APA Group

ENVESTRA SA NETWORKS

ASSET MANAGEMENT PLAN

Version 1.0
(Public Version)

June 2010

PREFACE

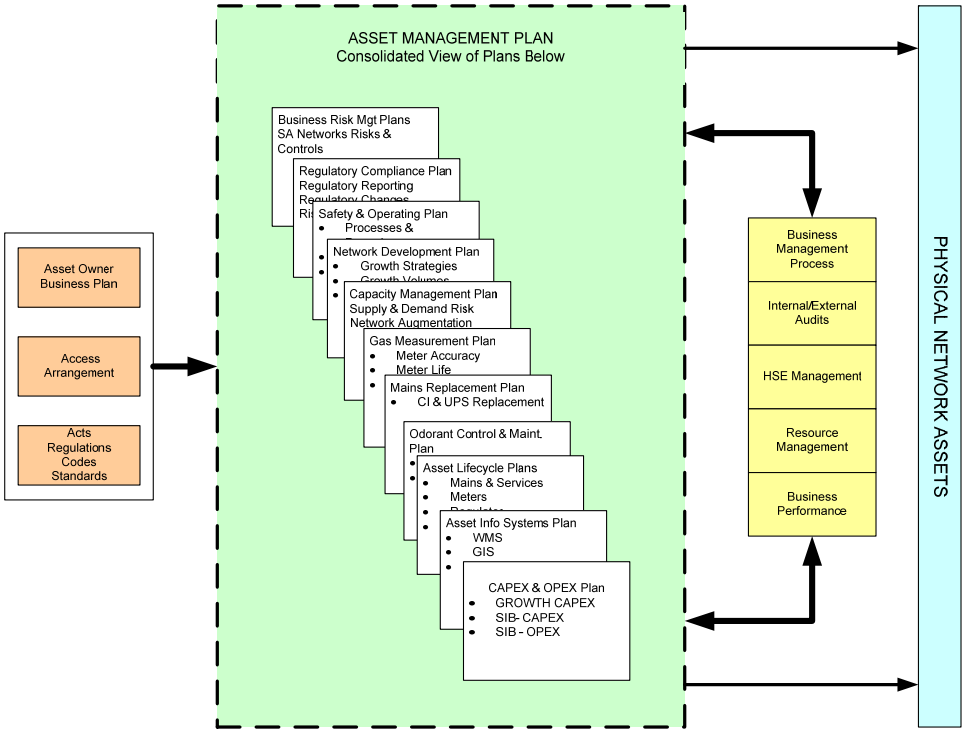
This Asset Management Plan (AMP) provides a consolidated view of a number of technical and operational plans and how these are used to drive asset management strategies and expenditure to ensure safe, reliable and sustainable supply of gas in line with:

- Legislative obligations
- Effective risk management
- Financial business parameters
- Lowest lifecycle costs
- Extraction of maximum value from assets

This AMP is underpinned by the following associated plans:

1. Business Risk Management Plan
2. Safety Management Plan
3. Network Load Growth Forecast Plan
4. Capacity Management Plan
5. Mains Replacement Plan
6. Gas Measurement Management Plan
7. Odorant Control and Maintenance Plan

Key issues and actions from these plans have been summarised in this AMP.



The AMP is structured into 8 Sections:

Section 1 – Executive Summary

Overall Summary

Section 2 – General

Purpose, scope, Envestra /APA relationship, asset management organisation structure and high level Asset Management Policy.

Section 3 – Key Asset Performance & Service

Overall summary of network performance, condition and levels of service.

Section 4 – Network Overview

Overview of the physical network covered by this plan, performance objectives and key asset drivers.

Section 5 – Network Management Plans Overview

Overview of key regulatory, technical and operational plans supporting this AMP.

Section 6 – Asset Life Cycle Plans

Overview of asset lifecycle issues, risks and recommended actions.

Section 7 – CAPEX OPEX Summary

Summary of: growth and replacement volumes; augmentation and other stay in business (SIB) projects.

Abbreviations

Abbreviation	Definition
AEI	Approved Engineering Investigation
BRMP	Business Risk Management Plan
CAPEX	Capital Expenditure
CI	Cast Iron
CP	Cathodic Protection
DCVG	Direct Current Voltage Gradient
ESCOSA	Essential Services Commission of South Australia
GIS	Geographic Information System
HFM	Hastings Fund Management
HP	High Pressure
HSE	Health Safety and Environment
I&C	Industrial and Commercial
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
MIRN	Meter Identification Reference Number
MP	Medium Pressure
NPV	Net Present Value
OPEX	Operating Expenditure
OTR	Office of the Technical Regulator
RMI	Road Map Initiative
ROI	Return on Investment
SA	South Australia
SCADA	Supervisory Control and Data Acquisition
SIB	Stay In Business
TP	Transmission Pressure
UAFG	Unaccounted for gas
UPS	Unprotected Steel
WMS	Works Management System

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SECTION 1 – EXECUTIVE SUMMARY

1.1 Asset Performance, Condition & Integrity

Unaccounted for gas in the Adelaide metropolitan area remains the single major issue within the SA Distribution Network. Analysis has associated the increasing UAFG to an accelerated deterioration of the cast iron and unprotected steel mains within the Adelaide network. Fugitive emissions from these mains account for around 80% of the total 2.0 PJ of UAFG. These emissions are also impacting the environment through greenhouse gas emissions.

An accelerated replacement programme is being proposed commencing FY 2010/11 aimed at replacing the remainder of the 1350 km of cast iron and unprotected steel mains over an 8-year period. When completed, this replacement programme is expected to reduce the UAFG from 2200 TJ to 500 TJ.

Ongoing growth in instantaneous demand on older LP networks is becoming difficult to sustain with high demand appliances and increased customer densities creating capacity issues with both existing and new customers as a result of insufficient mains pressure. While no major outages have yet been experienced, network modelling has highlighted that more than 20% of the network has insufficient capacity to maintain adequate supply pressures to households consistent with efficient appliance operation. These areas will be prioritised and targeted as part of the mains replacement strategy with insertion and upgrade in system pressures providing increased capacity to serve existing and future consumers.

Residential growth at the southern and northern extremities of the network is driving a number of capacity augmentation projects. The duplication of the transmission main in River Rd Port Noarlunga is expected to be completed in time for the 2010 winter with further augmentation of the network required over the next 5 years to maintain capacity to the Seaford/Aldinga area.

The forecast additional loads as result of the construction of the desalination plant at Port Stanvac have not materialised, enabling the planned Gillman Gate station at Port Adelaide to be deferred by 12 months. The estimated cost of this gate station has increased substantially since the original business case in 2008 prompting re-evaluation of other alternatives. A more cost effective solution has been identified with a proposal to interlink the Eastern Ring main with the Brompton Stanvac main to boost end of main pressures at the southern extremities of the network.

Ongoing residential growth in Gawler is necessitating augmentation of the HP network in that area over the next 5 years. A proposed gate station at Kudla and extension of the transmission network has been deferred pending more definite plans for the proposed 40,000 residential township at Concordia. Recent government announcements have confirmed that this development will proceed with residential development starting as early as 2012, however this is considered extremely optimistic. Given previous forecasts have not materialised an assumption has been made that no substantial infrastructure supporting the Concordia development will be required until after 2015/16. This will be monitored over the next few years.

On going residential growth in Mt Gambier and Whyalla MP networks will necessitate augmentation of those networks over the next 5 years.

1.2 Network Growth & Development

Residential growth is forecast to continue in line with current trends. The growth areas continue to be at the Northern and Southern extremities of the Adelaide network with continuing urban consolidation in older central suburbs.

While annual average consumption has been falling, and this continues to be an issue from a revenue perspective, the use of high demand appliances has contributed to maintaining relatively high peak hour demand across the network which in turn drives network augmentation.

Over the last 3 years the Adelaide metropolitan peak hour demand has shown a trend that could be indicative of a reduction in peak hour consumption for the network as a whole. It is uncertain if this is the start of a definite trend as, while all 3 years are on the low side, only one year has been below the long term lower confidence limit. This trend will be monitored over the next 2 years and if sustained, it would confirm that the market penetration of reverse cycle air conditioning is reducing the heating load on the network. Confirmation that there is a long term decline in peak hour consumption would affect the timing of transmission main augmentation projects.

The reduction in network marketing/development activities over the last 2 years has been counteracted to a degree by government decrees that favour gas for environmental purposes, consequently there does not appear to have been a material impact on connection numbers; however it is considered to have contributed to the falling residential consumption per customer. A renewed marketing development focus, commencing from FY 09/10 is anticipated to reverse this trend.

1.3 Operational Risks

A number of projects are planned over the next 5 years to address operational risks. The key projects are associated with:

1. Replacement of inlets inside cavities
2. Upgrading the Asset Information Systems Hardware & Software
3. Replacement of 26 below ground regulator vaults
4. Refurbishment of corroded below ground valves
5. Refurbishment of corroded I&C meter assemblies
6. Removal of 80 Transmission main sleeve railway crossings
7. Completion of SCADA Pressure Surveillance and Control facilities
8. Upgrading Asset Information management Systems

These have been identified through issues and risks arising from internal audit/asset lifecycle review and external audit. These projects aim to reduce risk, improve operational efficiency and or improve Envestra's asset management tactical and strategic capability.

SECTION 2 GENERAL

2.1 Purpose & Objectives

The purpose of this AMP is to demonstrate how Envestra develops and maintains its gas infrastructure assets in a prudent and sustainable manner. The AMP consolidates in one document the full asset life cycle processes and practices used to ensure optimal asset outcomes.

This plan:

1. Demonstrates to key stakeholders that Envestra's asset management approach is prudent, delivering long term sustainability, addressing an appropriate balance between service levels, performance, cost and risk.
2. Provides the technical basis to support Envestra's network expenditure.
3. Provides the basis for continuous improvement of asset management lifecycle management.

2.2 Scope

This AMP covers the asset lifecycle of Envestra's gas network assets within South Australia.

The lifecycle of assets relates to the cycle of planning, creating, operating and maintaining assets throughout their period of service, through to their replacement or removal from service.

The network assets covered by this plan include:

1. Transmission Pipelines
2. Distribution Mains and Services
3. Pressure Regulating & Valve Installations
4. Consumer Metering Installations
5. Odorant Facilities
6. Network Monitoring & Control (SCADA) Facilities

This plan also covers the strategic plan for the computer based Asset Information System supporting the lifecycle management of network assets.

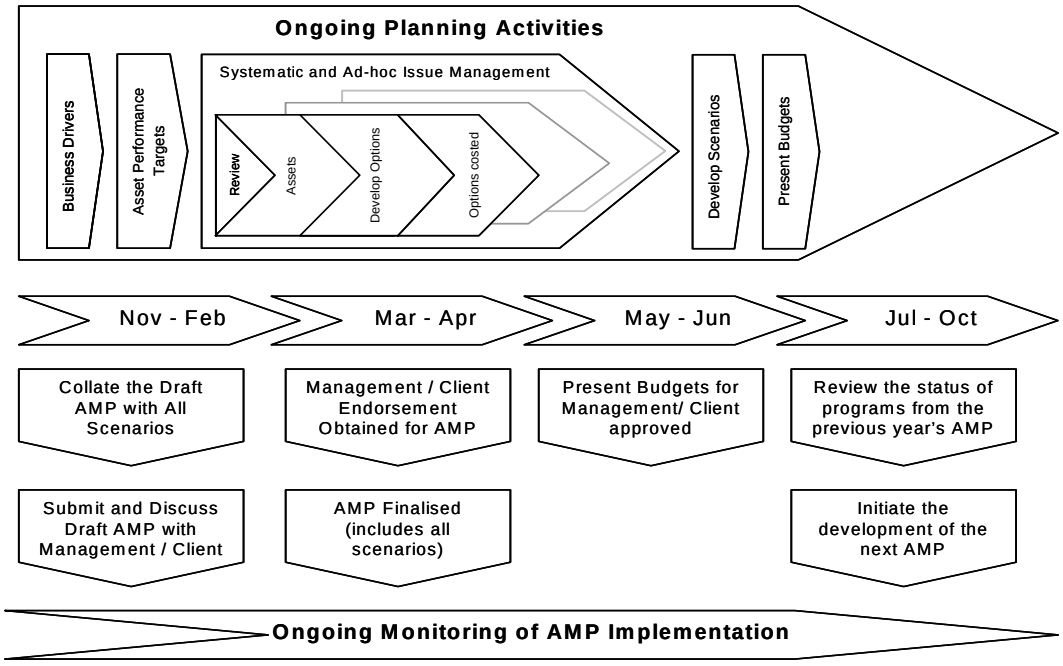
2.3 AMP Development & Planning Cycle

The development/review of the AMP is a year-round process with two parallel streams.

The first stream involves the ongoing monitoring of asset performance and implementation of the previous year's AMP projects and strategies.

The second stream involves the review of asset performance, risks, development of technical solutions, development of budgets and securing approvals from management.

This process is based on a 5-year planning horizon.



2.4 Envestra APA Relationship

Envestra is the holder of the gas transmission and distribution licences for the South Australian natural gas assets. Envestra has contracted APT Operation & Maintenance Services ("APA") to install, operate and maintain its gas infrastructure assets. In doing so APA must comply with all applicable laws and authorisations.

2.5 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.

• Envestra	Owner of the network assets
• APA	Asset Manager
• Office of the Technical Regulator	Technical regulator of the assets
• Australian Energy Regulator	Economic regulator of the assets
• Essential Services Commission SA	Licensor
• Retailers and consumers	Users of the services provided by the asset

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

Envestra - 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.

APA - as the entity responsible for the day-to-day operation and management of the network assets, is required to ensure that Envestra'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.

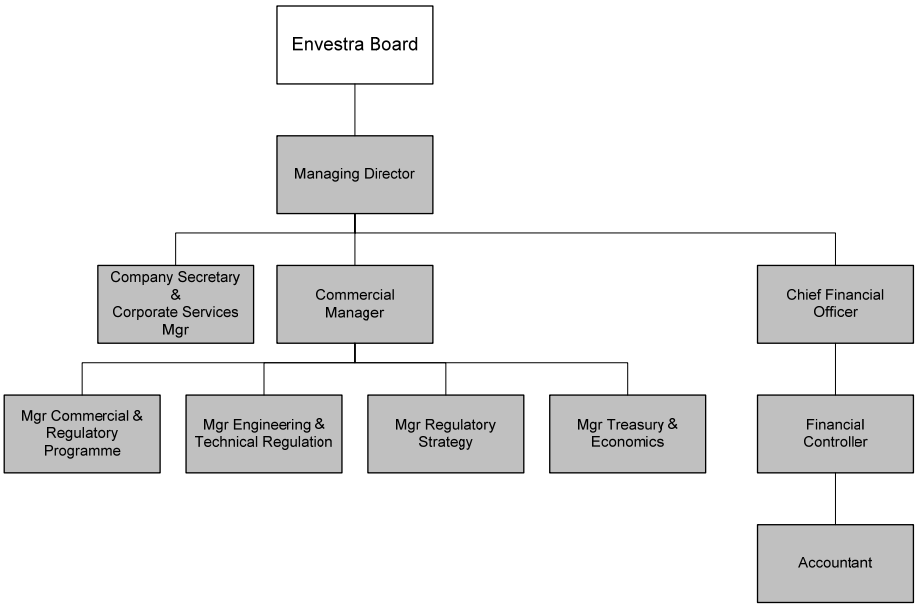
Australian Energy Regulator (AER) - requires economically efficient operating costs and seeks to ensure that network charges are reflective of prudent capital investment; requires compliance national codes and guidelines.

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

2.6 Organisation

2.6.1 Envestra

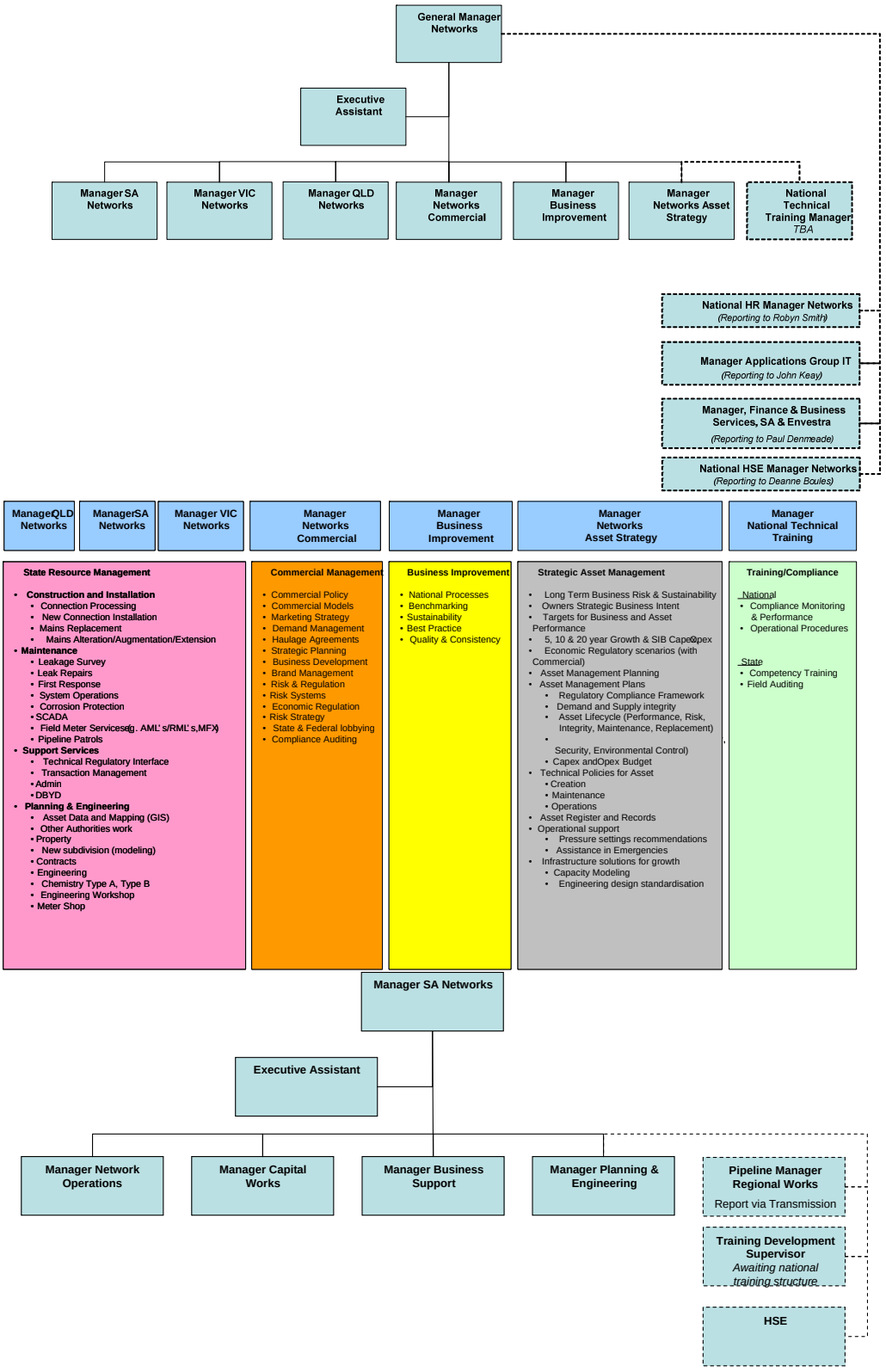
Envestra has ultimate responsibility for the assets it owns and for ensuring their long-term integrity. Envestra's management structure is shown below.



All day to day installation, operation and maintenance activities associated with Envestra's network are carried out by APA.

2.6.2 APA Management

APA manages the network and is responsible for the safety, reliability and integrity of the network. The key positions and functions of the APA organisation are highlighted below.


General Manager Networks
Executive Assistant
Manager SA Networks
Manager VIC Networks
Manager QLD Networks
Manager Networks Commercial
Manager Business Improvement
Manager Networks Asset Strategy
National Technical Training Manager
TBA
National HR Manager Networks
(Reporting to Robyn Smith)
Manager Applications Group IT
(Reporting to John Keay)
Manager, Finance & Business Services, SA & Envestra
(Reporting to Paul Denmeade)
National HSE Manager Networks
(Reporting to Deanne Boules)
Manager QLD Networks
Manager SA Networks
Manager VIC Networks
Manager Networks Commercial
Manager Business Improvement
Manager Networks Asset Strategy
Manager National Technical Training
State Resource Management
Construction and Installation
Connection Processing
New Connection Installation
Mains Replacement
Mains Alteration/Augmentation/Extension
Maintenance
Leakage Survey
Leak Repairs
First Response
System Operations
Corrosion Protection
SCADA
Field Meter Services (e.g. AML's/RML's,MFX)
Pipeline Patrols
Support Services
Technical Regulatory Interface
Transaction Management
Admin
DBYD
Planning & Engineering
Asset Data and Mapping (GIS)
Other Authorities work
Property
New subdivision (modeling)
Contracts
Engineering
Chemistry Type A, Type B
Engineering Workshop
Meter Shop
Commercial Management
Commercial Policy
Commercial Models
Marketing Strategy
Demand Management
Haulage Agreements
Strategic Planning
Business Development
Brand Management
Risk & Regulation
Risk Systems
Economic Regulation
Risk Strategy
State & Federal lobbying
Compliance Auditing
Business Improvement
National Processes
Benchmarking
Sustainability
Best Practice
Quality & Consistency
Strategic Asset Management
Long Term Business Risk & Sustainability
Owners Strategic Business Intent
Targets for Business and Asset Performance
5, 10 & 20 year Growth & SIB Capex&Opex
Economic Regulatory scenarios (with Commercial)
Asset Management Planning
Asset Management Plans
Regulatory Compliance Framework
Demand and Supply integrity
Asset Lifecycle (Performance, Risk, Integrity, Maintenance, Replacement)
Security, Environmental Control)
Capex andOpex Budget
Technical Policies for Asset
Creation
Maintenance
Operations
Asset Register and Records
Operational support
Pressure settings recommendations
Assistance in Emergencies
Infrastructure solutions for growth
Capacity Modeling
Engineering design standardisation
Training/Compliance
National
Compliance Monitoring & Performance
Operational Procedures
State
Competency Training
Field Auditing
Manager SA Networks
Executive Assistant
Manager Network Operations
Manager Capital Works
Manager Business Support
Manager Planning & Engineering
Pipeline Manager Regional Works
Report via Transmission
Training Development Supervisor
Awaiting national training structure
HSE

2.7 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 at 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 providing a high level of service (safety and security of supply) to consumers.

2.8 Risk Management

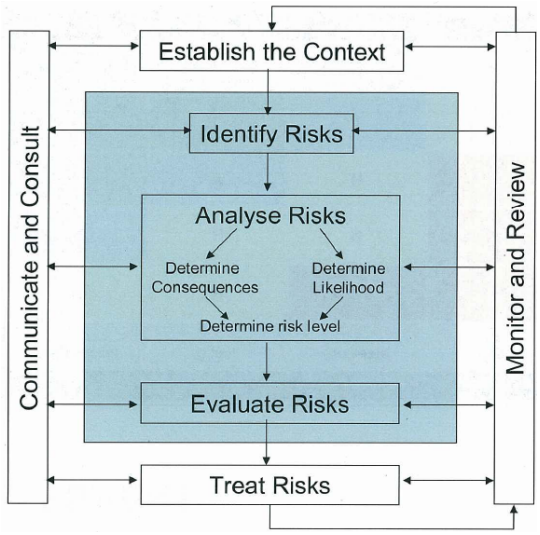
Envestra has adopted a formalised and systematic approach to risk management.

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 control and or minimise the consequences.

The process of Risk Analysis within the Envestra'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. AS4645 – Gas Distribution Network Management
5. AS3723 – Installation and Maintenance of Plastic Pipe Systems for Gas

The risk management process is summarised in the following diagram


Establish the Context
Identify Risks
Analyse Risks
Determine Consequences
Determine Likelihood
Determine risk level
Evaluate Risks
Treat Risks
Communicate and Consult
Monitor and Review

Any risk issues deemed to have an extreme or high risk rating are actioned on a priority basis to either remove the cause of the risk and/or apply additional controls to reduce the risk rating to an acceptable level. Items having a risk rating of Moderate are documented and actioned in accordance with available resources and other priority actions, whilst items rated as Low risk receive the lowest priority or may be accepted and monitored without further treatment.

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

2.9 Audit, 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 the 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.

Management is charged with ensuring that the network is operated and maintained to required levels of safety, reliability and sustainability with processes continuously improved and optimised. This cannot be achieved without access to reliable and consistent inputs. These inputs are multi-layered and cross a number of asset specific processes.

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 & activity management planning
- Procedural controls / operating manuals
- Records management processes

Audit Processes

- Internal audits
- External audits

2.9.1 Audit Processes

Auditing processes are multi-layered to ensure that all activities and processes are reviewed and challenged at an appropriate business level. The results of auditing

activities are reported to management hierarchy through various means, statistically at lower layers and through detailed, formally documented reports at higher layers in the business.

Internal Audits - Audits are performed at various levels within the organisation to ensure that the system and procedural integrity is maintained, and that improvement opportunities can be identified. Audits are conducted by trained and competent staff, with higher level activities being performed by qualified staff under a certified ISO 9001 quality management system.

Key Audits undertaken include:

- **Supervisor monitoring audits** are conducted as a means of ensuring that field activities are performed in accordance with internal requirements and relevant legislation. Audit findings are actioned through formal improvement processes, and results communicated to management through detailed statistical reports.
- **Verification audits** are 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. The findings of audits are compiled into detailed formal reports and submitted to management for review and action.
- **Technical facility audits** are 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 documented reports.
- **HSE Management system audits** provide evidence that the OE HSE system is implemented and effective. These audits are conducted by trained safety auditors and reported to management through documented reports.
- **Business Risk Management Plan (BRMP) audits** provide confidence to management that risk controls that have been identified in business assessments are implemented, robust and maintained. Audits are conducted by qualified auditors and reported to management through detailed reports.

External Audits - External auditors are used by the business as a means of independently reviewing and verifying functions and activities. These audits may have been commissioned from within the business, or may be imposed by regulators, customers or government agencies. External audits include:

- **Envestra audits** - Performed on a ”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.

A software package known as the Management of Audits, Regulatory Compliance and Incidents System (MARCIS) is used to track all audit actions through to completion. A process has been established whereby, following receipt of a finalised audit report, the responsible manager allocates recommended actions to appropriate staff for completion, along with a risk rating (using the risk matrix) and completion date. These

are entered into MARCIS to allow ease of tracking. Regular email alerts, reports and senior management review is regularly undertaken of the status of all MARCIS actions.

2.9.2 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 Envestra's Board and audit committee.
- **Envestra 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. Budget forecasts are prepared based on a review of activities and forecast changes in growth and other environmental and economic factors. Budgets are based on a detailed review of the work to be undertaken to operate and maintain the network to manage the business and to construct the required extensions, augmentation and replacement of network assets.

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:

- Promptness of Connection
- Network Extension & Expansion Charges
- Planned Interruptions
- Major Interruptions
- Statistical Information
- Technical Information
- Complaints
- Key performance indicators

2.9.3 Measuring Network Reliability

The reliability of the SA network is continually monitored and assessed from the perspective of the performance of the assets and the impact on consumers.

Performance of Assets - Envestra continually monitors the performance of the distribution network in South Australia utilising a number of systems and has a number of Key Performance Indicators which are tracked, monitored and reported on. An annual Distribution System Performance Review (DSPR) is undertaken covering system capacity, and integrity and network changes for the preceding calendar year.

Impact on Customers - Envestra participates in the Ombudsman Scheme in South Australia which allows consumers to raise complaints in relation to service levels or procedures to an independent authority for follow up.

Envestra has in place a procedure for handling network-related customer complaints in a courteous, timely and effective manner. The Procedure meets the requirements under Clause 8 of the South Australian Gas Distribution Code and has been prepared in accordance with Australian Standard 4269 (1995) 'Complaints Handling'.

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

A Complaints Tracking database has been established to monitor and report on complaints received.

2.9.4 Review Processes

Formal and informal reviews undertaken throughout the organisation form a vital input into the planning and management processes. These reviews provide the required level of details essential in balancing the many factors relating to the effective operation of network assets.
The following sections outline some of the main areas which are subject to review, the output being used to assist in planning and management decision making.

2.9.4.1 Asset Condition & KPIs

The asset KPIs detailed in Section **Error! Reference source not found.** are the primary measures of asset performance. For each asset group, specific data is collected and KPIs derived for analysis and review. The output of this process assists in determining the most appropriate course of action.

The formal mechanism to monitor and review KPI trends and asset performance measures is the APA Monthly Operating and Management Report, which contains all KPI data for the current month and year-to-date reporting periods. These reports are reviewed by both Envestra and APA to facilitate improved day-to-day asset management decision-making such as the decision to maintain or replace assets. These same measures are used to monitor underlying condition and trends that may affect the network's performance over the longer term. Generally, gas distribution networks are fairly stable with well established underlying trends allowing corrective actions or required changes to be planned well in advance.

2.9.4.2 *Skills and Competencies*

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

Processes are in place to ensure that only those staff members and contractors that possess the relevant competency are able to perform tasks without direct supervision.

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. This process of operator licensing provides the business with confidence that strict controls are implemented for critical activities.

2.9.4.3 *Business Risk Management Planning*

A "risk based" approach to managing the business ensures that key risks to the business have been identified and adequately controlled, and that resources are utilised for the greatest benefit. The business has been divided into a number of sites and activities to enable management plans to focus on the area of functional control. Each site and activity has been assigned to a person with overall responsibility for managing the risk based process, and this person is accountable for ensuring the effectiveness and ongoing improvement of the systems therein.

Business Risk Management Plans (BRMP) are developed following a business risk assessment, conducted in a collaborative approach by staff.

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.

Business Risk Management Plans support the business risk assessments, and ensure that critical controls are identified and appropriately managed. The BRMP are pivotal in the control of the business activity and provide the input to continuous improvement and optimisation processes.

Measures of performance and outcomes, assigned to key controls, are continuously assessed to ensure that principal risks are managed to acceptable levels.

2.9.4.4 *Procedural Controls / Operating Manuals*

Maintenance of the intellectual knowledge of the business is paramount to ensure the long term successful management of assets. A detailed program has been established to ensure that key conceptual design, construction, operational, maintenance and replacement knowledge is documented in an appropriately indexed and controlled format to enable effective retrieval.

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.

Document control measures ensure that only certified and approved procedures and work instructions are made available to relevant field or operational personnel. These documents are reviewed on a scheduled basis, however where need for significant change is identified, a special review is instigated. Such reviews are formally documented and appropriate change management controls implemented.

2.9.4.5 Record Management Processes

Record management processes ensure that pertinent historical data is stored as evidence that those systems conform to requirements. Records are stored in such a way that they remain legible over time, readily identifiable and retrievable. Management processes ensure that record controls address the identification, storage, protection, retrieval, retention time and disposal of records.

Depending on the type, records may be stored as hard copy, electronically or both. Hard copy records are managed in appropriately controlled filing systems that are suitably protected, while electronic records are controlled by networked databases.

2.10 Key Asset Management Drivers

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

2.10.1 Network Growth

On-going growth drives expansion of the network into new areas as well as reinforcement of existing networks through either upgrade of pressures and or the installation of additional mains and links between mains.

Historically 7,000 – 8,000 new connections are made to the network every year giving rise to additional network mains, services and new meters. Marketing of natural gas is aimed at maintaining the existing customer base as well as growing the use of gas.

There is a trend of declining average domestic gas consumption due in part to increasing penetration of reverse cycle air conditioning and solar hot water heating, higher efficiency gas appliances, improved thermal performance of dwellings and climatic warming.

The reduction in average annual domestic consumption is compounded by higher instantaneous flow appliances (space heating and instantaneous gas HWS) causing additional peak hourly demand, with the impact being evident particularly in low pressure networks, necessitating on-going network augmentation.

2.10.2 Mains Asset Condition

A major component of Envestra's OPEX relates to locating and repairing leaks and UAFG associated with the old Cast Iron & Unprotected Steel (CI & 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 used when these assets were first installed. In areas where CI mains have been laid in clay, the acidic nature of these soils leads to graphitisation resulting in brittle fracture and in some instances sections of the main "blowing out" during maintenance.

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 the first call to a leak problem here reveals quite extensive pitting corrosion along the pipe length with replacement rather than repair the only option.

2.10.3 Supply Risk Management

While the risk of supply to the Adelaide metropolitan distribution network has been significantly improved with the addition of the SEAGas gate station, there remain areas within downstream networks where a single point failure of a trunk main or supply regulator could result in significant disruption to supply.

The review of supply risk within networks is an ongoing process to ensure a safe and reliable supply of gas is maintained. Envestra's policy is to focus on those scenarios where a single point of failure could result in more than 1000 consumers losing supply.

Improving security of supply requires either additional mains, regulators, surveillance equipment or changes to operational and maintenance procedures.

2.10.4 Meter Replacement

Meters are required to be replaced at the end of their nominated "technical" life or as determined by representative sampling. This gives rise to 30,000-40,000 meter replacements per annum (referred to as Periodic Meter Change or PMC).

2.10.5 Third Party Capital Works Programmes

Ongoing capital works programs by other utilities and road authorities requires that from time to time, gas mains have to be moved, modified and/or replaced.

2.10.6 Network Risk Reviews

Reviews of quality, productivity, service delivery and network integrity invariably highlight risks throughout the asset lifecycle that require changes to policies, processes and procedures.

2.11 Asset Performance Objectives

The following objectives apply to the respective asset classes

2.11.1 Transmission & Distribution Mains

2.11.1.1 Capacity

1. Network capacity is sufficient to meet a 1:25 year winter peak hour demand.
2. Pressures are maintained above recommended minimum values at network extremities.

2.11.1.2 Network Integrity

1. Total mains & service leaks reported per km of main reduce over time.
2. The moving annual 12-month UAFG reduces over time.
3. The number of 3rd party damages per km of main reduces over time.
4. No 3rd party damage incidents on transmission supply mains result in interruption to supply.

2.11.2 Pressure Regulating Installations

1. Networks do not exceed their maximum allowable operating pressure.
2. Pressures are controlled and maintained in accordance with nominated supply pressures to avoid loss of supply within the distribution network.

2.11.3 Metering

1. Metering accuracies are maintained within tolerances specified in the Gas Metering Code 2009.
2. Timeframes for installation, upgrading and maintenance to be in accordance with the requirements of 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.

2.11.4 SCADA Facilities

1. Sufficient remote pressure 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

2.11.5 Odorisation Facilities

To control the injection of odorant such that natural gas can be detected at levels defined in the Regulations under The Gas Act 1997 (20% of the LEL).

2.11.6 Asset Service Life

Envestra's networks are planned, designed, constructed, operated and maintained in order to maximise an asset's useful life. The following table summarises the expected useful life of network assets.

Asset	Life, (Years)
Mains & Services	
Steel (CP covered)	80
Steel (Non CP)	50
Cast iron	50
PE & PVC	50
Pressure Regulating Facilities	40
Meters	15
Network Isolation Valves	As per main
SCADA Facilities	
Field Based Hardware	5-10
Base Station Hardware	5
Software	5
Odorising Facilities	40

2.12 Planning Horizons

A rolling 5-year forecast of expected expenditure for the business is maintained from which annual network Opex and Capex budgets are developed.

Requirements for the next year are based on latest performance of the network, asset condition, asset age, and forecast growth for the coming year.

As the Access Arrangement for the South Australian network is reviewed every 5 years and the degree to which Envestra recovers its investment in the network is an important factor in relation to availability of funds, additional emphasis is placed at each review on identifying and quantifying funding requirements for the subsequent 5 years.

Cost benefit analysis of network extensions (domestic and I&C) and mains replacements are based on either a 10 or 20 year horizon.

2.13 CAPEX & OPEX CATEGORIES

2.13.1 Growth CAPEX

Growth CAPEX relates to expenditure associated with additional infrastructure (mains, services, meters, regulators etc.) required for to supply the increasing customer base.

The following expenditure types are categorised as Growth CAPEX. This type of expenditure proceeds on the basis that the NPV of incremental revenue exceeds the capital investment.

- New Main Existing Domestic
- New Main New Estate
- New Main Industrial & Commercial
- New Services Domestic
- New Service I&C
- New Meters Domestic
- New Meter I&C

2.13.2 Replacement CAPEX

Replacement CAPEX relates to replacement of the asset once it has reached the end of its technical or economic life.

2.13.3 Augmentation CAPEX

Augmentation CAPEX relates to expenditure associated with additional infrastructure necessary to ensure the integrity of supply to existing consumers which is fundamental to customer service.

2.13.4 Stay in Business (SIB) CAPEX & OPEX

The assets are designed, constructed, operated and maintained to ensure that they will continue to meet the required service levels at an 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 and technological opportunities for improvement.

Potential SIB projects are identified via the lifecycle planning reviews.

SIB Projects are associated with different justification drivers:

- Efficiency improvements

  CAPEX - *Asset Efficiency Improvements*; consisting of projects that reduce operational costs.

  OPEX - *Process Efficiency Improvements*; consisting of projects that aim to modify the ways assets are being managed, hence improving business profitability.

The prioritisation of projects in this group is based on NPV calculations, with higher priority given to higher NPV returns.

- Risk Mitigation

  CAPEX - *Capacity Development:* consisting of projects that aim to improve reliability of services. *Renewal and Upgrade:* consisting of projects that aim to maintain targeted levels of compliance, safety and reliability.

  OPEX - *Planning, Operating and Maintenance initiatives*; consisting of projects that aim to mitigate risk with no capex.

Every project is analysed for untreated risk and residual risk, with ratings of Likelihood, and Consequence. Risk Level is assigned based on the Risk Management Matrix.

SECTION 3 – ASSET PERFORMANCE & SERVICE SUMMARY

3.1 Introduction

This section summarises key asset performance & service levels associated with:

1. Supply Reliability
2. Asset Integrity
3. Gas Containment
4. Network Utilisation.

These primary indicators reflect outcome of asset management policies, processes and plans.

3.2 Supply Reliability & Quality

3.2.1 Gas Outages

There have been no incidents of gas outage as result of inadequate system capacity.

The majority of gas outage incidents have been caused by third parties.

A major unplanned outage occurred in the regional centre of Whyalla in 2008 when the custody transfer meter, owned by Epic, at the Whyalla Gate Station failed. This impacted supply to the entire township, resulting in approximately 3000 customers requiring their gas supply to be turned off and then restored.

3.2.2 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 does not comply with the regulations

Odorosity in Envestra's networks is targeted between 12% and 18% of the LEL.

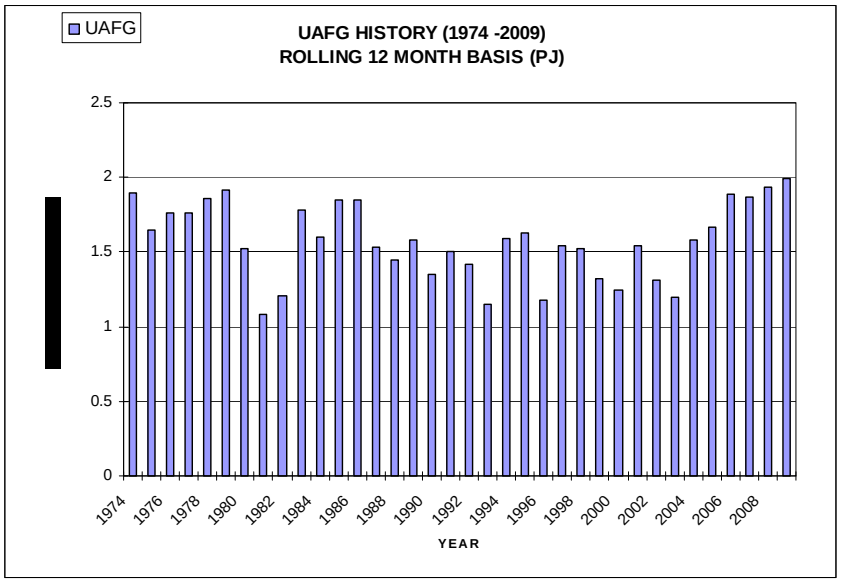
Measurements below 12% means there is more odorant than necessary.

Odorant levels have been maintained within the regulatory requirements. There have been a number of maintenance interventions to resolve periodic over dosing issues that have been experienced over the last 18 months. These have now been resolved with odorosity expected to be maintained within target limits from 2010.

3.3 Asset Performance & Integrity

3.3.1 UAFG

A moving annual total UAFG is used to provide an indication of the condition of the network. Of the total reported UAFG, 80% is considered to emanate from the Cast Iron & Unprotected Steel mains.



UAFG has been increasing over the last 5-6 years with the current level of around 2.0 PJ. The majority (80%) of this UAFG is considered to be associated with leaks from CI & UPS mains.

An accelerated replacement of these mains is proposed over the next 8 years that, once complete, will reduce UAFG to approximately 500TJ.

Details of this programme are provided in SA Mains Replacement Plan. An overview of the replacement strategy is provided in Section 5.6.

3.3.2 Distribution Network Leaks

The total number of gas escapes is as an indicator of the integrity of the network
While the overall leaks/km has remained relatively stable there has been a significant increase in CI & UPS leaks/km over the last 5 years despite an average replacement rate of 65 km/yr during this period.

This is indicative that the CI& UPS network, which represents approximately 22% of the total mains assets, is deteriorating faster than the current replacement rates.

To maintain network integrity an accelerated replacement programme of the remaining CI&UPS mains is proposed. This has been detailed in the SA Mains Replacement Plan. An overview of the replacement strategy is provided in Section 5.6

3.3.3 Metering Accuracy

Accurate measurements of gas received and delivered are critical in minimising the risk to customers, to Envestra's revenue and service delivery obligations.

3.3.3.1 Consumer Meters

Meters removed from the field as part of the periodic meter change programme are tested for accuracy prior to repair.
Results indicate that over 99% of domestic meters tested were within the Gas Metering Code requirements of +/- 2% accuracy.

3.3.3.2 Customer Complaint and Billing

The following table summarises customer meter complaints.

	FY 04/05	FY 05/06	FY 06/07	FY 07/08	FY 08/09
Total Customer Meter Complaints	9	19	30	19	31
Meters Within Tolerance +/- 2%	6	14	23	16	21
Meters Outside Tolerance +/- 2%	2	2	3	1	5
Meters - Unable to Test	1	3	4	2	5

The number of requests for meter tests is extremely low compared to the total number of consumers (approximately 390,000). Statistically the figure is very small and there are no indications that will change in the future.

3.3.3.3 Gate Station Accuracy

APA undertakes accuracy verification tests in conjunction with EPIC and SEAGAS to ensure measurements of gas deliveries to Envestra's networks are within tolerances stipulated in Envestra's transfer agreement.

The table below summarises the frequency of accuracy verification tests (AVT) for all such sites in SA.

	Frequency	Flow Adjustments (last 12 mths)
Adelaide City Gate Stations	2 monthly	0
Regional Gate Stations	quarterly	0
Farm Tap Stations	quarterly	0

Over the last 12 months there have been no material accuracy issues identified that necessitated gas flow adjustments due to meter inaccuracy.

3.4 Emergency Management

3.4.1 Leak First Response

In accordance with the SA Leak Management Plan all public reported leaks are required to be attended to within 2 hours.

The target is for a compliance of greater than 95%.

Records of actual response times have been kept since June 2008 and are as per the following table.

	FY 08/09	FY 09/10
% Response within 2 hrs	97.5	97.0

3.4.2 Network Incidents

Third party damages per km of main have remained relatively constant over the last 4 years.

Mains location details are recorded electronically and readily available to 3rd parties via Dial Before You Dig. Details of services are recorded inside the consumer meter box (where installed) or in hardcopy archives.

The majority (75%) of 3rd party damage is associated with consumer services.

Having accurate electronic mains information and an efficient process for responding to Dial Before You Dig requests has maintained 3rd party damages to relatively low levels when compared to 3rd party damages to services.

3.4.3 Significant Environmental Incidents

Environmental incidents would be reported to the EPA as and when they occur. There have been no significant environmental incidents reported over the last 5 years.

	FY 04/05	FY 05/06	FY 06/07	FY 07/08	FY 08/09
Significant Environmental Incidents	0	0	0	0	0

3.5 Utilisation

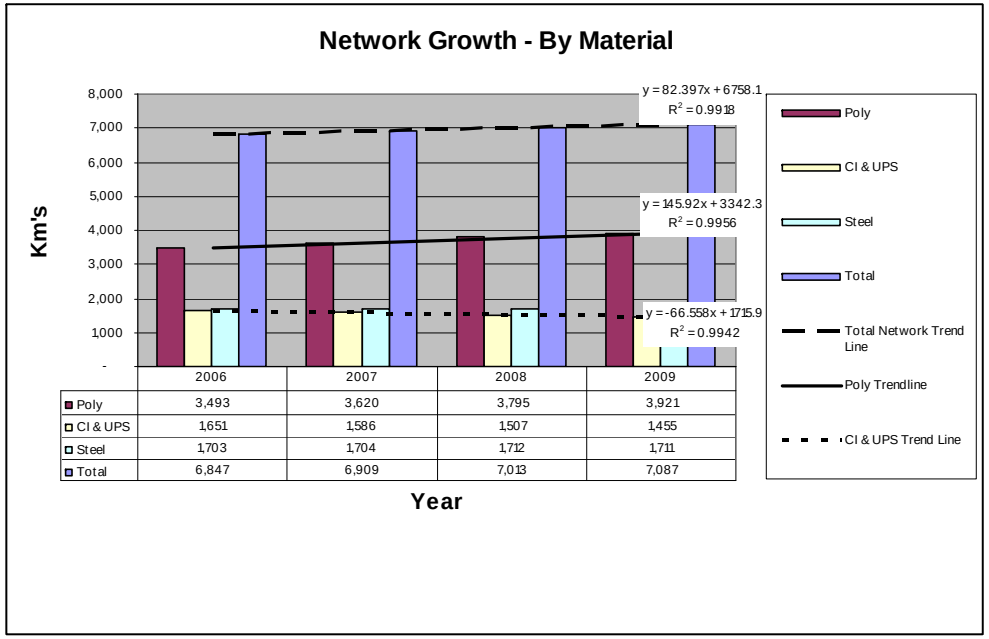
The number of consumers per kilometre of distribution main has remained relatively constant over the last 5 years while annual consumption per km has been declining, principally due to reduction in consumption in the Tariff R (Residential) and Tariff D markets.

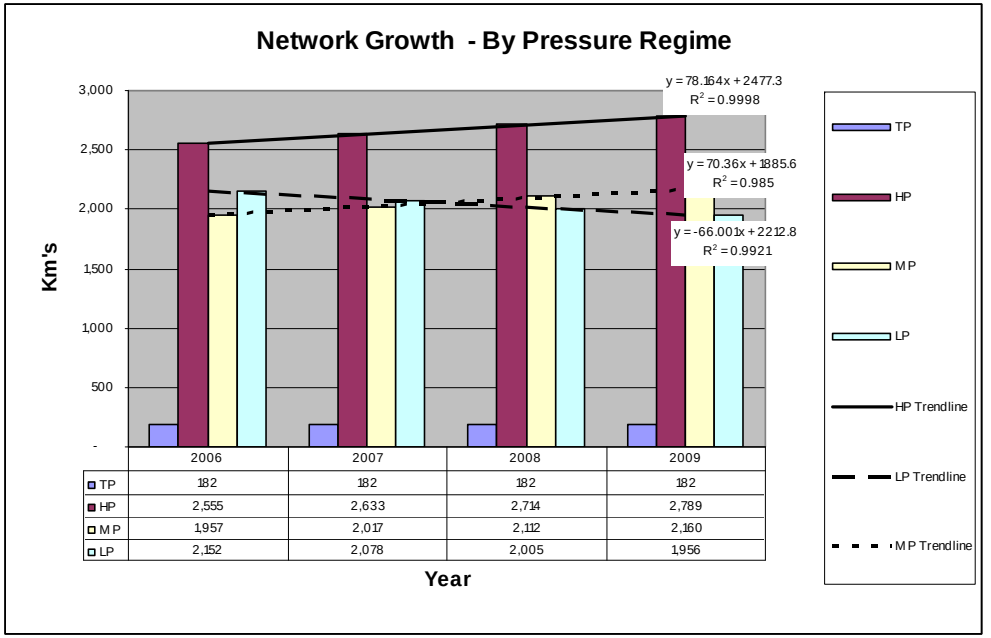
While there is falling domestic average consumption, it masks an increasing instantaneous peak loading, which remains a key criterion for network planning.

3.6 Key Network Parameters and Statistics

3.6.1 Installed Mains – km

	2006					2007					2008					2009				
Material	TP	HP	MP	LP	Total	TP	HP	MP	LP	Total	TP	HP	MP	LP	Total	TP	HP	MP	LP	Total
Poly	-	1,475	1,459	559	3,493	-	1,551	1,521	548	3,620	-	1,625	1,626	543	3,795	-	1,700	1,677	544	3,921
CI & UPS	-	-	114	1,537	1,651	-	-	111	1,475	1,586	-	-	99	1,407	1,507	-	-	97	1,358	1,455
Steel	182	1,081	385	56	1,703	182	1,082	385	55	1,704	182	1,089	386	55	1,712	182	1,089	386	54	1,711
Total	182	2,555	1,957	2,152	6,847	182	2,633	2,017	2,078	6,909	182	2,714	2,112	2,005	7,013	182	2,789	2,160	1,956	7,087

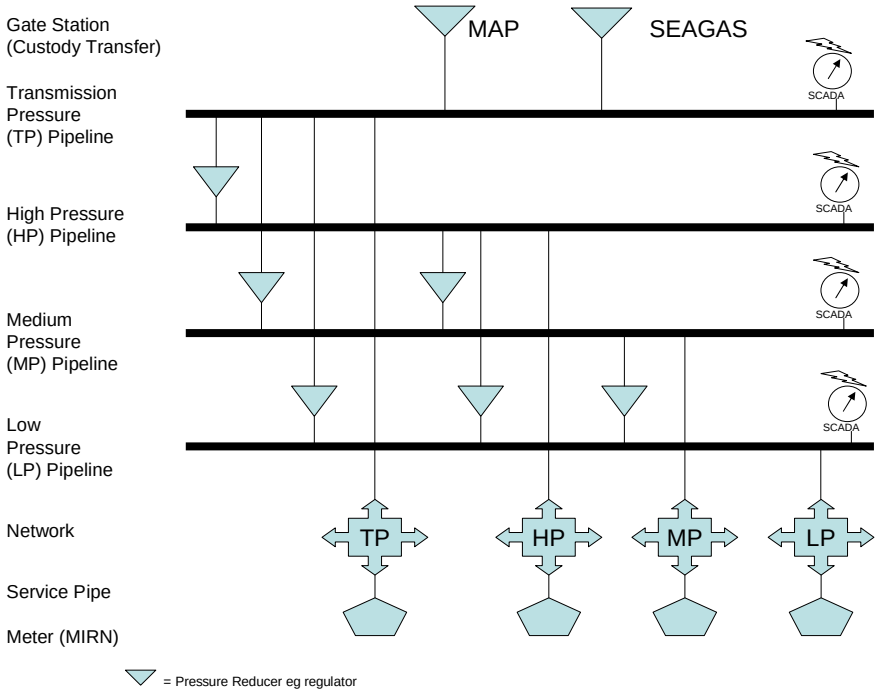




SECTION 4 - NETWORK ASSET OVERVIEW

4.1 Gas Networks 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 (PRI)



4.2 Sources of Supply

Envestra's SA networks are supplied with natural gas from three sources.

1. Moomba to Adelaide pipeline (MAP) - A 800 km 520 mm diameter pipeline delivering gas to all Envestra networks except Mt Gambier. This pipeline is owned by Hastings Funds Management (HFM) and operated by its subsidiary EPIC Energy.
2. Port Campbell (Victoria) to Adelaide (SEAGas Pipeline) - A 680 km 455mm diameter pipeline delivering gas to Envestra's Adelaide Metropolitan and Mt Gambier networks (via the SESA pipeline). This pipeline is owned and operated by SEAGas Ltd.
3. Katnook (near Penola in the South East) to Mt Gambier – A 65 km 150 mm diameter pipeline owned by HFM and operated by its subsidiary EPIC Energy.

Gas is delivered into Envestra's networks via gate or custody transfer stations owned by either HFM 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

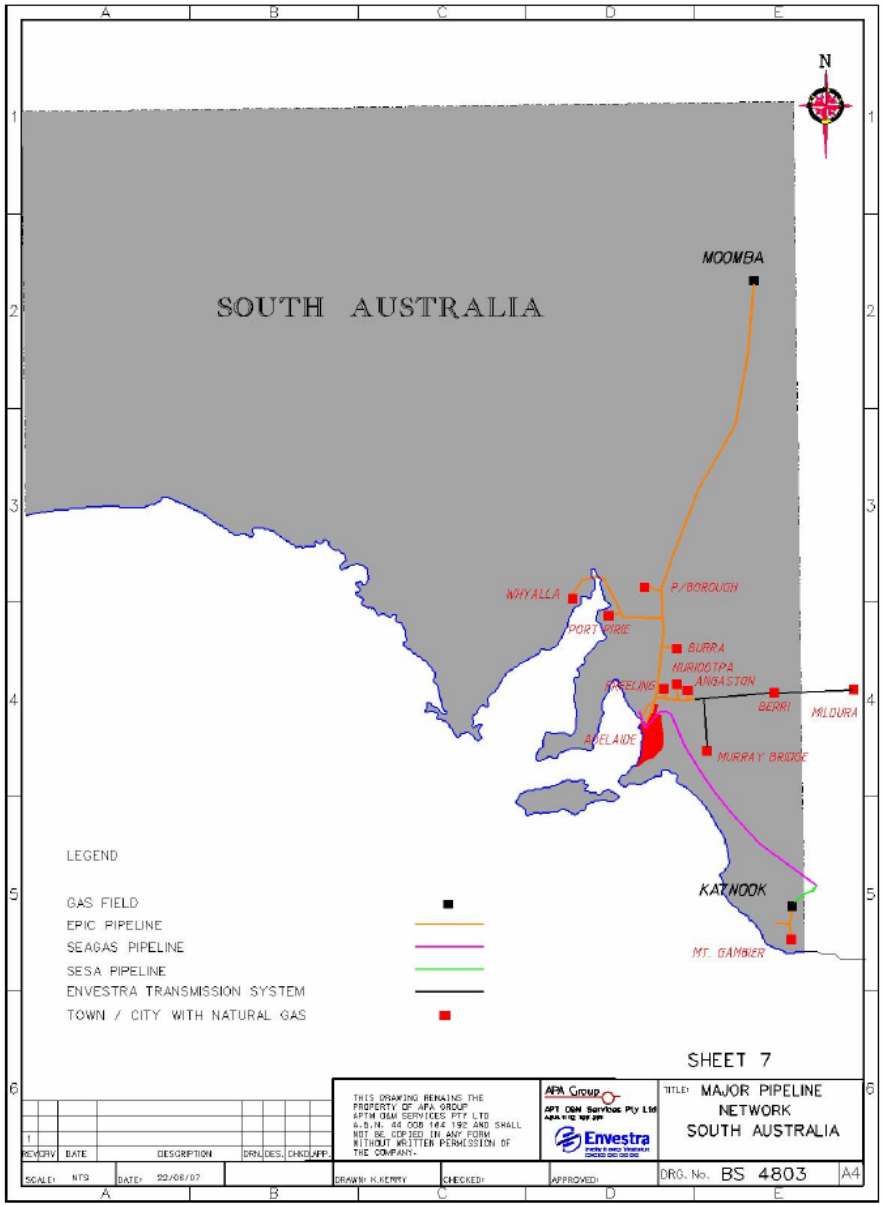
Envestra's networks. Through interface agreements Envestra has access to data and equipment calibration witnessing rights.

4.3 Principal Distribution Networks

EPIC and SEAGas supply points into Envestra's principal networks are summarised in the table below.

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

These networks are highlighted in the following maps.


SOUTH AUSTRALIA
N
MOOMBA
WHYALLA
PORT PIRIE
P/BOROUGH
BURRA
MURIOOTPA
ANGASTON
KEELING
BERRI
MILDURA
ADELAIDE
MURRAY BRIDGE
KATNOOK
MT. GAMBIER
LEGEND
GAS FIELD
EPIC PIPELINE
SEAGAS PIPELINE
SESA PIPELINE
ENVESTRA TRANSMISSION SYSTEM
TOWN / CITY WITH NATURAL GAS
SHEET 7
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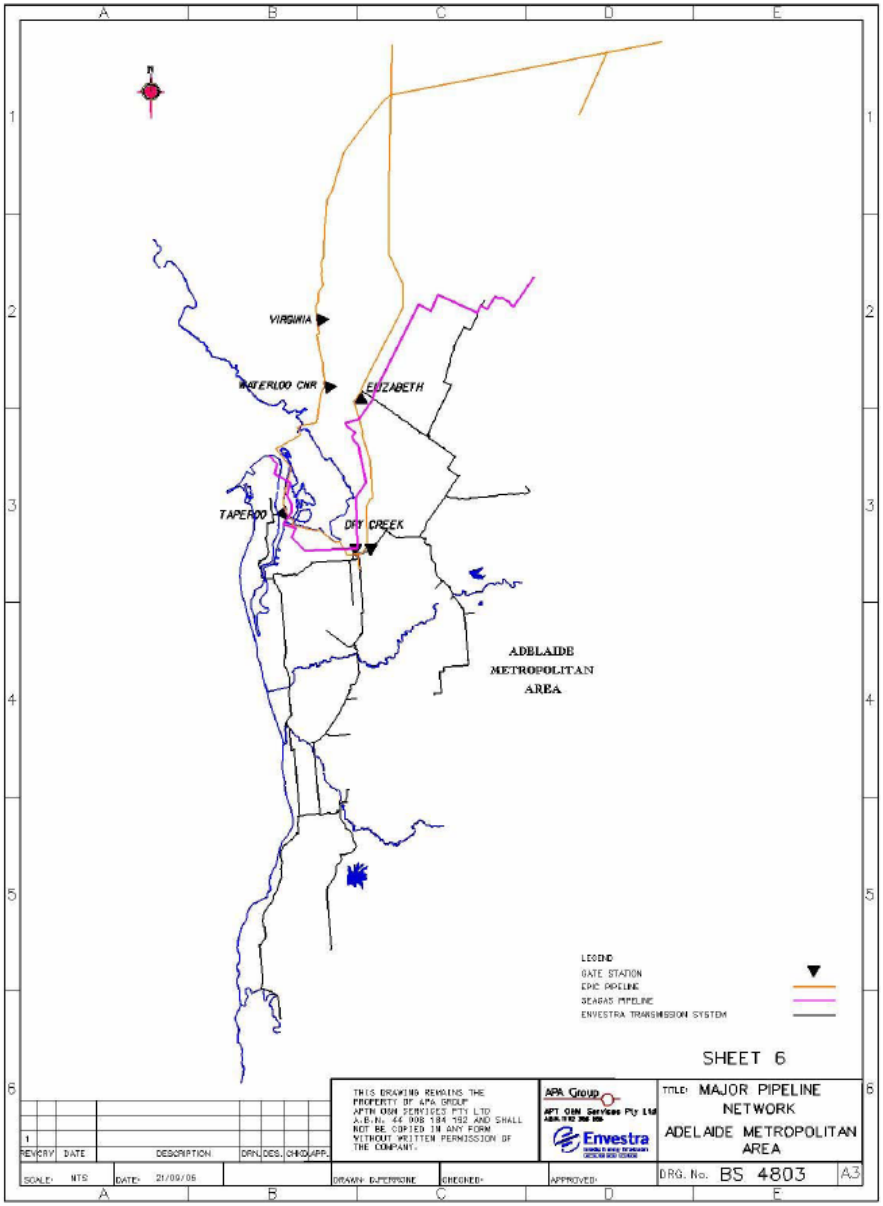
DRG. No. BS 4803
A4


VIRGINIA
WATERLOO CNR
ELIZABETH
TAPEROO
DRY CREEK
ADELAIDE METROPOLITAN AREA
LEGEND
GATE STATION
EPIC PIPELINE
SEAGAS PIPELINE
ENVESTRA TRANSMISSION SYSTEM
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Envestra
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DRG. No. BS 4803
A3

In addition to these supply points there are 12 farm taps supplying single industrial consumer sites directly from EPIC's Moomba and Katnook pipelines.

Supply Network
Burra
KCA Snuggery
Carter Holt
Pacific Salt Whyalla
Penfield Roses
Peterborough
Safries
Two Wells
Virginia
Wasleys Piggery / Ridley Agri Products
Waterloo

4.4 Operating Pressure Regimes

The network operates under four pressure regimes as defined in the following table.

Pressure Regime	Definition
Transmission Pressure (TP)	MAOP* between 1050 kPa and 10,000 kPa
High Pressure (HP)	MAOP* between 250kPa and 1050 kPa
Medium Pressure (MP)	MAOP* between 7 kPa and 250 kPa
Low Pressure (LP)	MAOP* up to 7 kPa

* Maximum Allowable Operating Pressure

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

Each network has its own defined operating range depending on the network configuration and capacity requirements. Operating pressures may vary depending on seasonal load demand.

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

SA Networks Nominal Operating Pressure Ranges - kPa														
	ADEL	MTGB	PTPR	WHY	MBDG	ANG	NURI	BRI	VRG	WAS	WTL	FRL	SNG	PTB
Trans - Inter	-	-	-	-	2800-5000	2800-5000		2800-5000	-	-	-	-	-	-
Trans - Intra	850-1750	-	-	-	700-1400	-	700-1400	700-1400	-	-	-	-	400-800	-
High	70-350	250-475	70-350	-	70-350	70-350	70-350	70-150	70-350	70-350	70-350	70-350	-	70-350
Medium	35-100	35-180	-	35-100	-	-	-	35-100	-	-	-	-	-	-
Low	1.2-7.0	1.2-1.7	1.2-1.7	-	-	-	-	-	-	-	-	-	-	-

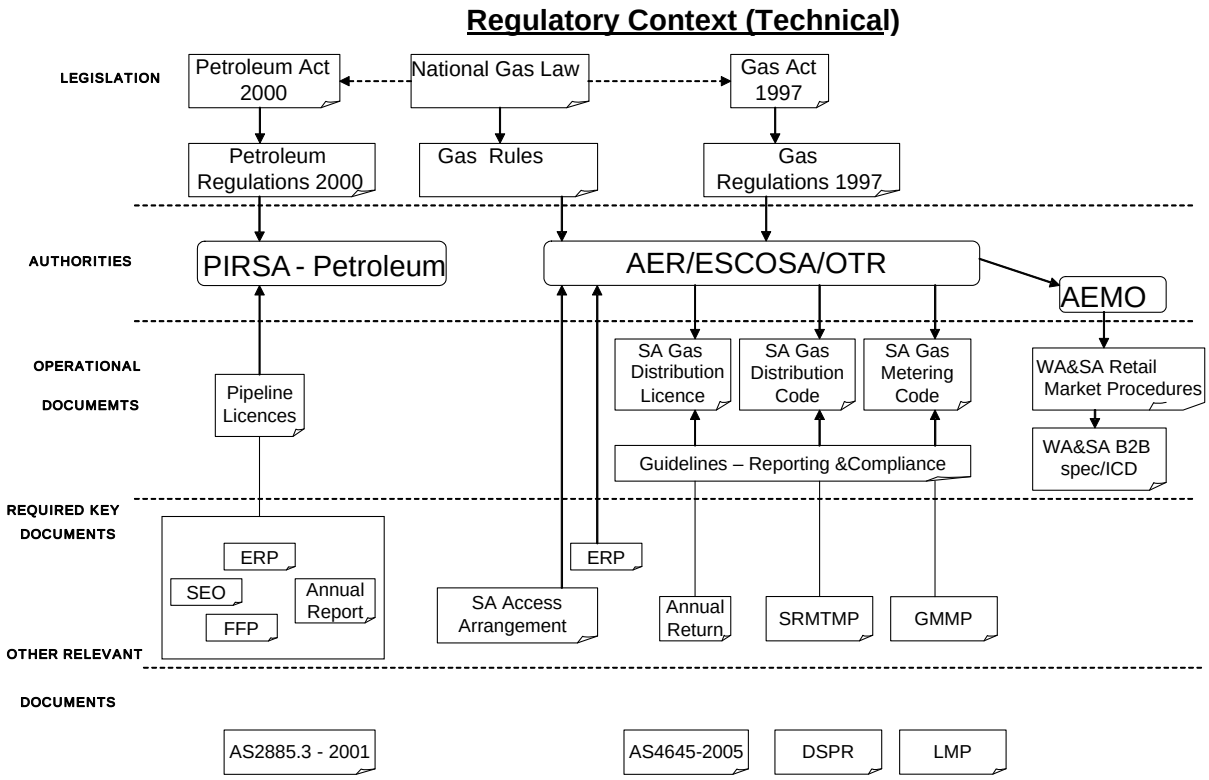
*Trans – Inter relates to transmission pipelines between regions
**Trans – Intra relates to transmission pipelines within distribution networks

SECTION 5 - NETWORK MANAGEMENT PLANS

5.1 Regulatory Compliance

5.1.1 Operating Framework

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



PIRSA - Department of Primary Industries and Resources South Australia (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 Plan

The key regulatory instruments with which Envestra must comply are:

- Gas Act 1997 and Regulations 1997
- Gas Pipelines Law
- 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

5.1.2 Applicable Regulations, Codes and Standards

5.1.2.1 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

5.1.2.2 Gas Metering Code

The Gas Metering Code regulates standards for meters and 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

5.1.2.3 Australian Codes and Standards

Envestra'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

5.1.3 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
- Number of new connections not completed by the agreed date
- Number of previously connected supply addresses reconnected
- Number of new network extension projects approved and the number and amount requiring customer contributions
- Number of planned and unplanned 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 20 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

5.1.4 Regulatory Audits

Regulatory audits of the SA Network are undertaken annually by staff from the Office of the Technical Regulator.

The last audit was carried out during the period April to July 2009. The auditors carried out a series of desktop and field audits of the SRMTMP and GMMP in areas that directly affect consumers and/or the safety, reliability, maintenance, metering and integrity of the distribution network. These audits covered 12 auditing sessions and included a review of:

1. Evidence of completion of outstanding corrective actions on all recommendations noted during the OTR's audit in 2007-08 and Envestra's conducted by Kellogg Brown & Root Pty Ltd (KBR)

2. APA's Terrorism Risk Management System – review as to how Envestra and APA evaluate and respond to potential security threats and counter-terrorism alerts that may impact on the critical gas distribution infrastructure, facilities, security of gas supply and personnel (Section 4.5.11 of SRMTMP)

3. The revised Leakage Management Plan (LMP) – review end to end practices from a gas leak report through to rectification and close out of job to ensure compliance with the revised LMP, procedures and response timeframes (Section 4.5.10 of SRMTMP)

4. The Odorising Management System – review effectiveness of odorisation processes and procedures at the gate stations and farm taps, including the implementation of the odorising sampling and analysis (Section 4.5.8 and Appendix 6 of SRMTMP)

5. Unaccounted for Gas (UAFG) – review the methodology for the calculation of UAFG and establish whether the methodology accurately and meaningful represents the amount of UAFG. Review and establish the technical, safety and commercial implications of UAFG to the Envestra gas distribution network, environment and the public. Review of procedures/means used to reduce UAFG and their effectiveness (Section 4.5.11 of GMMP)

6. Periodic Meter Changeover (PMC) – process review with a particular attention being given to the procedure in relation to notifying the occupants of the meter changeover and follow-up actions (Sections 2 and 4 of GMMP)

7. Gas supply disconnection and meter removal process – review, from start to finish, APA's practices/procedures for gas supply disconnection and meter removal to get assurance that public safety and the integrity of the network is maintained, including interactions with Retailers, Developers, Builders and Housing SA (Gas Distribution Code, Gas Metering Code and Sections 2 and 4 of GMMP)

8. Systems and procedures with respect to installations, operations, maintenance and emergency preparedness of the Envestra regional gas distribution networks in Whyalla and Port Pirie (Section 4.5 of SRMTMP)

9. Risk Management Reporting System – review processes/practices for capturing and reporting information on Key Performance Indicators (KPI's) (Sections 4.9.2 and 4.9.3 of SRMTMP and Proforma OP5 – Statistical Information of Gas Industry Guideline No.1)

10. Field processes for installation, joining, squeeze-off etc of polyethylene (PE) pipes – review of processes to ensure the long term integrity of the network (Sections 4.2, 4.3, 4.4 and 4.5 of SRMTMP)

11. Large project management process – review process for managing large projects including the progress status of network reinforcement project at River Road, Port Noarlunga (Section 4 of SRMTMP)

12. Supervisory Control and Data Acquisition (SCADA) and Telemetry Systems – review of SCADA/Telemetry systems and what information is collected, including a review of the competence of the operators and a review of the procedures which are used for interpretation of the field data and how the data is used (Sections 2.2.5 of SRMTMP and Sections 6,7 and 8 of GMMP)

The OTR audits found, in general, that the implementation of Envestra's SRMTMP and GMMP is meeting the minimum requirements prescribed by the Gas Act 1997, the Gas Regulations 1997, Envestra's Distribution Licence conditions, safety and technical standards, and industry codes.

The auditors' major concern during the 2009 audit was related to the fact that the UAFG level (currently approximately 2000 TJ) did not show a material decrease despite the Envestra ongoing mains (cast iron) replacement program, and suggested that Envestra strongly considers and develops an accelerated mains replacement strategy to reduce UAFG as soon as practicable.

Since the audit, analysis of KPI trends and assessment of other possible sources of UAFG has concluded that the CI & UPS networks are responsible for about 80% of UAFG with the escalating levels due to deterioration of these mains exceeding the current rate of replacement rates.

As a result a strategy for an accelerated mains replacement of the Cast Iron & Unprotected steel mains has been developed. This has been detailed in the Mains Replacement Strategic Plan with a summary included in Section 5.6 of this document.

5.2 Business Risk Management Plan

5.2.1 Overview

A “risk based” business approach ensures that key risks to the business are identified and adequately controlled, that use of resources is optimised. The business has been divided into a number of sites and activities to enable management plans to focus on the area the respective areas of functional control. Each site and activity has been assigned a person with overall responsibility for managing the risk-based process, and accountable for ensuring the effectiveness and ongoing improvement of the systems therein.

The Business Risk Management Plan (BRMP) is pivotal in the control of the business activity and provides the input to continuous improvement and optimisation processes. Performance measures which are assigned to key controls are continuously assessed to ensure that principal risks are managed to acceptable levels.

Supporting the BRMP is a business risk assessment, conducted in a collaborative approach by staff that are key to the relevant activity.

The business risk assessment process provides a framework to:

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

Each BRMP lists the existing controls that are used to manage the risks to an acceptable level and any actions to be taken to reduce the key risks to an acceptable level.

5.2.2 BRMP - Key Risks/Issues/Actions

The key risks for SA Networks have been determined by consolidating and reviewing the key risks identified in operational risk assessments.

5.3 Safety Plan

5.3.1 Overview

Under the Gas Act 1997, Envestra must produce a Safety Reliability, Maintenance & Technical Management Plan (Network Safety Plan) in line with Regulation 15B(2) of the Gas Regulations, which must be approved by ESCOSA on the recommendation of the OTR. The Safety Plan summarises the management system & procedures used for:

1. Reducing risk of injury to personnel or damage to property
2. The safe design, installation, commissioning, operation, maintenance and decommissioning of gas infrastructure.
3. Maintaining gas quality
4. Maintaining gas supply
5. Monitoring network performance
6. Ensuring adequate testing of new installations
7. Ensuring employees and contractors are competent
8. Reporting and investigating accidents and incidents
9. Regulatory compliance monitoring

The Network Safety Plan is part of an overall management system approach and is expected to follow a continuous improvement cycle of Plan/Act/Monitor/Review.

The objectives of the Network Safety Plan are to ensure that:

- A strong focus on safety and reliability is maintained in relation to the operation and management of the gas network in South Australia.
- Suitable safety management systems are in place and operating to ensure that the risks relating to the operation of the distribution system are effectively managed to keep risks as low as reasonably practicable (ALARP).
- All relevant information related to the safe and reliable operation of the gas network is communicated to those needing such information.

The plan has been developed with reference to Australian Standard AS4568-2005 “Preparation of a safety and operating plan for gas networks”. However, it has been tailored to suit internal processes and systems having regard to the requirements of Clause 15B of the Gas Regulations 1997.

5.3.2 Reviews

The Network Safety Plan is reviewed annually to verify that the objectives of the plan are being met and that the risks are being managed effectively. The outcome of the review process is to provide constructive feedback to facilitate improvement.

The annual review considers the following:

- Review of the key risks and controls
- Progress of key actions
- Performance of the KPIs
- Review of audit, inspection and incident reports
- Review of any risk assessments carried out during the year
- Review of the BRMP

A report on the review of the plan is submitted annually to the ESCOSA/OTR along with a copy of the revised plan.

In addition a formal risk assessment is completed at a frequency of no more than 5 years and the results of this are incorporated into a revised Network Safety Plan.

5.3.3 Risks/Issues/Actions

The key issues were identified by through an OTR audit. A summary of these findings are summarised in Section **Error! Reference source not found.**

5.4 Network Load Growth & Demand Forecast Plan

5.4.1 Overview

The purpose of this plan is to detail market issues, trends and influences along with forecast new connections and volumes for the various market sectors, marketing programmes and budgets.

Load growth forecasting is a critical input to network capacity modelling and provides the basis for determining where and how networks are augmented to meet future demand.

At the macro level, forecasts of demand for each of the regions in SA are developed using inputs from independent forecasters where appropriate.

The forecasts are normalised for weather to provide a macro view of gas consumption for specific networks. For network design and planning purposes the demand forecasts are augmented with location specific information sourced from Planning SA so that intra-network constraints can be identified and future capital expenditure allocations optimised.

Envestra has formulated its forecasts of natural gas demand for the South Australian regulated network using a forward looking methodology that takes into consideration projections of macroeconomic activity, microeconomic behaviour, government policy initiatives and trends in weather. The key drivers of natural gas demand in South Australia were identified, quantified and developed into forecasts of gas demand by tariff zone for the 2010/11 – 2015/16 period.

The National Institute of Economic & Industry Research, an independent economic forecasting consultancy, provided estimates of the macroeconomic parameters used in developing the forecasts.

The demand forecasts relate to the established distribution network allowing for the usual incremental expansions. The forecasts relating to any new townships are different in that they are discrete projects that will receive targeted business development activities in order to ensure projected customer connection and volumes are achieved.

The Load Growth & Demand Forecast Plan details the:

1. Forecasting methodology for Demand for Large Industrial Users (greater than 10 TJ per annum).
2. Process used in quantifying the warming trend in the weather and its impact on gas demand
3. Derivation of the demand forecasts for the Commercial segment.
4. Derivation of the forecasts of demand Domestic Users segment.
5. Forecasts of demand for the new townships to be reticulated in the next Access Period.
6. The projected gas demand and consumer numbers by segment and tariff zone.
7. Historical data for the 2005/6 – 2008/9 period.

5.5 Capacity Management Plan

5.5.1 Overview

The Capacity Management Plan is aimed at ensuring Envestra's SA Networks have the capacity to provide for forecasted marketing growth. It reviews risks of supply integrity and presents a programme for capacity development in line with forecast demand growth on the network.

The Plan is a rolling 5 -year plan that defines additional infrastructure or operating requirements that address:

1. Network Reinforcement – maintaining adequate capacity in the gas network to ensure existing and new consumers can continue to be supplied with gas.
2. Network Strategic Replacement – providing supply mains to facilitate network replacement.
3. Network Security of Supply – providing additional mains and or facilities to mitigate the risk of loss of supply.

The Plan documents:

- The design basis for maintaining capacity.
- The capacity performance and drivers for network augmentation.
- The scope, timing and budget estimates of augmentation projects required to cost effectively sustain network growth and maintain a safe and reliable supply of gas to consumers.

5.5.2 Risks/Issues/Actions

Supply risks and issues have been detailed in the Capacity Management Plan. A summary of the supply issues and augmentation proposals is provided in the following sections. Augmentation project timing has been summarised in Section **Error! Reference source not found.**.

5.6 Mains Replacement Plan (MRP)

5.6.1 Overview

The MRP details:

1. Mains replacement policy and objectives
2. KPIs , actual performance and assessment of CI & UPS mains integrity
3. The relationship/association with UAFG
4. Basis and Justification for mains replacement
5. Costs and schedule for replacement

It has long been recognised that the ageing Cast Iron & Unprotected Steel (CI & UPS) mains are overrepresented as a proportion of the maintenance activities associated with the distribution network with a focus over the last 10-15 years to minimise risk and operational cost by replacing these mains.

In summary it is proposed to replace the remaining 1450 km of CI & UPS mains over the next 8 years. Based on the average mains replacement rate over the last 5 years this brings forward the total replacement of CI & UPS by approximately 10 years.

The strategy for replacement focuses on:

1. The replacement of LP and MP mains on a safety basis. The key risk identified for mains is associated with the fracture of Cast Iron mains. Deterioration of mains results in a higher risk of fracture leading to increasing risk of fire/explosion in a property. This programme is expected to include mains that are identified as high risk including the Adelaide CBD.

2. The replacement of mains on the basis of maintaining asset integrity and performance that are based on:

   (a) Areas suffering low pressure at the customer's meter due to water ingress or other asset integrity issues.
   (b) Areas expected to have low pressure issues due change over of appliances by connected consumers.
   (c) Mains that are unable to be repaired (piecemeal replacement).

3. Replacement of mains on an economic basis. This is driven by rising operating costs and UAFG costs attributable to mains in poor condition.

   The annual cost of UAFG and maintenance associated with these mains is rising.

5.7 Gas Measurement Management Plan

5.7.1 Overview

The Gas Measurement Management Plan (GMMP) is required by the South Australian Gas Metering Code and compliance with this plan is required under Envestra's South Australian Distribution Licence. The plan contains an overview of the current systems and procedures as well as future practices to be developed to ensure that the measurement of gas complies with the requirements of the Gas Metering Code. The GMMP addresses the areas of:

1. Metering
2. Metering purchasing policy & accuracy verification
3. Meter changeover and replacement practice
4. Meter repair and re-verification policy and practice
5. Meter Maintenance practice
6. Gas measurement principles and practice
7. Calorimetry
8. Billing
9. Unaccounted for Gas
10. Training
11. Internal Auditing

The plan also summarises statistical information on the number of meter installations in South Australia by meter age, type and consumer category.

The plan reviews and summarises the activities carried out over the past 12 months and any proposed changes to practices and procedures going forward.

5.7.2 Reviews

The Gas Measurement Management Plan is reviewed annually and modified to:

- Update meter age and profile statistics
- Report any changes in company structure (relating to metering activities)
- Highlight any metering issues that may have occurred over the previous 12 months
- Propose changes and or modifications to future metering practices and process.

The plan is submitted to the OTR for approval.

5.7.3 Risks/Issues/Actions

Key issues and risks associated with the meter life cycle have been summarised in Section **Error! Reference source not found.** of this AMP.

5.8 Odorant Control & Maintenance Management Plan

5.8.1 Overview

The Odorising Management System document details

- Requirement for odorising
- Number and location of odorising facilities in SA
- Current odorising practice
- Operation and control of existing facilities
- Monitoring of odorant levels
- Training and Competence
- Emergency preparedness
- Non Conformance and corrective actions

The natural gas that feeds South Australia (SA) from the Moomba gas fields is not odorised. Regulations under the Gas Act 1997 require that the gas to be reticulated shall possess a pronounced and distinctive odour. This is achieved through the addition of an odorant at a rate sufficient to ensure the gas is not only detected, but is also recognised at a level less than 20% of the Lower Explosive Limit (L.E.L.) of the gas in air. This is the legal requirement established to protect the public and is consistent with best practices worldwide. Maintaining specified gas odorosity levels presents a key business risk for Envestra.

Odorisation of gas supplied to Envestra's South Australian networks is carried out by Envestra except for gas which is supplied from the SEAGas pipeline (approximately 50-60% of the Adelaide metropolitan gas usage) which is already odorised. Monitoring of network odorosity levels is Envestra's responsibility.

There are fourteen Envestra owned odorising sites. Seven are located at gate stations supplying Envestra networks and seven are located at 'Farm Tap' sites. The odoriser located at the Wasleys gate station also odorises gas supplied to Envestra's Mildura network in Victoria.

5.8.2 Risks/Issues/Actions

Key issues and risks associated with the meter life cycle have been summarised in Section **Error! Reference source not found.** of this AMP.

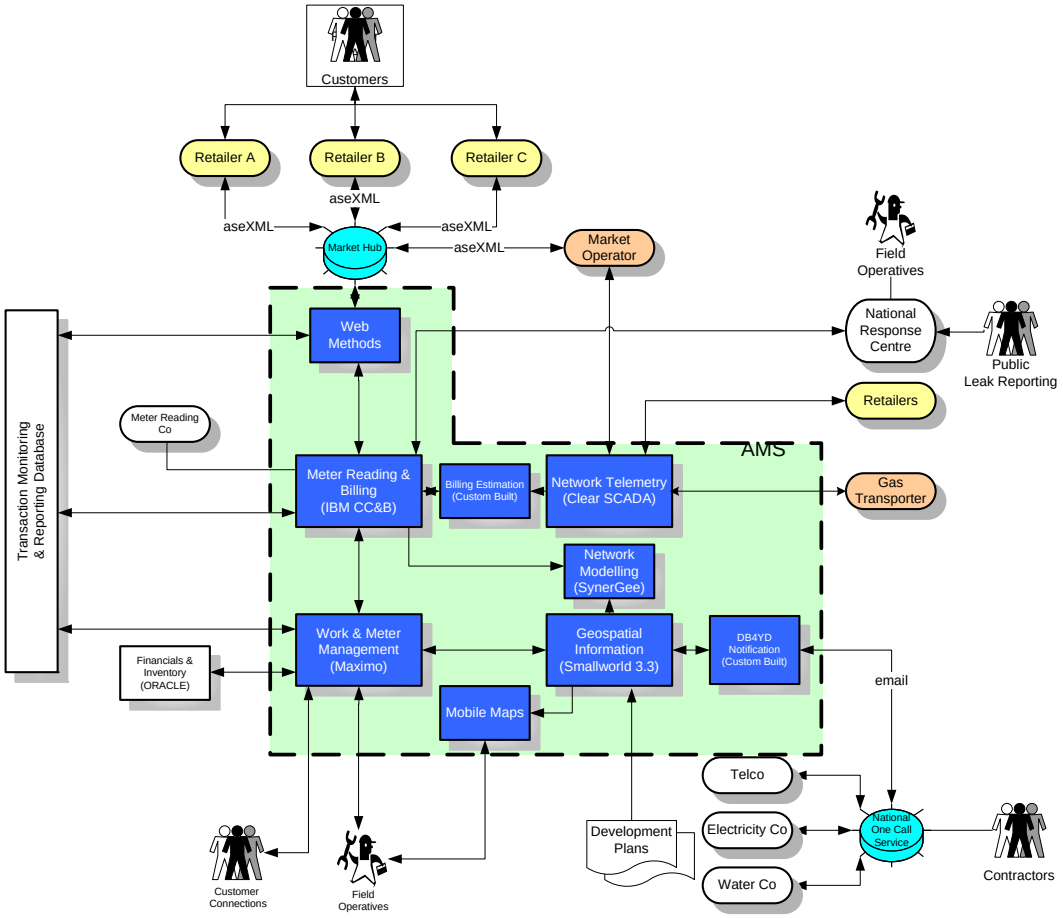
5.9 Asset Management Information System (AMS) Plan

5.9.1 Overview

Envestra uses a number of computer based systems and applications for:

1. Managing"B2B" market transactions
2. Issue and control of field work
3. Monitoring and recording gas deliveries to customer sites
4. Emergency response
5. Monitoring network condition
6. Analysing network capacity and
7. Recording the configuration and location of assets.

The following diagram provides a high level context picture of the AMS.



The AMS consists of the following core applications:

1. Web Methods
   - Send & Receive Service Order requests
   - Send & Receive Meter Fix
   - Send & Receive Customer Transfer requests
2. Meter Reading & Billing System – ORACLE Customer Care & Billing (CC&B)
   - Transaction Workflow
   - Meter Reading
   - Delivery Point Billing
3. Work Management System – IBM Maximo
   - Planning
   - Dispatching Work
   - Job Completion Details
   - Delivery Point Status Management
   - Preventative Maintenance
   - Contractor Payment
   - Meter Management
4. Geospatial Information System (GIS)- GE Smallworld
   - Map Base (Cadastre) Management
   - Delivery Point Lifecycle Management
   - Network Configuration/Connectivity Management
   - Emergency Response Management
   - Mains Extension & Replacement Planning
5. Mobile Maps – Tensing
   - Asset Location – Emergency Response
   - Asset Location – Customer Connection
6. Network Modelling System – Synergee
   - Capacity Strategic Planning
   - Customer Connection Assessment
   - Emergency Response
7. One Call System – Custom Built Application
   - Management of National Dial Before You Dig Enquiries
   - Asset Location Notification
8. Network Telemetry System
   - Pressure Monitoring
   - Interval Meter Monitoring & Reporting
   - Custody Transfer Monitoring & Reporting
9. Billing Estimation Module (Red Box)
   - Delivery Point Forward Estimate
   - Interval Consumer Management
   - Base Load & Temperature Sensitivity Factor (TSF) Calculation

SECTION 6 - ASSET LIFE CYCLE PLANS

6.1 Asset Lifecycle Management Overview

This section describes the key processes, procedures and controls associated with the lifecycle management of Envestra's network assets.

Generically the asset life cycle is defined as:

- Planning and Creation
- Operation and Maintenance
- Removal/Replacement

6.1.1 Planning & Creation Processes

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 typically are:

1 Year
Annual network OPEX and CAPEX budgets are developed by APA and approved by Envestra. These represent relatively firm requirements for the next year based on actual performance of the network, asset condition, asset age (meters) and forecast growth for the coming year.

5 Year
Strategic CAPEX & OPEX forecasts are prepared a 5 year period.
This 5-year plan is reviewed annually to maintain a rolling 5-year forecast for budgeting purposes.

10-20 Year
Cost benefit analysis of network extensions (domestic and I&C) and mains replacements are based on either 10 or 20 year forecast projections of connection, utilisation and maintenance expenditure.

The following controls assure quality (and prudence) in the planning and creation of assets:

1. Engineering Management Plan
2. Configuration/Change Management Manual
3. Project Management Manual
4. Asset policies, procedures, standards and specifications.
5. Standard Materials & Component Specifications
6. Testing, Inspection & Commissioning policies & procedures
7. Appropriately skilled and experienced personnel

6.1.1.1 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 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 Envestra, 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 Envestra approval.
6. Projects in excess of $1m require Envestra Board approval.
7. APA reports to Envestra monthly on progress against capital budget and progress for all capital projects approved. In addition to this, Envestra's internal auditors periodically audit the CAPEX approval process.

6.1.2 Operation and Maintenance

Envestra's approach to network operation and maintenance is detailed in the Safety Plan.

Operation and Maintenance involves three principal sub-processes:

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

6.1.3 Remove/Replace

The processes associated with assets that have reached the end of their technical or economic lives including 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' and current replacement cost. 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 assure quality in the process of removing/replacing assets:

1. All mains replacement work is approved by senior management as per defined approval limits.

2. Periodic Meter Changeover schedules are managed through the Works Management System (Maximo).

6.2 Transmission Mains Lifecycle Plan

6.2.1 Transmission Mains Overview

These mains are the principal supply to the low, medium and high distribution sub networks. They also can be the primary supply to major industrial consumers.

Under industry standards, pipelines with a Maximum Allowable Operating Pressure (MAOP) greater than 1050 kPa are designed, constructed and operated to AS 2885.

Transmission mains are constructed from steel with a protective external coating (polyethylene or tar epoxy) and protected from corrosion by cathodic protection systems (impressed current or galvanic anodes).

The following table summarises the age profile of Envestra's transmission mains.

Age	Km's	%
50-60	0	0%
40-50	28	15%
30-40	58	32%
20-30	58	32%
10-20	14	8%
0-10	24	13%
Total	182	100%

6.2.2 Asset Performance, Condition & Integrity

6.2.2.1 Transmission Mains Performance

Asset capacity performance is monitored on an annual basis with the transmission pipeline capacity reported in the annual DSPR. There are known capacity constraints at the southern extremity of the Adelaide network.

Details of transmission augmentation plans have been detailed in the Capacity Management Plan. A summary of this plan has been provided in Section 5.5

6.2.2.2 Transmission Mains Condition

The transmission mains are operated and maintained in accordance with the Safety Plan and the Technical Regulatory Compliance Plan as outlined in Section 5.1.2
The condition and integrity of the transmission pipeline assets are monitored by:

- Weekly Patrols
- 5 Yearly MAOP Review as per requirements of AS 2885.1, AS2885.3 Section 8 and Appendix D.
- 5 Yearly DCVG Coating Surveys
- Approved Engineering Investigation at the end of the pipeline design life (21 years) as per AS2998.3 clause 8.5
- 5 Yearly Safety Management Studies (formerly Risk Assessments) as per requirements of AS2885.3

6.2.3 Growth

The transmission pipeline growth is driven by capacity constraints at the extremities of the network.

A 2 km extension of the transmission pipeline in River Rd, Port Noarlunga was commissioned in 2009 with a further 2 km extension planned for completion in 2010. Details of this network augmentation have been included in the Capacity Management Plan a summary of which has been included in Section **Error! Reference source not found.**

6.2.4 Operation & Maintenance

The three most significant threats which affect the useful life of mains and require ongoing operational management are external corrosion, Floods/Subsidence and third party damage.

The maintenance strategy for Transmission pipelines is driven by the critical nature, both in terms of gas supply and potential for catastrophic failure, particularly where pipelines are located in or near busy roads and/or through built up areas

6.2.5 Replacement/Upgrade/Abandonment

Due to the high standards applied during the design, construction and operation of TP pipelines and the expected life of those assets, replacement of those assets is not expected for many years. However from time to time, major works by statutory authorities, e.g. highway or rail projects, may necessitate the relocation of the asset.

Detailed Approved Engineering Investigations (AEIs) are conducted before the expiry of the design life of transmission mains. Licensed pipelines also undergo an AS2885 formal risk assessment every 5 years. These investigations are used as the basis for assessing whether the pipeline continues to be fit-for-purpose for the next operating period. Any corrective actions specified in these investigations are undertaken to mitigate risk.

6.3 Transmission Facilities Lifecycle Plan

6.3.1 Overview

Facilities associated with Transmission Pipelines are typically gate stations or custody transfer stations. These sites typically comprise:

1. Filtering equipment,
2. Regulation equipment,
3. Metering equipment,
4. Valves,
5. Telemetry equipment
6. Odorising equipment.

These sites are owned and operated by the upstream companies (i.e. Epic Energy or SEAgas) and it is their responsibility to maintain all the equipment. The exception is the odorising equipment which belongs to Envestra which is operated and maintained by APA.

Envestra is responsible for odorising the gas carried through its networks as part of its haulage service. The objective of this is to provide a distinctive odour to the natural gas that is recognisable at well below hazardous concentrations of natural gas in air.

6.3.2 Asset Performance, Condition & Integrity

Odorisation is provided by NJEX and LEWA type odorising plants. NJEX equipment has proved to be inferior and they need more frequent repair and maintenance. The spare parts these units are also more expensive. The predominant problem with these odorisers is the unreliability of the pneumatic pumps and the subsequent cost of their repair. Also the operator training requirements are more involved, time consuming and costly.

LEWA plant is simple and easy to maintain and the training requirements for repair and maintenance are less stringent compared to the NJEX plant.

6.3.3 Growth

There are no new major facilities planned over the next 5 years.

6.3.4 Operation & Maintenance

The main metropolitan units are checked monthly.

6.3.5 Replacement/Upgrade/Abandonment

There are no plans for major replacement of odorant facilities. A review of injection pumps is planned with a view of reducing maintenance and rationalising spares.

6.4 Distribution Mains & Services Life Cycle Plan

6.4.1 Overview

The following tables summarise the inventory of all distribution mains within Envestra's Adelaide metropolitan distribution and Regional networks as of 30 June 2009.

Adelaide Metro - Distribution Mains - km						
Network	Poly	Steel	CI	UPS	Total	CI & UPS %
LP	544	54	1,276	105	1,980	70%
MP	1,656	386	81	17	2,140	5%
HP	1,651	1,089	0	0	2,740	0%
TOTAL	3,851	1,530	1,357	122	6,860	22%

SA Regional - Distribution Mains - km						
Network	Poly	Steel	CI	UPS	Total	CI & UPs %
LP	18.4	1.7	3.7	13.9	37.7	2%
MP	132.5	103.5	0.0	18.9	254.9	2%
HP	434.7	91.5	0.0	0.0	526.2	0%
TOTAL	585.6	196.7	3.7	32.8	818.8	4%

Details of when individual mains segment were laid have not been kept and as such an accurate age profile is not available.

An indicative age of CI and UPS within the network has been derived from an initial age profile provided by GHD in 1997 as part of the original Envestra Prospectus. Based on this profile the age of CI is estimated to be between 50 & 71 years and UPS between 48 & 62 years.

6.4.2 Asset Performance, Condition & Integrity

Details of asset condition/integrity are provided in the annual Distribution System Performance Review (DSPR).

Key measurements relating to network integrity are:

1. Mains & Service leaks
2. Survey reported Mains & Service leaks
3. Partial and full breaks associated with CI mains in high risk locations.
4. UAFG.
5. Capacity issues in the network

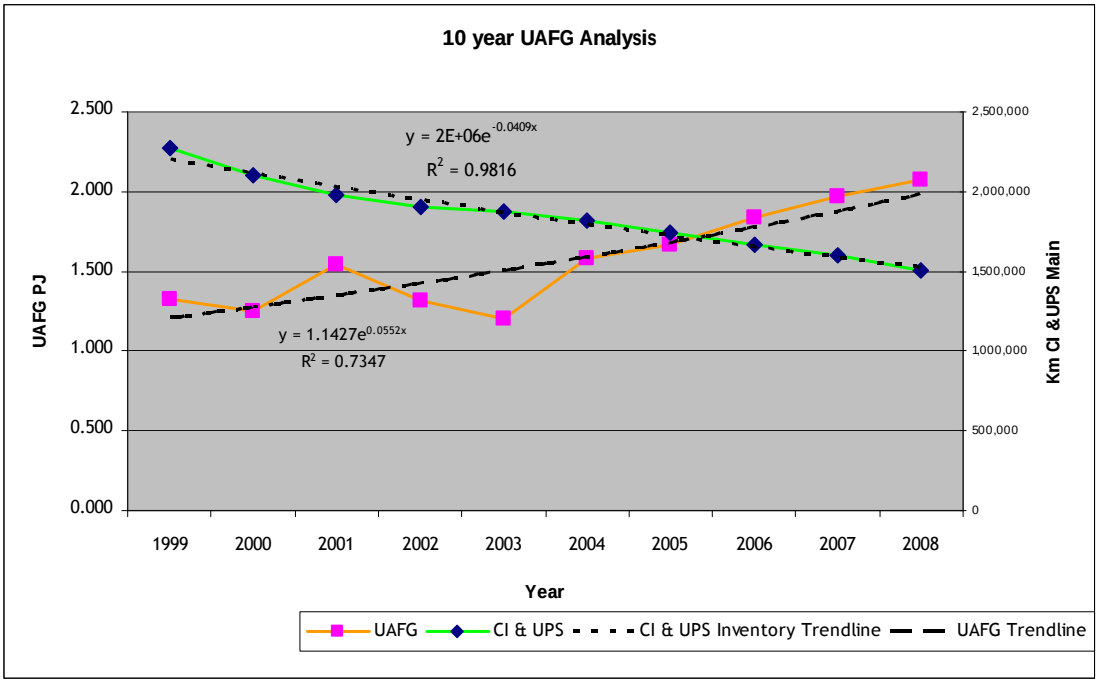
Analysis of historic measures and trends are included in the Mains Replacement Plan. The conclusion from these KPIs is that:

1. About 80% of UAFG is associated with leaks from CI & UPS
2. The increasing trend in UAFG (5% year on year increase) is due to deterioration of the CI & UPS Network.
3. Approximately 520 km of the LP CI Network has insufficient pressure during peak periods to maintain adequate supply pressures to the consumer's appliances.
4. There are a number of risk areas (principally the Adelaide CBD) where the cracking of CI mains as result or corrosion and soil movement could result in a risk to the community and or maintenance personnel.

These conclusions are driving the proposed accelerated replacement of these mains as detailed in the Mains Replacement Plan.

6.4.2.1 UAFG

The following graph summarises the trend in UAFG over the last 10 years and the reduction in CI and UPS over the same time period.



UAFG has been increasing approximately 5% on a year on year basis over the last 10 years.

Over this period there has been 4 % year on year reduction in the amount of CI & UPS mains within the network.

Based on the above observations, the net underlying deterioration rate of the network is considered to be 9%.

6.4.2.2 Supply Integrity Issues

Details of capacity performance and network augmentation requirements are provided in the Capacity Management Plan. A summary of issues has been included in Section 5.5

6.4.3 Operation & Maintenance

Networks are operated within defined pressure operating limits aligned to the safe and reliable delivery of gas while not exceeding the maximum allowable operating pressure.

Pressures are controlled by manually set pressure regulating devices. There are no remote control facilities.

The Leak Management Plan (LMP) outlines the process for managing gas leaks from the gas networks managed by APA Services Pty Ltd (APA Networks). The process ensures that leaks from the gas network are identified, responded to and classified in a consistent manner, and that the process is monitored effectively by the business, in order to ensure that:

- Risk to the public is managed to a level as low as reasonably practicable.
- Regulatory and Australia Standard requirements, as well as internal requirements are understood and implemented.
- The life of the network asset is managed effectively through timely leak repair and periodic survey.

The Leakage Management Plan (LMP) outlines the frequency and scope of work to be carried out of the following assets:

- High pressure mains and services
- Medium and low pressure mains and services
- Gate stations
- Sub gate stations
- Pressure reducing stations
- Meter Stations

Leakage Surveys are carried out to ensure that the gas assets operated and maintained by SA Networks are constantly monitored within frequencies that are acceptable to legislative requirements to identify gas leakage so that it might be managed before it presents a serious hazard to people and property.

Leak Management includes all the following criteria when carrying out data analysis and determination of suitable action plans:

- safety of the general public, employees and protection of property and the environment
- asset type and age

- location and operating environment
- importance of function
- manufacturers recommendations
- asset history
- industry experience
- local knowledge
- current UAFG strategies

Reassessment of survey frequencies is carried out annually and a program set for 12 months along with a general update of the anticipated 5-year plan.

A Dial Before You Dig (DBYD) service is maintained to mitigate the risk of 3rd party damage. This service continues to be promoted and over the last few years its use has been increasing. Annual growth in the number of calls is expected to grow by at least about 11 %. The following table summarises the historic and forecast volumes. Forecast volumes are based observed historic increase in enquiries received.

	Actual				Forecast						
	FY 05/06	FY 06/07	FY 07/08	FY 08/09	FY 09/10	FY 10/11	FY 11/12	FY 12/13	FY 13/14	FY 14/15	FY 15/16
Total Number of Calls	-	19202	19416	21386	25550	28400	31500	35,000	38,800	43,000	47,800
Response within 48 hrs - % (Target > 90%)	-	-	>90%	>95%							

Response times are improving with automation of the process.

6.4.4 Replacement/Upgrade/Disposal

6.4.4.1 Mains & Services Replacement Process

Details of the mains replacement process are included in the SA Mains Replacement Strategic Plan.

Replacement programmes include:

1. Replacement of single mains lengths and associated services (like-for-like or with pressure upgrade).
2. Replacement or relocation of mains in conjunction with council or other authorities' works programs.
3. Planned Block renewal mains and associated services (reduced diameter and pressure upgraded).

The replacement of distribution mains is usually conducted to the high-pressure standard utilising mains and service insertion technique and upgrading to HP wherever possible. This approach:

1. Minimises renewal costs and disruption to the community by using mains and service insertion techniques wherever possible.
2. Eliminates the recurring problem of water ingress into the low-pressure network.
3. Provides additional capacity to address high instantaneous gas load appliances being installed in established areas.

6.4.4.2 Planned Mains Renewal

As discussed in Section 6.4.2 the 65 km/yr average over the last 6 years has been insufficient to maintain the integrity of the network. To ensure network integrity is maintained it is proposed to replace the remaining CI & UPS mains. This has been

detailed in the SA Mains Replacement Strategic Plan. A summary of volumes and schedule are provided in Section **Error! Reference source not found.**.

6.4.4.3 Piecemeal Renewals

Mains renewals are performed on a "reactive" piecemeal basis as a means of overcoming leakage problems or localised cases of water ingress into mains.

Subject to the condition of the existing mains, it is sometimes found that conventional repairs are either not possible or are economically not feasible due to there being multiple leaks in a localised area or the main being so corroded that future leaks are inevitable. In these cases piecemeal mains renewal is adopted with short sections of mains being replaced. Piecemeal mains renewals are typically in the order of 100 metres or less in length. This short length combined with the fact that direct burial, rather than insertion, is often required results in a higher unit cost relative to planned "block" renewals, which are normally carried out using insertion techniques.

6.4.4.4 Inlet Service Renewals

There are cases where inlet services need to be renewed on a stand-alone basis (unrelated to mains renewal works). The need for such inlet service renewals arise when leaks or damages occur on the inlet service and inspection reveals that the service is heavily corroded or in such poor condition that repairs are not viable. In such cases, the service is replaced.

Based on historical trends it is estimated that approximately 400 inlet service renewals will be required over the next 3 years reducing to about 200 during the subsequent 3 years to the impact of the proposed planned mains replacement programme.

6.4.5 Risks/Issues/Actions

The principle issues and risks with the distribution network are the increasing UAFG and deteriorating condition and integrity of the CI & UPS mains, principally in the LP network. In addition, the increasing use of high demand appliances and urban consolidation has reduced the capacity in sections of the LP network to below what is considered required to maintain a reliable supply to consumers. These have been detailed in the Mains Replacement Strategic Plan and the Capacity Management Plan. A summary of these Plans is included in Sections 5.5 and 5.6 of this AMP.

6.5 Distribution Facilities Lifecycle Plan

6.5.1 Overview

The distribution facilities comprise of pressure regulating installations, network isolation valves and cathodic protection (CP) facilities.

6.5.1.1 Pressure Regulating Installations

Pressure Regulating Installations regulate the delivery of gas into the HP, MP, LP distribution networks. Pressure regulating installations are designed to ensure the maximum allowable operating pressure of the downstream network is not exceeded.
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 configuration designs are used within Envestra's network but typically these tend to be single stream active-monitor arrangements.

6.5.1.2 Network Isolation Valves

6.5.1.3 Approximately 9,400 mainline and branch isolation valves are installed throughout Envestra's networks. These provide emergency isolation and control during normal operation, maintenance and emergency response situations. 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 five impressed current Cathodic Protection (CP) Units consisting of a Transformer Rectifier (TR) and Ground Bed.

There are two types of material used in the sacrificial anode systems. There are approximately 2000 magnesium anodes and 200 zinc anodes.

6.5.2 Asset Performance, Condition & Integrity

The Distribution System facilities are generally in good condition. The condition of a number isolation valves located in underground vaults has deteriorated to the extent that a programme of in situ grit blasting and painting is required to ensure the life of these assets is maximised. Similarly the condition of number of brick regulator vaults has deteriorated to the extent that water ingress is corroding the below ground pipes, valves and regulators. A programme of regulator and valve refurbishment is proposed over the next 5 years as detailed in Projects SA00035 and SA00036.

6.5.3 Growth

Various augmentation projects over the next 5 years are expected to add 2 x TP – HP and 1 x HP-MP regulators to the distribution system. Refer to Projects SA00032 & SA00035.

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.

6.5.4 Operation & Maintenance

6.5.4.1 Operation

A process of changing MP and LP network regulator set pressures to winter and summer settings as well as providing intra-day variation of regulator set pressures by "manual"

clock control is used to minimise the average system operating pressure. The driver for this is to minimise UAFG from "old" cast iron networks that are prone to leaking.

A SCADA system is used to provide surveillance of network pressures with High/Low alarms paged out to standby resources for immediate action.

Additional pressure surveillance is provided through fixed and mobile chart recorders. Network pressure data collected from these is reviewed and analysed to diagnose pressure control equipment faults and network capacity problems.

An annual winter pressure survey is undertaken to pinpoint and or confirm pressure supply problems.

A Network Surveillance & Control Strategic Plan has been developed covering the extension of Envestra's SCADA system for improved network pressure surveillance and control of critical regulators and valves within the SA network.

Envestra's pressure surveillance system has grown "organically" over the years and consists of a mixture of telemeter sites connected to the SCADA system and standalone fixed and mobile chart recorders. The number and location of monitored sites, reliability, accuracy and immediacy of information from some of the sites has been a problem for several years. Further, the system does not provide any control functionality for remote operation of regulators or critical valves.

Network surveillance with SCADA equipment is standard practice within the gas distribution industry. In comparison with other utilities, Envestra's SA network has a low level of SCADA capability.

A strategy based on mitigating network operational risk has been developed that focuses on providing a core pressure surveillance system overlaid with control functionality of critical supply regulators and main line valves. This approach is consistent with practices adopted in other utilities in Australia and throughout the world. Refer to Project SA 00053.

6.5.4.2 Pressure Regulator Installations Maintenance

Scheduled maintenance of pressure regulating installations (PRI's) is carried out in accordance with the requirements set out in the APA Transmission and Pipelines Manual Section on "Operations and Maintenance Schedule" for the frequency listing of all maintenance activities and the Section on "Scheduled Maintenance" which details what must be done for each activity.

6.5.4.3 Valve Maintenance

The maintenance of valve installations in the Adelaide Distribution Network comprises:

1. Yearly inspection and maintenance of transmission 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.

6.5.4.4 Cathodic Protection Systems O&M

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 specific points on the transmission pipelines and networks are monitored continuously via the SCADA system.

The monitoring of CP units commences after commissioning and, as there are few moving parts, maintenance is relatively minor. Small items, such as fuses, are replaced from vehicle stocks during monitoring surveys. The main threats to the integrity of

impressed current CP systems are third party damages, contact with other structures (touches) and electrical surges.

6.5.5 Repair/Replacement

Pressure regulating installations (PRIs) have the capability of lasting indefinitely provided:

1. The PRI design remains suitable for current loads.
2. The external surfaces of components are adequately painted to provide protection from corrosion.
3. The elements remain supported with spare parts availability.

Where replacement occurs, this would be due to changed capacity conditions of an installation arising from changes in supply pressure or a significant increase or decrease in output requirements

6.6 Metering Facilities Life Cycle Plan

6.6.1 Overview

There are predominantly 3 main types of meters used in the SA Network:

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

The Gas Metering Code stipulates that the minimum standard of accuracy of metering installations must be within a margin of accuracy of plus or minus 2 percent of the volume of gas delivered at that site.

All meters are tested prior to installation to ensure they comply with this accuracy requirement.

Metering installations containing pressure regulators are provided to ensure sufficient flow at the minimum regulator inlet pressure and ensure delivery pressure requirements are met. Pressure regulators for domestic customers shall have set delivery pressures of 1.4 kPa or 2.75 kPa.

Domestic consumers account for approximately 20% of all natural gas delivered in the network.

6.6.2 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 depending on the type of installation, and painting.

Other O&M activities centre on minimising the risks of interference and 3rd party damage by:

1. Securing metering equipment inside locked enclosures where necessary, particularly for I&C installations.
2. Housing domestic meters in meter boxes or meter covers.

The maintenance frequency of metering installations depends on the type of equipment at the site and the operating pressure of the installation and can be summarised as follows:

6.6.2.1 Low Pressure Installations

Low pressure sites are sites that operate at less than 3kPa. These sites all have smaller diaphragm meters and no routine maintenance is carried out unless the consumer, retailer or APA personnel report a problem.

6.6.2.2 Elevated Pressure Installations with Remote Telemetry and Correcting Instruments

The sites are also visited on a 6 monthly basis to:

- check the pressure and temperature transducers for accuracy
- compare the uncorrected flow on the meter index with the uncorrected flow from the correcting instrument
- check the isolation valve, check meter site for leaks and ensure that all signage is appropriate

Note that sites are visited 3-monthly where the meter requires oil top up or where a mechanical drive arms exist.

6.6.2.3 Elevated Pressure Installations with Correcting Instruments and No Remote Telemetry

These installations are visited on a 6 monthly basis to:

- check the pressure and temperature transducers for accuracy
- compare uncorrected flow on the meter index with uncorrected flow from instrument
- manually check correction factor calculation
- check the isolation valve, check meter set for leaks and ensure that all signage is appropriate

Note that sites are visited 3 monthly where the meter requires oil top up or where a mechanical drive arms exist.

6.6.2.4 Elevated Pressure Installations with No Correcting Instruments and No Remote Telemetry

These installations are visited either annually if they have a pressure relief valve or 3-yearly if they do not. The 3 yearly visits consists of checking the site and meter integrity, checking the set pressure on the regulator, checking the isolation valve, checking meter site for leaks and ensuring that all signage is appropriate. The meter set is also painted if required.

6.6.3 Renewal/Upgrade/Disposal

All meters in South Australia are deemed to have a 10 year life unless otherwise approved by the technical regulator (the only families of meters that have been approved different life spans to date are the Email 602 meters and the Parkinson Cowan U6 meters. These have been approved 15 year lives.

Each year Envestra undertakes a meter change-over program to replace meters that have reached their approved life span.

6.7 Network Control & Monitoring Life Cycle Plan

6.7.1 Overview

A SCADA system is used for monitoring and reporting consumption for approximately 190 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 65 sites enable remote monitoring of system pressures

The system functionality includes:

- Collection of raw data.
- Transmission of data to a central data storage system.
- Calculation and verification.
- Reporting to the market operator (REMCo) and Retailers

A purpose built database incorporating ClearSCADA software, remote terminal units (RTU's) and a communications network using telephone (GSM, GPRS, PSTN) and radio communications are used to collect, transmit, store and process hourly and daily consumption data.

The RTU and communications equipment is powered from the local electricity distribution grid although some locations are solar powered or powered by internal batteries.

The SCADA system is also used to monitor key network pressure and equipment status with alarms paged to operations personnel.

Network pressures are monitored at various locations within the networks with data communicated back to a central base station by radio or through the telephone network.

6.7.2 Asset Performance, Condition & Integrity

Equipment at all the sites has been installed new and/or upgraded within the last six years.

6.7.3 Growth

In the last 3 years, about 15 new pressure surveillance sites a year have been added. At this stage, it is planned to add 10 new sites next financial year and replace 3 existing sites.

6.7.4 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

6.7.5 Replacement

Generally, SCADA facilities are replaced as result of technical obsolescence. The facilities have a technical life of about 10 years. Over the last 5 years the move to standard communication protocols (GSM/GPRS) has driven changes to field devices using telecommunications.