | Low | Grand Total |
| Transmission | 60 | 28 | 1 | 89 |
| High | 3 | 44 | 73 | 120 |
| Medium | | 3 | 110 | 113 |
| Grand Total | 63 | 75 | 184 | 322 |

Table 27 – District Regulators

*Valves*

Approximately 9,400 mainline and branch isolation valves are installed throughout AGN's networks. These provide emergency isolation and control during normal operation, maintenance and emergency response situations. The following table summarises the various types of network isolation valves.

| Item | Valve Category | Total |
|---|---|---|
| 1 | Mains – Mainline Isolation | 12 |
| 2 | Mains - City Isolation | 13 |
| 3 | Mains – Major Control | 1,361 |
| 4 | Mains – Secondary Isolation | 5,062 |
| 5 | Regulators – Primary Isolation | 179 |
| 6 | I&C Customer Supply - Primary Isolation | 2,812 |
| | Total | 9,440 |

Table 28 – Network Valves

*Cathodic Protection Facilities*

A network corrosion protection system is used to protect approximately 1700 km of steel mains and pipelines. This system consists of both impressed current and sacrificial anode systems.

There are 12 impressed current cathodic protection (ICCP) units consisting of a transformer rectifier and ground bed. There are approximately 2,000 magnesium anodes and 200 zinc anodes.

### 8.4.2 Asset Performance, Condition & Integrity

*District Regulator Stations*

Degradation of brick constructed below ground vaults is allowing water ingress leading to corrosion of pipe valves and fittings within the chamber. The wet and congested environment within these chambers has been identified as a maintenance risk. A replacement program has commenced with 26 TP DRS planned to be replaced during this current regulatory period with a further 10 planned for the next period. Refer to business case "SA22 - Below Ground Regulator Replacement" for details.

A risk assessment identified that a number of TP DRSs are not are not fitted with over pressure shut-off (OPSO) valves with potential for over pressure in the downstream network. To mitigate this risk it is planned to install OPSO valves at these stations. Refer to business case "SA19 Upgrade of TP stations without OPSO valve" for details.

The DRSs feeding the Seaford – Aldinga HP network are approaching their capacity limits. Extension of the TP network and additional TP-HP regulators are planned during 2015/16 to maintain adequate capacity to this network.

*Valves*

There are 250 key network isolation valves within the network with a number located in underground concrete and brick chambers accessed via a small manhole cover located in the roadway or footpath. These chambers are susceptible to accelerated corrosion due to the wet environment. The high humidity created by the lack of ventilation and constant presence of water results in corrosion pitting, which if left unchecked, could result in a major gas escape.

Six of these are now inoperable with three located in the middle of major roads presenting a significant risk to the safety of the maintenance personnel. Replacement of these valves is planned over the next regulatory period. Refer to project business case "SA70 Transmission Valve Replacement" for details.

Some valves are buried in the smaller 300mm diameter chambers also contain a cavity where there is no soil contact. These valves are wrapped and not able to be visually checked for corrosion unless they are excavated.

Inspections of these valves have highlighted that corrosion pitting has been gradually progressing in all valve pits to a point that a remediation program of grit blasting and painting, has been commenced to halt further deterioration that could affect operability or result in a major gas escape. The remediation program will extend over the next regulatory period. Refer to project business case "SA09 TP Valve Corrosion" for details.

### *8.4.3 Growth*

Network augmentation and the mains replacement program is expected to add 3-4 additional regulators HP and MP regulators to the network.

There will be small "organic" growth in valves as the network expands to serve new customers. Typically 200-300 new I&C primary isolation valves and 50-60 mains isolation valves are added to the network every year.

To improve cathodic protection of steel trunk mains an additional 6 ICCP units are planned over the next regulatory period. These will replace a number of existing anode installations.

### *8.4.4 Operation & Maintenance*

*District Regulator Stations*

Maintenance is carried out on a three-month, annual and five-year basis. The three monthly and annual checks include inspection, set point and operational checks. The five-yearly maintenance activities include a major overhaul of the regulators, control valves and pilots and all soft seal components are replaced.

A program to provide real time SCADA pressure surveillance on 50 key TP regulators has commenced. Real time SCADA monitoring of regulator supply pressures provides a "health" check of these facilities allowing timely diagnosis and rectification of equipment performance before problems arise. It is expected that 26 sites will be completed in the current regulatory period with the final 24 sites planned over the next period. Refer to project business case "SA01 SCADA Network Surveillance" for details.

DRS preventative maintenance will reduce progressively with the replacement of LP mains. The 184 LP DRSs feeding these networks will be made redundant once the LP CI and UPS mains replacement program has been completed (by end 2021).

Maintainability issues at a number of TP DRS have been identified, with spare parts no longer available for old Grove regulators and some older types of OPSO valves. A program to replace the Grove pressure regulating and OPSO valves at these stations has been initiated. Refer to business case "SA34 - Replacement of Obsolete TP Regulator Station Components" for details.

The above ground Kilburn TP-MP regulator station R103 is located in a highly trafficked area susceptible to 3rd party damage. To mitigate the risk of a major gas incident with this facility, relocation is planned as part of replacing obsolete components (business case SA34).

*Valves*

The maintenance of valve installations includes:

1. Yearly inspection and maintenance of transmission and critical emergency isolation valves
2. Three-yearly inspection and maintenance of other network valves

It is expected preventative valve maintenance volumes will not materially alter over the next 5-6 years. There will be small "organic" growth as the network expands to serve new customers, however this is expected to be covered by existing resources.

*Cathodic Protection*

CP monitoring and inspection of CP units is carried out on a continuous basis in accordance with AS 2832.1 and AS 2885. The operational status of galvanic anodes is obtained by the use of current and potential measurements gathered every six months from control area surveys.

Pipeline potentials at a number of locations are provided through impressed current cathodic protection (ICCP) units that are monitored continuously via the SCADA system. ICCP units provide more effective and reliable corrosion protection, particularly in soils with high resistivity, and where high corrosion protection currents are required (e.g. at coating defects). These units can be adjusted to provide the right level of protection (current), compensating for coating defects

Twelve units have been installed over the last 10 years with a further 6 units planned for the next regulatory period. Refer to project business case "SA06 Install Impressed Current CP Units" for details.

### 8.4.5 Replace/Upgrade/Dispose

It is planned to continue the replacement program of below ground transmission system regulators that are subject to water ingress. The replacement of these vaults with modern day designs will significantly improve the safety and maintainability of these facilities. Of the 66 below ground brick regulator chambers, 36 have been assessed to be at the end of their useful lives with a program of replacement commenced in 2012. Twenty one will be replaced by the by the end of the current regulatory period with a further 15 to be completed over the next period.

The replacement and upgrade of the remaining CI and UPS mains over the next regulatory will result in the redundancy of 184 LP DRS.

### 8.4.6 Risks Issues/Actions

Key risks, issues and actions associated with distribution facilities have been summarised in the following table. Associated Capex and Opex has been summarised in Section - 9.

| Ref No. | Risk/Issue | Risk/Issue Detail | Priority | Actions |
|---|---|---|---|---|
| SA22 | Corrosion & water Ingress associate with below ground bricked regulator vaults | 36 existing vaults have been assessed as being in a bad state of repair with constant water ingress corrosive environment and restricted access presenting OH&S hazards | 2 | Replace 36 below ground brick vaults with modern designs.<br><br>The replacement program has commenced with 21 facilities planned for replacement in the current regulatory period and the remaining 15 to be completed over the next regulatory period.<br><br>Refer to project business case "SA22 - Below Ground |

| Ref No. | Risk/Issue | Risk/Issue Detail | Priority | Actions |
|---|---|---|---|---|
| | | | | Regulator Replacement" for details |
| SA 09 | Corrosion & water Ingress associate with below ground bricked valve vaults | Significant corrosion activity of critical isolation valves located in underground valve pits has been identified that if left unchecked could cause a significant risk to the safe and reliable supply of gas. | 2 | Carry out in situ grit blasting and coating with long life corrosion coatings.<br><br>170 valves will be completed in the current regulatory period with 80 to be completed over the next regulatory period. |
| SA70 | TP Isolation Valves | Six primary isolation valves have become inoperable impacting emergency response. | 2 | Replace and relocate valves.<br><br>Refer to project business case " SA70 TP Valve Replacement" for details |
| SA19 | TP DRS Overpressure Protection | 45 TP/HP DRS do not have OPSO valves installed – risk of over pressure.<br>At 29 of these stations Grove regulator parts are obsolete. Unable to be adequately maintained | 2 | Install OPSO valves + replace Grove regulator.<br><br>Refer to project business case "SA19 Upgrade TP Reg Stations without OPSO valves" |
| SA34 | TP DRS – Obsolete Regulators | DRS unable to be adequately maintained.<br><br>12 TP regulator stations are fitted with old OPSO systems for which no spares or replacements are now available<br><br>At 9 of these stations Grove regulator parts are no longer available. | 2 | Install new OPSO valves + replace Grove regulator.<br><br>Refer to project business case "SA34 Replacement of Obsolete TP Reg components" |
| SA01 | TP DRS SCADA Monitoring | Provision of real time "health" check of facilities allowing timely diagnosis and rectification of equipment performance before problems arise.<br><br>Additional pressure surveillance to improve network capacity modelling | 2 | Install telemetry at 50 TP reg sites.<br>26 forecast to be completed in current regulatory period – 24 in next.<br>Refer to project business case "SA01 SCADA Network Surveillance" |
| | R103 TP – MP Regulator Location | Relocation and "undergrounding" the above ground Kilburn TP-MP regulator station R103 is required as it is located in a highly trafficked area susceptible to 3rd party damage | 2 | Relocate regulator – Included as part of SA34 scope |

Table 29 – Distribution Facilities Risks/Issues/Actions

## 8.5 Metering Facilities

### *8.5.1 Overview*

There are 3 main types of meters used in SA Networks:

- Diaphragm meters – domestic consumer and smaller I&C consumer installations
- Rotary meters - medium to large I&C consumer installations
- Turbine meters - very large consumer installations.

The Gas Metering Code requires:

- The net volume of gas delivered to each delivery point will be measured to an accuracy of +/- 2%.

- That there is no systemic bias in metering facilities within the allowable margin of accuracy

All new meters are tested by the manufacturer in accordance with AS 4647-2005 to an accuracy of +/- 1.0% prior to delivery.

In accordance with AS/NZS 4944 all diaphragm meters with a capacity up to 25 m3/hr already installed in the field at the time this standard was issued (2006) are deemed to have an initial field life of 15 years. Meters installed subsequent to 2006 shall undergo compliance testing of a meter family sample within a period of 3 to 5 years from installation. The result of these tests determines the initial in-service compliance period for that meter family as per the following table.

| | Within ±1.5% | Within ±2.0% | Within ±2.5% | Within ±3.0% |
|---|---|---|---|---|
| Compliance Period | 18yrs | 15yrs | 10yrs | 5yrs |

Table 30 – Meter in-service Compliance Periods

The South Australian Technical Regulator has agreed to accept the standard on the basis that:

- All domestic meters must be within ±2.0% accuracy and are deemed to have an initial service life of 10 years.
- Compliance testing showing accuracy +/- 1.5% or better may extend the service life to 18 years.

All meters with a capacity greater than 25m3/hr are deemed to have an initial field life of 10 years

### *8.5.2 Basic Meters - Residential*

Basic residential meters have been defined as any meter with a capacity less than or equal to 7.5 m3/hour. There are 14 associated meter families summarised in the tables below.

| RESIDENTIAL METERS | | | | | | |
|---|---|---|---|---|---|---|
| Meter Make & Model | Max Flow (m3/hr) | Meter Type | Nominal Life (Years) | Pressure Class | | Total |
| | | | | High | Low | |
| ABB DS5 | 6 | Diaphragm | 15 | | 8,683 | 8,683 |
| AMPY 750 | 7.5 | Diaphragm | 18 | | 91,479 | 91,479 |
| ATLAS U6 | 6 | Diaphragm | 10 | | 16,564 | 16,564 |
| ATLAS U8 | 7.5 | Diaphragm | 10 | | 4,778 | 4,778 |
| | 7.5 | Diaphragm | 15 | | 6,619 | 6,619 |
| E600 | 6 | Diaphragm | 10 | | 1 | 1 |
| E602 | 6 | Diaphragm | 15 | | 84,414 | 84,414 |
| E602 INTEST | 6 | Diaphragm | 10 | | 65,745 | 65,745 |
| E610 | 6 | Diaphragm | 10 | | 36,060 | 36,060 |
| G2000 | 6 | Diaphragm | 10 | | 38,879 | 38,879 |
| OTHER DOMESTIC | 2.5 | Diaphragm | 10 | | 108 | 108 |
| | 6 | Diaphragm | 10 | | 1 | 1 |
| PC U6 | 6 | Diaphragm | 15 | | 49,594 | 49,594 |

| | | | | | | |
|---|---|---|---|---|---|---|
| PC U6 INTEST | 6 | Diaphragm | 10 | | 10,602 | 10,602 |
| **Total** | | | | | **413,527** | **413,527** |

Table 31 – Residential Meters

| RESIDENTIAL METERS AGE PROFILE | | | | |
|---|---|---|---|---|
| Age (years) | Meter Nominal Life (years) 10 | 15 | 18 | Total |
| 0 – 6 | 58,539 | 58,442 | 53,403 | 170,384 |
| 6 – 7 | 23,061 | 11,021 | 11,495 | 45,577 |
| 7 - 8 | 25,737 | 11,982 | 10,402 | 48,121 |
| 8 - 9 | 25,017 | 5,531 | 10,977 | 41,525 |
| 9 – 10 | 19,255 | 5,502 | 3,941 | 28,698 |
| 10 - 11 | 20,259 | 6,247 | 1,261 | 27,767 |
| 11 – 12 | 442 | 8,112 | 0 | 8,554 |
| 12 – 13 | 61 | 9,442 | 0 | 9,503 |
| 13 – 14 | 108 | 12,907 | 0 | 13,015 |
| 14 -15 | 100 | 14,620 | 0 | 14,720 |
| 15 -16 | 48 | 5,297 | 0 | 5,345 |
| 16+ | 111 | 207 | 0 | 318 |
| **Total** | **172,738** | **149,310** | **91,479** | **413,527** |

Table 32 – Residential Meter Age Profile

### 8.5.3 Basic I&C Meters (<10TJ)

This meter class is based on a capacity greater than 7.5 m3/hour, installed at commercial or industrial premises with annual consumption less than 10 TJ. These are summarised in the tables below.

| I&C METERS (30 June 2014) | | | | |
|---|---|---|---|---|
| Meter Make & Model | Max Flow (m3/hr) | Meter Type | Nominal Life (years) | Total |
| AC-630 | 8 | Diaphragm | 10 | 945 |
| AERZENER | 600 | Rotary | 10 | 1 |
| | 1200 | Rotary | 10 | 4 |
| AL1000 | 28 | Diaphragm | 10 | 1,147 |
| AL1400 | 40 | Diaphragm | 10 | 152 |
| AL2300 | 65 | Diaphragm | 10 | 199 |
| AL425 | 12 | Diaphragm | 10 | 3,064 |
| AL5000 | 141 | Diaphragm | 10 | 95 |
| AL800 | 22 | Diaphragm | 10 | 19 |
| AMPY 1010 | 10 | Diaphragm | 18 | 5,824 |
| ATLAS U10 | 10 | Diaphragm | 10 | 4,244 |
| MR9 | 9 | Diaphragm | 10 | 252 |
| OTHER I&C | | | 10 | 797 |
| PC U16 | 16 | | 10 | 2,768 |
| ROOTS | 22 | Rotary | 10 | 1 |
| | 42 | Rotary | 10 | 19 |
| | 56 | Rotary | 10 | 65 |
| | 85 | Rotary | 10 | 94 |
| | 141 | Rotary | 10 | 79 |
| | 198 | Rotary | 10 | 19 |
| | 308 | Rotary | 10 | 43 |
| | 453 | Rotary | 10 | 30 |
| | 250 | Turbine | 10 | 8 |
| | 500 | Turbine | 10 | 11 |
| | 1000 | Turbine | 10 | 11 |
| | 1700 | Turbine | 10 | 7 |
| **Total** | | | | **19,898** |

Table 33 – I&C Meters

| I&C METERS AGE PROFILE | | | |
|---|---|---|---|
| Age (years) | Meter Nominal Life (years) | | Total |
| | 10 | 18 | |
| 0-6 | 8,606 | 2,501 | 11,107 |
| 6-7 | 1,072 | 1,141 | 2,213 |
| 7-8 | 977 | 911 | 1,888 |
| 8-9 | 893 | 729 | 1,622 |
| 9/10 | 879 | 454 | 1,333 |
| 10/11 | 1,381 | 88 | 1,469 |
| 11/12 | 154 | - | 154 |
| 12/13 | 21 | - | 21 |
| 13-14 | 20 | - | 20 |
| 14-15 | 31 | - | 31 |

| | | | |
|---|---|---|---|
| 15-16 | 16 | - | 16 |
| 16+ | 24 | - | 24 |
| **Total** | **14,070** | **5,824** | **19,898** |

Table 34 – I&C Meter Age Profile

### *8.5.4 Demand Interval Meters (>10 TJ)*

This meter class relates to meters installed at commercial or industrial premises with annual consumption greater than 10 TJ. These are summarised in the tables below.

| DEMAND INTERVAL METERS (30 June 2014) | | | | |
|---|---|---|---|---|
| Meter Make & Model | Max Flow (m3/hr) | Meter Type | Nominal Life (years) | Total |
| AERZENER | 600 | Rotary | 10 | 1 |
| | 1200 | Rotary | 10 | 4 |
| AL1000 | 28 | Diaphragm | 10 | 2 |
| AL2300 | 65 | Diaphragm | 10 | 4 |
| AL5000 | 141 | Diaphragm | 10 | 22 |
| OTHER I&C | | Rotary | 10 | 40 |
| | | Turbine | 10 | 3 |
| | 100 | Rotary | 10 | 1 |
| | 250 | Rotary | 10 | 4 |
| | 400 | Rotary | 10 | 3 |
| | 650 | Rotary | 10 | 2 |
| | 850 | Turbine | 10 | 1 |
| | 1000 | Turbine | 10 | 1 |
| | 1600 | Turbine | 10 | 3 |
| | 2500 | Turbine | 10 | 1 |
| | 4000 | Turbine | 10 | 2 |
| ROOTS | 85 | Rotary | 10 | 1 |
| | 141 | Rotary | 10 | 3 |
| | 308 | Rotary | 10 | 12 |
| | 453 | Turbine | 10 | 19 |
| SINGER | 250 | Turbine | 10 | 5 |
| | 500 | Turbine | 10 | 7 |
| | 1000 | Turbine | 10 | 9 |
| | 1700 | Turbine | 10 | 7 |
| E602 | 6 | Diaphragm | 15 | 1 |
| PC U16 | 16 | Diaphragm | 10 | 1 |
| **Totals** | | | | **159** |

Table 35 – Demand Interval Meters

| DEMAND INTERVAL METERS AGE PROFILE (30 June 2014) | |
|---|---|
| Age (years) | 10 Year Life |
| 0 - 6 | 78 |
| 6 - 7 | 7 |
| 7 - 8 | 6 |
| 8 - 9 | 24 |
| Demand 9 - 10 | 44 |
| **Total** | **159** |

Table 36 – Demand Interval Meter Age Profile

### 8.5.5 Growth

The following graph and tables summarise forecast growth in new meters.

| | FY 16/17 | FY 17/18 | FY 18/19 | FY 19/20 | FY 20/21 |
|---|---|---|---|---|---|
| Tariff V - Residential | 7,909 | 7,707 | 7,288 | 7,209 | 7,112 |
| Tariff V – I&C | 329 | 276 | 350 | 412 | 478 |
| Demand | 1 | 1 | 1 | 1 | 1 |

Table 37 – Residential Meter Forecast

### 8.5.6 Asset Performance, Condition & Integrity

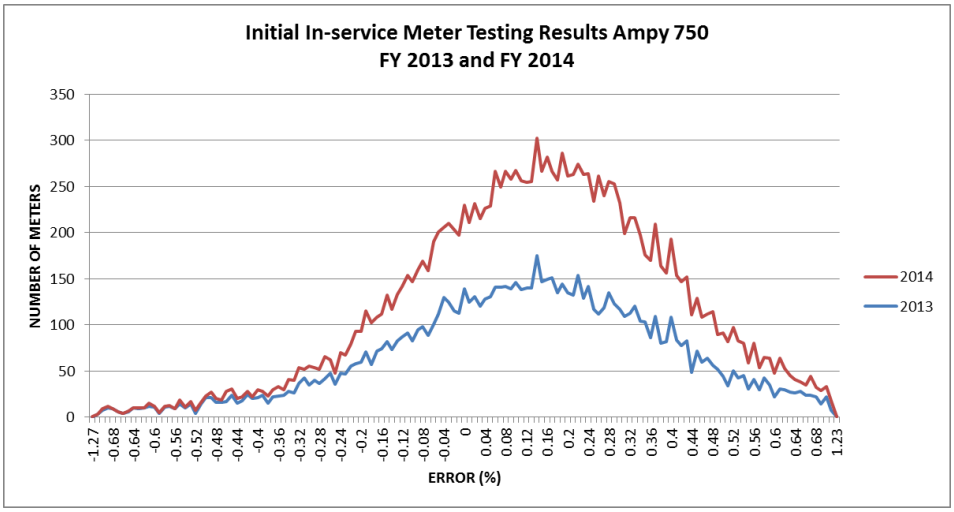
*Performance*

All new meters are accuracy tested and pressure tested on delivery. The statutory requirement for the accuracy of new meters less than 25 m3/hour is plus/minus 1.5%. APA's requirement is for the accuracy of all new meters to be plus/minus 1%. The table below shows the test results.

| RESIDENTIAL METER FAMILIES INITIAL IN-SERVICE METER TESTING RESULTS | | | | | | | |
|---|---|---|---|---|---|---|---|
| Meter Type | | FY 09 | FY 10 | FY 11 | FY 12 | FY 13 | FY14 |
| Ampy 750 | Total number | 11,600 | 10,700 | 9,600 | 9,000 | 9,000 | 12,900 |
| | Mean error (%) | 0.19 | 0.1 | 0.14 | 0.10 | -0.10 | 0.15 |
| EDMI U8 New Tangent Model | Total number | n/a | n/a | 900 | 100 | 1,000 | 2,400 |
| | Mean error (%) | | | -0.21 | -0.030 | -0.10 | -0.002 |
| Atlas U-8 | Total number | 1,500 | 900 | 1,200 | n/a | n/a | n/a |
| | Mean error (%) | -0.15 | -0.16 | -0.12 | | | |

Table 38 – Domestic Meter Accuracy

The graph below shows the error distribution in 2013 and in 2014 for the Ampy 750, the primary domestic meter. Results show an improved accuracy in 2014, indicated by a smaller spread around zero.




Graph 25 – AMPY 750 Meter Test Results

Meters returned from the field are in-tested, repaired and tested for re-use or disposed and scrapped if the meter is uneconomic to repair or parts are no longer available. The outcome of these tests are summarised in the table below. The percentage passed in 2013/14 is consistent with the negative trend over the last 3 years and supports the reason for removing these meters (Email 602) from the field.

The in-test process will phase out over the next years when the group of in-tested meters becomes smaller and eventually disappears (only Email 602 meters are in-tested).

| INTEST METER ACCURACY | | | | | | |
|---|---|---|---|---|---|---|
| | FY 09 | FY 10 | FY 11 | FY 12 | FY 13 | FY14 |
| Meters Tested - No. | 14,207 | 9,278 | 1,416 | 707 | 459 | 36 |
| Passed – No. | 14,096 | 9,089 | 1,294 | 674 | 368 | 24 |
| Passed – % | 99.22 | 97.82 | 91.4 | 95.33 | 80.2 | 66.6 |
| Failed – No. | 111 | 189 | 122 | 33 | 91 | 12 |

Table 39 – In test Accuracy

The following table summarises customer requests for meter tests. The number of meters outside tolerance remains relatively small compared to the total number of installed meters.

| CUSTOMER METERING REQUESTS | | | | | | |
|---|---|---|---|---|---|---|
| | FY 09 | FY 10 | FY 11 | FY 12 | FY 13 | FY 14 |
| Total Customer Meter Requests | 31 | 30 | 26 | 24 | 29 | 33 |
| Meters Within Tolerance +/- 1.5% | 21 | 20 | 23 | 19 | 16 | 20 |
| Meters Outside Tolerance +/- 1.5% | 5 | 5 | 1 | 4 | 10 | 11 |
| Meters - Unable to Test | 5 | 5 | 2 | 1 | 3 | 2 |

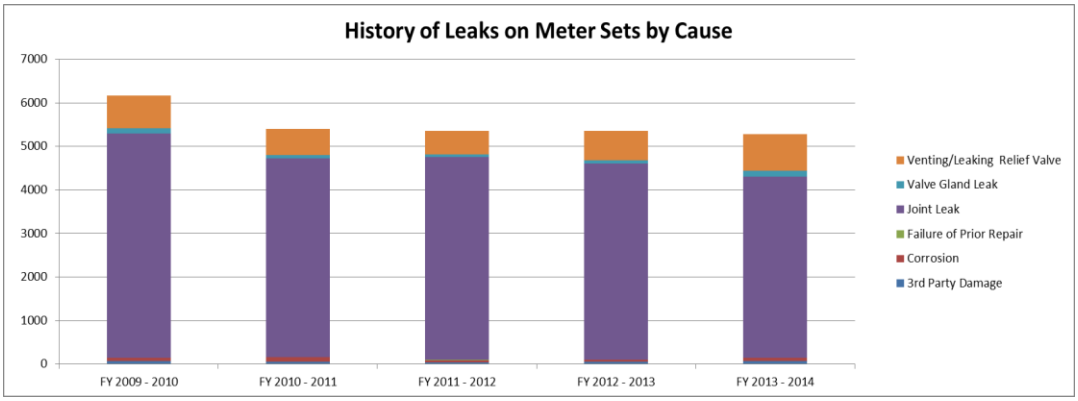
Table 40 – Customer Meter Complaints

## *Condition and Integrity*

The following Table and Graph provide a summary of meter related leak repairs.

| | FY 10 | FY 11 | FY 12 | FY 13 | FY 14 |
|---|---|---|---|---|---|
| Total Meter Leaks | 6,171 | 5,403 | 5,361 | 5,356 | 5,285 |

Table 41 – Meter Leaks



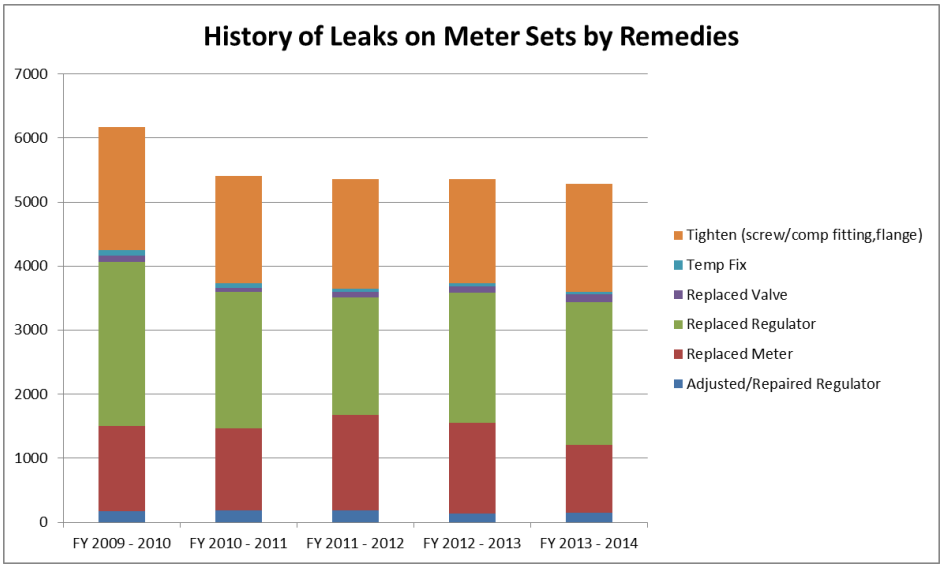

Graph 26 – Meter Leak Cause

- There has been a 30% decrease in meter leak repairs from FY 08 to FY 13. Over tightening the "O" connection was found to be a contributor to the high meter leak volumes in FY08. Changes in work practices when replacement and new meters are fitted have contributed to the reduction in leaks during FY 11 and FY 12. Leaks have now stabilised to more of a historic baseline.

The following table and graph provide a breakdown of actions taken in response to reported meter leaks.

| Year | Adjusted or Repaired Regulator | Replaced Meter | Replaced Regulator | Replaced Valve | Temp Fix | Tighten | Total |
|---|---|---|---|---|---|---|---|
| FY 09/10 | 175 | 1,333 | 2,559 | 100 | 88 | 1,916 | 6,171 |
| FY 10/11 | 186 | 1,286 | 2,130 | 61 | 70 | 1,669 | 5,402 |
| FY 11/12 | 192 | 1,482 | 1,843 | 75 | 60 | 1,709 | 5,361 |
| FY 12/13 | 136 | 1,413 | 2,040 | 93 | 52 | 1,622 | 5,356 |
| FY 13/14 | 144 | 1,063 | 2,232 | 125 | 39 | 1,682 | 5,285 |
| **Total** | **833** | **6,577** | **10,804** | **454** | **309** | **8,598** | **27,575** |

Table 42 – Meter Leak Actions




Graph 27 – Meter Leak Actions

- Meter related leaks have remained relatively constant over the last 4 years
- The majority of repairs were undertaken by the first response fitter by either tightening a joint or replacing the meter/service regulator.

### *8.5.7 Operation & Maintenance*

Domestic meter installations are designed not to require routine maintenance other than field-testing of meter families. Maintenance is limited to responding to isolated meter failures caused by blockages, external damage, failed mechanisms, etc.

The scheduled maintenance program for I&C meters includes; periodic operational checks and meter lubrication, and “touch up” painting.

The condition of paintwork on about 800 of the more complex, elevated pressure meter assemblies has reached a level where touch up painting is not sufficient. Significant corrosion has been observed on some meter sets, requiring extensive clean up and repainting. There have been some instances where pipework, at the air and soil interface, has failed due to the extensive corrosion. A grit blasting and painting program has commenced with about 500 meter set to be completed in the current regulatory period. A further 300 meter sets are planned to be refurbished in the next period. Refer to business case “SA08 I&C Meter Set Painting” for details.

Changes to the customer’s plant and facilities over the years have resulted in facilities now located in areas not compliant with current hazardous zone standards. Specifically, risks associated with venting gas creating a fire hazard were identified. A program of rebuild/modification has commenced to align with current standards. Refer to business case “SA33- Upgrade Demand Customer Mete Sets” for details.

A number of meter sets and services have been identified to be installed inside buildings, contrary to current standards. Meters operating at high or medium pressures inside buildings can pose a risk from a venting inlet service regulator. A program of modifying and or relocating the meter and or inlet services is planned. Refer to project business case “SA32 Non-Compliant Meter Set in Buildings” for details.

Gas meters installed at a number of properties have been left located in positions where they are vulnerable to 3rd party damage. This has come about following building and or construction work

undertaken years after the original installation. Meters left in these locations are susceptible to damage and are on occasion hit by vehicles and subject to vandalism. A program to relocate the se meters is planned. Refer to project business case "SA75 Relocate Meters in Vulnerable Positions" for details.

There are a number of domestic regulators, operating in the high pressure network that may have insufficient relief capacity. A program of replacement has commenced with about 3,000 regulators to be replaced in this current regulatory period with an estimated further 9,600 over the next period. Refer to project business case "SA 45 Domestic Regulator Replacement" for details.

### *8.5.8 Replace/Upgrade/Dispose*

Meters returned from the field are In-tested, repaired and tested for re-use or disposed and scrapped if the meter is uneconomic to repair or parts are no longer available.

I&C meters are changed at 10 year intervals and overhauled, repaired and tested for re-use. The meter set pipe work and valves is not replaced periodically and therefore can be much older than 10 years. These components have very little regular maintenance and in many cases the pipe work has started to corrode. A programme of in situ grit blasting and painting of these meter facilities is planned to ensure asset life is maximised.

The following table summarises historic and forecast meter replacements.

| | FY 11/12 | FY 12/13 | FY 13/14 | FY 14/15 | FY 15/16 | Total Current AA | FY 16/17 | FY 17/18 | FY 18/19 | FY 19/20 | FY 20/21 | Total Next AA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Domestic | 20,243 | 21,434 | 28,829 | 32,279 | 33,327 | 136,112 | 37,347 | 35,064 | 31,101 | 24,077 | 16,656 | 144,245 |
| I&C < 10 TJ | 648 | 817 | 1,232 | 1,551 | 826 | 5,074 | 860 | 955 | 1,059 | 1,013 | 1,316 | 5,203 |
| I&C > 10 TJ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Table 43 –Periodic Meter Changes

### *8.5.9 Risks/Issues/Actions*

Key risks, issues and actions associated with metering facilities have been summarised in the following table. Associated Capex and Opex has been summarised in Section - 9.

| Ref No. | Risk/Issue | Risk/Issue Detail | Priority | Actions |
|---|---|---|---|---|
| SA08 | I&C Meter set corrosion | Pipework and valves at many of the I&C sites is corroding | 3 | Planned to grit blast and repaint 800 sites.<br><br>500 sites are forecast to be completed in the current regulatory period with program to complete the balance to continue over the next period.<br><br>Refer to project business case "SA08 I& C Meter Set Painting" for details. |
| SA45 | Non-Compliant Domestic Regulators | Some HP domestic regulators may not have adequate relief capacity and some meter boxes do not comply with current standards | 2 | Replace non-compliant regulators.<br><br>Program has commenced with about 12,600 replacements to be completed over the current and next regulatory period.<br><br>Refer to business case "SA 45 Domestic Regulator Replacement" |

| Ref No. | Risk/Issue | Risk/Issue Detail | Priority | Actions |
|---|---|---|---|---|
| SA33 | Demand Meter Facilities Location | A survey has found a number of compliance issues with the location of metering facilities. | 3 | Relocate/upgrade non-compliant metering facilities.<br><br>Refer to business case "SA33 Upgrade Demand Customer Meter Set" for details. |
| SA32 | Meters inside buildings | About 700 meters have been identified with non-vented regulators located inside buildings. These installations are not compliant to current standards. | 2 | Relocate non-compliant meters<br><br>Refer to business case "SA32 Non-Compliant Meters Inside Buildings" for details. |
| SA75 | Meters in vulnerable locations | There are a number of meters located where they are vulnerable to 3rd party damage creating a safety risk for consumers and the public. | 3 | Relocate meters in vulnerable locations<br>Refer to business case "SA75 Relocate Meters in Vulnerable Locations" |

Table 44 – Gas Meters Risks and Issues

## 8.6 SCADA Monitoring Facilities

### *8.6.1 Overview*

A SCADA system is used for monitoring and reporting consumption for about 170 demand customer sites and 15 gate stations as required by the SA Retail Market Rules and the SA Metering Code. These are typically referred to as full retail contestability (FRC) sites. Another 73 sites enable remote monitoring of network system pressures.

The system functionality includes:

1. Collection of raw data.
2. Transmission of data to a central data storage system.
3. Calculation and verification.
4. Reporting to the market operator (AEMO) and Retailers

| Asset Description | Asset Volumes |
|---|---|
| **Adelaide Metropolitan Area** | |
| SCADA Servers – No. | 5 |
| Telemetry Units (at Customer Sites) – No. | 140 |
| Telemetry Units (at Pressure Sites) – No. | 64 |
| EK 220 Instruments, Flow Correctors – No. | 1 |
| Inline Instruments, Flow Correctors – No. | 39 |
| Transformer and Rectifier Cathodic Protection Unit Monitors – No. | 6 |
| Odorising Stations – No. | 3 |
| Pressure Monitoring Stations - No. | 64 |
| Pressure Transmitters (at Customer Sites) – No. | 42 |
| Pressure Transmitters (at Pressure Sites) – No. | 157 |
| Pressure Switches (at Pressure Sites) – No. | 4 |
| Temperature Transmitters (at Customer Sites) – No. | 31 |
| Customer Meter Sets – No. | 140 |
| **SA Regional Areas** | |
| SCADA Servers - No. | 0 |
| Telemetry Units (at Customer Sites) – No. | 34 |
| Telemetry Units (at Pressure Sites) – No. | 9 |
| EK 220 Instruments, Flow Correctors – No. | 0 |
| Inline Instruments, Flow Correctors – No. | 16 |
| Transformer and Rectifier Cathodic Protection Unit Monitors – No. | 2 |
| Odorising Facilities – No. | 8 |
| Pressure Monitoring Stations - No. | 9 |
| Pressure Transmitters (at Customer Sites) – No. | 15 |
| Pressure Transmitters (at Pressure Sites) – No. | 20 |
| Pressure Switches (at Pressure Sites) – No. | 0 |
| Temperature Transmitters (at Customer Sites) – No. | 6 |
| Customer Meter Sets – No. | 34 |

Table 45 – SCADA Monitoring Assets

### 8.6.2 Asset Performance, Condition & Integrity

The overall condition of the existing control and monitoring assets is satisfactory. These assets have a technical life of about 10 years with replacement generally due to obsolescence.

### 8.6.3 Growth

Additional telemetered pressure monitoring is being installed to provide a "health" check of TP regulators and monitor network extremity pressures.

Telemeter pressure monitoring at an additional 24 TP regulator and 32 network extremity sites is planned over the next regulatory period. Refer to business case "SA01 SCADA Network Surveillance" for details.

Telemeter monitoring at an additional 6 impressed current cathodic protection facilities is planned over the next regulatory period. Refer to business case 'SA06 Install Impressed Current CP Units" for details

### 8.6.4 Operation & Maintenance

The maintenance schedule comprises an annual visit to each site to:

- Test and calibrate all instrument, pressure, temperature transmitters and verify flow computer calculations
- Test batteries conditions and earthing systems
- Clean solar systems and verify functionality
- Inspect hazardous installation

The communication protocols accessing site data are due to change with phasing out of Telstra's 2G network and the move to Telstra's 4G Network over the next few years. The RTU's at 69 demand customer sites will be incompatible with the 4G protocols and will require replacement. Refer to project business case "SA01 SCADA Network Surveillance" for details.

### 8.6.5 Replace/Upgrade/Dispose

SCADA field equipment is generally replaced because of technical obsolescence with equipment typically having a technical life of about 10 years. Over the last 5 years the move to standard communication protocols (GSM/GPRS) has driven changes to telecommunication field devices.

The following items have been identified for replacement upgrade over the next regulatory period.

- 32 chart pressure recorders to be replaced with electronic data loggers
- Telemeter modem equipment at 69 demand customer sites
- 25 flow correctors at demand customer sites

### 8.6.6 Risks/Issues/Actions

Key risks, issues and actions associated with SCADA monitoring facilities have been summarised in the following table. Associated Capex and Opex has been summarised in Section - 9.

| Ref No. | Risk/Issue | Risk/Issue Detail | Priority | Actions |
|---|---|---|---|---|
| SA01 | SCADA Pressure Surveillance | Additional telemetry for network pressure monitoring required | 2 | Provide additional pressure surveillance at TP regs and network extremity sites. Additional 54 sites to be monitored<br><br>Refer to business case "SA01 SCADA Network Monitoring", |
| | RTU - Modem compatibility. | Some older telemetry modems will be incompatible Telstra 4G network communication protocol | 2 | Complete replacement program |
| | Flow Corrector End of life | Routine end of life replacement | 2 | Replace flow correctors<br><br>Refer to business case "SA01 SCADA Network Monitoring" |
| SA06 | ICCP monitoring | Additional ICCP units require SCADA monitoring systems to be installed over next regulatory period. | 2 | Complete Monitoring system Replacement Review |

Table 46 – SCADA Monitoring Facilities Risks and Issues

# Section - 9 CAPEX & OPEX PLAN

The following tables summarise growth and stay in business projects and activity volumes associated with replacing, maintaining and/or extending the network during the next regulatory period.

## 9.1 Network Growth Volumes

| Item | Description | Units | FY 16/17 | FY 17/18 | FY 18/19 | FY 19/20 | FY 20/21 | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | New Service - New Home | ea. | 5,560 | 5,188 | 5,118 | 5,032 | 5,040 | 25,938 |
| 2 | New Service - Exist Home | ea. | 1,435 | 1,435 | 1,435 | 1,435 | 1,435 | 7,175 |
| 3 | New Service - Multi User | ea. | 119 | 111 | 109 | 108 | 108 | 554 |
| 4 | New Service - I&C < 10 TJ | ea. | 276 | 350 | 412 | 478 | 414 | 1,930 |
| 5 | New Main - Estate | m | 39,336 | 36,704 | 36,209 | 35,600 | 35,657 | 183,505 |
| 6 | New Main - Existing Domestic | m | 7,543 | 7,505 | 7,498 | 7,489 | 7,490 | 37,526 |
| 7 | New Main - I&C < 10TJ | m | 3,394 | 4,304 | 5,067 | 5,878 | 5,091 | 23,735 |
| 8 | Meter - Growth - Domestic | ea. | 7,707 | 7,288 | 7,209 | 7,112 | 7,121 | 36,437 |
| 9 | Meter Growth - I & C Meters | ea. | 276 | 350 | 412 | 478 | 414 | 1,930 |
| 10 | Meter Growth - Demand | ea. | 0 | 0 | 0 | 0 | 0 | 0 |

Table 47 – Growth Volumes

## 9.2 Step Out Development Projects

| $'000 (Real 2014) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Ref No | Activity/Project Description | Category | FY 16/17 | FY 17/18 | FY 18/19 | FY 19/20 | FY 20/21 | Total |
| SA24 | Two Wells Supply Main | Capex | | | | 5,000 | 0 | 5,000 |
| SA77 | Monarto FEED Study | Opex | | | 250 | | | 250 |

Table 48 – Step Out Development Projects

## 9.3 Network Augmentation

| $'000 (Real 2014) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Ref No | Activity/Project Description | Priority Rating | FY 16/17 | FY 17/18 | FY 18/19 | FY 19/20 | FY 20/21 | Total |
| 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 |
| SA17 | 325 HP Virginia Augmentation | 3 | 0 | 0 | 809 | 0 | 0 | 809 |
| | Total | | 170 | 614 | 3,401 | 1,386 | 0 | 5,571 |

Table 49 – Augmentation Projects

## 9.4 Periodic Meter Changes

| Item | Description | Units | FY 16/17 | FY 17/18 | FY 18/19 | FY 19/20 | FY 20/21 | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | Domestic | ea. | 37,347 | 35,064 | 31,101 | 24,077 | 16,656 | 144,245 |
| 2 | I&C | ea. | 860 | 955 | 1,059 | 1,013 | 1,316 | 5,203 |
| 3 | Demand | ea. | 0 | 0 | 0 | 0 | 0 | 0 |

Table 50 – Periodic Meter Change Volumes

## 9.5 SIB Capex Projects

| Asset Category | Ref No | Activity/Project Description | Priority Rating | Direct Cost $'000 (Real 2014) FY 16/17 | FY 17/18 | FY 18/19 | FY 19/20 | FY 20/21 | Total |
|---|---|---|---|---|---|---|---|---|---|
| Transmission Pipelines | SA06 | Install Impressed Current CP Units | 3 | 124 | 124 | 124 | 0 | 0 | 372 |
| | SA09 | Valve Corrosion Protection | 2 | 62 | 62 | 62 | 62 | 62 | 311 |
| | SA10 | Sleeved Railway Crossings | 2 | 437 | 437 | 437 | 437 | 437 | 2,183 |
| | SA21 | Replacement of TP Pipelines M21 & M53 | 2 | 350 | 7,118 | 0 | 0 | 0 | 7,468 |
| | SA21a | TP Pipeline Corrosion under HSS | 2 | 663 | 663 | 663 | 663 | 663 | 3,315 |
| | SA36 | TP Pipelines - Additional Coating Dig up & Repair | 2 | 214 | 214 | 214 | 214 | 214 | 1,069 |
| | SA37 | Replacement of TP Pipeline Insulation Flanges | 2 | 170 | 170 | 170 | 170 | 170 | 849 |
| | SA53 | M36 Flagstaff Hill TP pipeline HSS corrosion repair | 2 | 144 | 137 | 137 | 137 | 137 | 693 |
| | SA70 | Transmission Valve Replacement | 2 | 42 | 84 | 258 | 258 | 258 | 901 |
| Transmission Facilities | SA69 | Fencing Critical Infrastructure | 3 | 267 | 167 | | | | 434 |
| Distribution Mains & Services | SA28 | Above ground PE service replacement | 2 | 1,425 | 1,425 | 1,425 | 1,425 | 1,425 | 7,125 |
| | SA31 | Fire Safety Valves | 3 | 3,416 | 2,178 | 1,980 | 1,629 | 1,258 | 10,461 |
| | SA49 | DCVG Survey & Excavations - Distribution Mains | 3 | 381 | 211 | 211 | 211 | 211 | 1,224 |
| | SA52 | HDPE Camera Investigation & Repair | 3 | 2,316 | 2,316 | 2,316 | 2,316 | 2,316 | 11,580 |
| | SA56 | Gas Vents on HDPE Mains | 2 | 200 | | | | | 200 |
| Distribution Facilities | SA19 | Upgrade TP Reg stations without OPSO valves | 2 | 448 | 385 | 265 | 289 | 163 | 1,551 |
| | SA34 | Replacement of Obsolete TP Reg Station Components | 2 | 108 | 89 | 100 | 122 | 18 | 435 |
| | SA22 | Replace Below Ground TP Regulators | 2 | 987 | 987 | 987 | 987 | 987 | 4,935 |
| Metering Facilities | SA08 | Meter Set Refurbishment | 3 | 352 | 352 | 352 | 352 | 352 | 1,760 |
| | SA32 | Non-Compliant Meters Inside Buildings | 2 | 281 | 281 | 281 | 281 | 281 | 1,405 |
| | SA33 | Upgrade Demand Customer Meter Set | 2 | 415 | 415 | 415 | 415 | 332 | 1,992 |
| | SA45 | Domestic Regulator Replacement | 3 | 189 | 186 | 186 | 186 | 186 | 931 |
| | SA75 | Meters in Vulnerable Positions | 2 | 468 | 468 | 468 | 468 | 468 | 2,340 |
| SCADA | SA01 | SCADA Network Surveillance | 3 | 310 | 239 | 207 | 215 | 141 | 1,112 |
| | | Total SIB Capex | | 13,767 | 18,707 | 11,257 | 10,835 | 10,078 | 64,643 |

Table 51 – SIB CAPEX Projects

## 9.6 Mains & Services Replacement Capex

| Asset Class | Category | Item | Mains & Services Replacement Schedule Direct Cost (Real 2014) FY 16/17 | FY 17/18 | FY 18/19 | FY 19/20 | FY 20/21 | Total |
|---|---|---|---|---|---|---|---|---|
| CI & UPS | Block - General | Mains - km | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] |
| | | Total Cost - $'M | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] |
| | Piecemeal | Mains - km | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] |
| | | Total Cost - $'M | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] |
| | CBD - Block & Trunk | Mains - km | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] |
| | | Total Cost - $'M | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] |
| | MP Trunk | Mains - km | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] |
| | | Total Cost - $'M | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] |
| | Multi User - Inlet Services | Sites | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] |
| | | Total Cost - $'M | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] |
| HDPE | MP Class 250 Mains | Mains - km | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] |
| | | Total Cost - $'M | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] |
| | HP Class 575 Mains | Mains - km | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] |
| | | Total Cost - $'M | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] |
| | HDPE Piecemeal | Mains - km | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] |
| | | Total Cost - $'M | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] |
| Summary | | **Total Mains - km** | **252.9** | **249.9** | **257.0** | **257.0** | **256.0** | **1273** |
| | | Total Mains Cost - $'M | 72.2 | 71.1 | 70.7 | 72.9 | 68.4 | **355.3** |
| | | **Total Services - No** | **266** | **266** | **266** | **266** | **266** | **1328** |
| | | Total Services Cost - $'M | 2.9 | 2.9 | 2.9 | 2.9 | 2.9 | **14.4** |
| | | **Grand Total Replacement - $'M** | **75.1** | **74.0** | **73.6** | **75.8** | **71.3** | **369.7** |

Table 52 – Mains and Services Replacement Capex

## 9.7 SIB Opex Projects

| Asset Category | Ref No | Activity/Project Description | Direct Cost $'000 (Real 2014) Priority Rating | FY 16/17 | FY 17/18 | FY 18/19 | FY 19/20 | FY 20/21 | Total |
|---|---|---|---|---|---|---|---|---|---|
| Distribution Mains & Services | SA44 | Inlet data Capture | 3 | 0 | 0 | 586 | 536 | 536 | 1,658 |
| | SA45 | Domestic Regulator Replacement | 2 | 189 | 186 | 186 | 186 | 186 | 931 |
| | SA54 | Risk Management of HDPE | 2 | 657 | 642 | 637 | 632 | 627 | 3,197 |
| | SA56 | Gas Vents on HDPE Mains | 2 | 267 | 534 | 116 | 0 | 0 | 917 |
| | | **Total** | | 1,113 | 1,362 | 1,525 | 1,354 | 1,349 | 6,703 |

Table 53 – SIB OPEX Projects

# Section - 10 Appendices

## Appendix 1 - Network Location Map

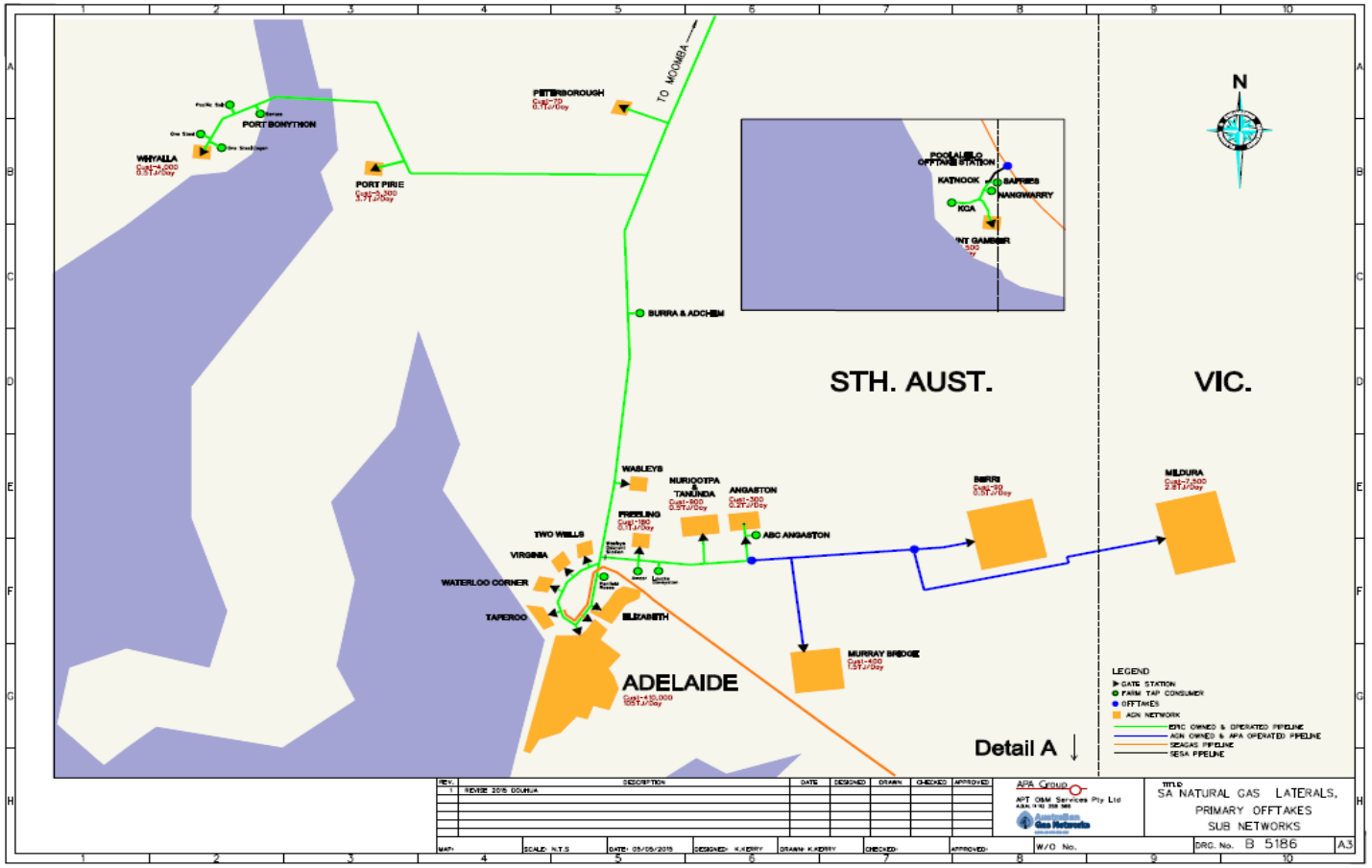



Figure 10 – Network Location Map

# 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 54 – SA Network Gate Stations