ENVESTRA QUEENSLAND NETWORKS ASSET MANAGEMENT PLAN

Version 1.0
(Public Version)

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PREFACE

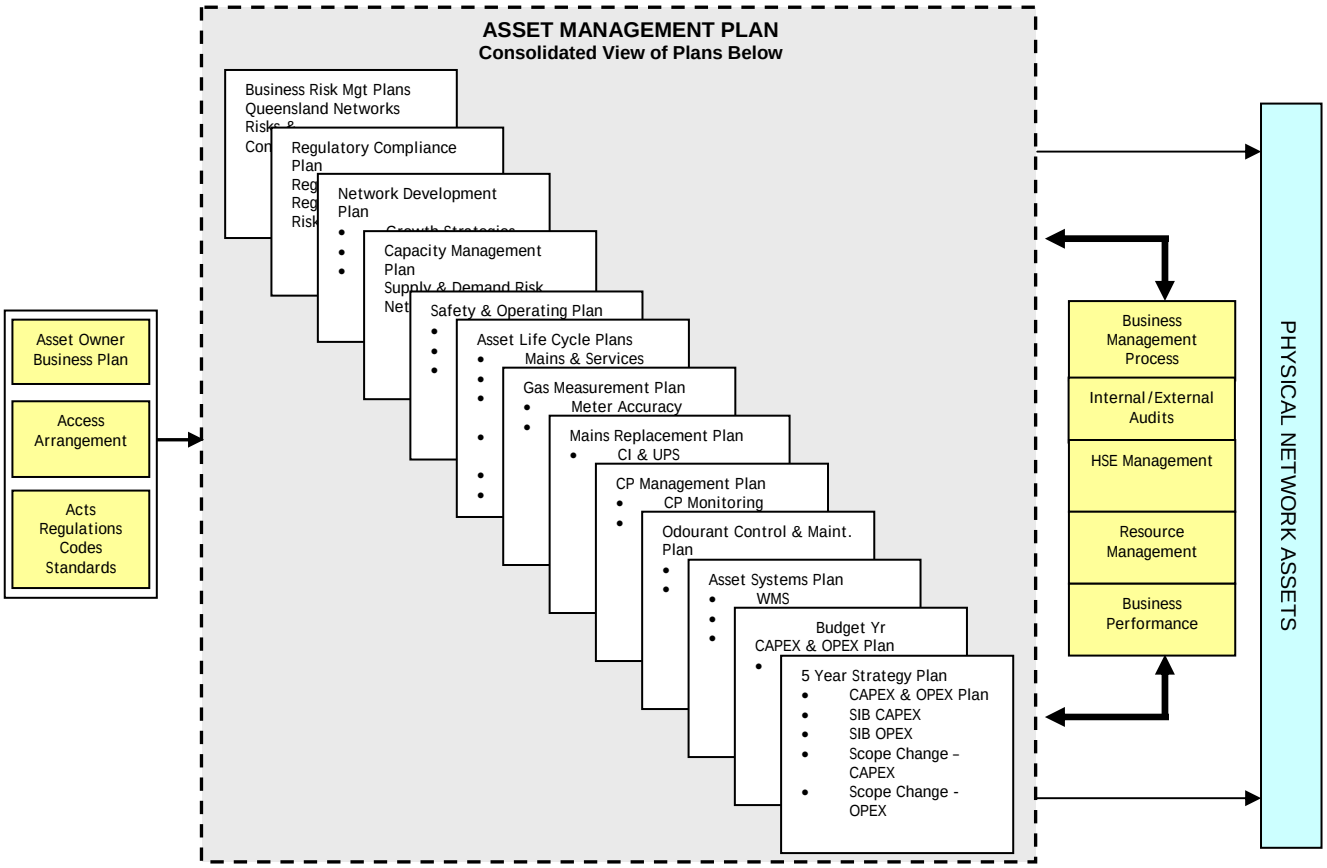
This Asset Management Plan (AMP) provides a consolidated view of a number of technical and operational plans and how these are used to drive asset management strategies and expenditure to ensure safe, reliable and sustainable supply of gas in line with:

- 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 Strategic Plan
6. Gas Measurement Scheme Ver3
7. Queensland Odorising Manual

Key issues and actions from these plans have been summarised and detailed 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.

Section 8 – Project Proposals

Detailed project proposals/business cases associated with SIB Capex & Opex.

SECTION 1 – EXECUTIVE SUMMARY

1.1 Asset Performance, Condition & Integrity

The condition and integrity of the remaining CI & UPS mains remains a material issue within the Queensland Networks. These assets are at the end of their useful lives with escalating repairs and leakage forecast.

The mains replacement programme will continue with the aim of replacing the remainder of the 351 km of cast iron and unprotected steel mains over a 6 year period.

Growth within older LP networks is becoming difficult to sustain with demand from high demand appliances and increasing customer densities creating capacity issues affecting existing consumers and new customers as result of insufficient mains pressure. While no major outages have 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.

1.2 Network Growth & Development

A stronger emphasis on marketing of natural gas and the Queensland Government's "Climate Smart 2050" initiative is expected to increase customer connections to existing households from 2011/12. An estimated additional 24,000 connections are expected over the 5-year period ending 2015/16.

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 domestic consumption is compounded by the use of higher instantaneous flow appliances (space heating and instantaneous gas HWS) causing additional peak demand, particularly in low pressure networks necessitating on going network augmentation.

1.3 Operational Risks

A number of projects are planned over the next 6 years to address operational risks. The key projects are associated with:

1. Replacement of sleeve railway crossings
2. Regulator change out
3. CBD metering station venting
4. Upgrading the Asset Information Systems Hardware & Software
5. Replacement of heavy lids on district regulators
6. Refurbishment of corroded I&C meter assemblies
7. Expansion 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 Queensland.

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. Gate Stations
4. Pressure Regulating & Valve Installations
5. Consumer Metering Installations
6. Odorant Facilities
7. 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.

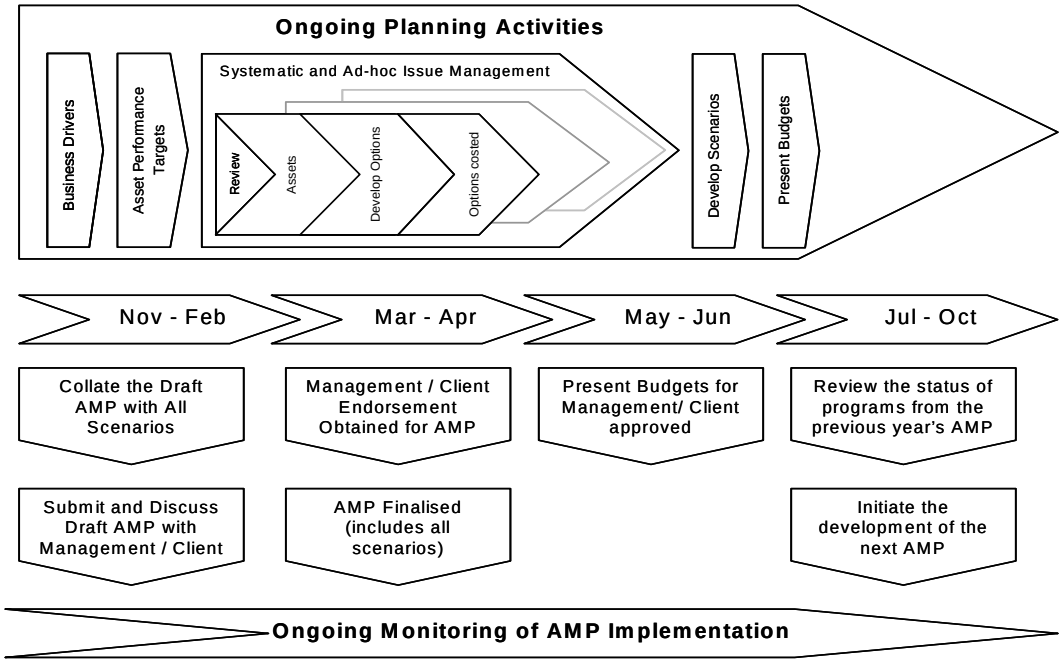
2.3 Plan Development & Planning Cycle

The development of 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.

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 nominal 5-year planning horizon.



Asset Management Plan development and Planning Activities cycle. Time-line based on standard July – June Financial Year, it can be adjusted to contract requirements.

2.4 Envestra APA Relationship

Envestra is the holder of the Area Distribution Authority and Pipeline Licence issued by the Queensland Department of Mines & Energy for all Envestra natural gas assets in Queensland. Envestra has contracted APT Operation & Maintenance Services (APA) to operate and maintain its gas infrastructure assets, including extension projects that provide natural gas to new areas. The contractual arrangement between Envestra and APA is set out in an Operating and Maintenance Agreement, whereby 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
• Australian Energy Regulator	Economic regulator of the assets
• Retailers and Consumers	Users of the services provided by the assets
• Department of Mines & Energy (DME) Gas Inspectorate	Regulator of all gas asset infrastructures in Qld

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

Envestra - as owners 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.

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.

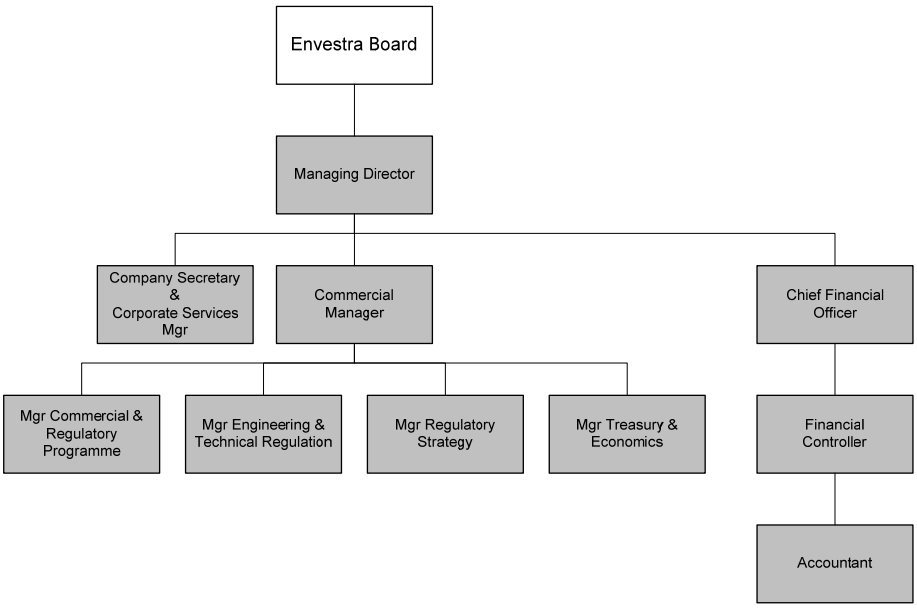
Retailers and Consumers – require that a safe, secure and reliable supply of gas can be provided at a reasonable cost, and a high level of service is delivered in response to gas supply problems and associated issues.

Queensland Department of Mines and Energy (DME) – are responsible for licensing for gas distribution as legislated under the Gas Supply Act 2003, and require that all pipeline activities are licensed and all pipeline and gas distribution systems comply with relevant Acts, Regulations and Codes.

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.



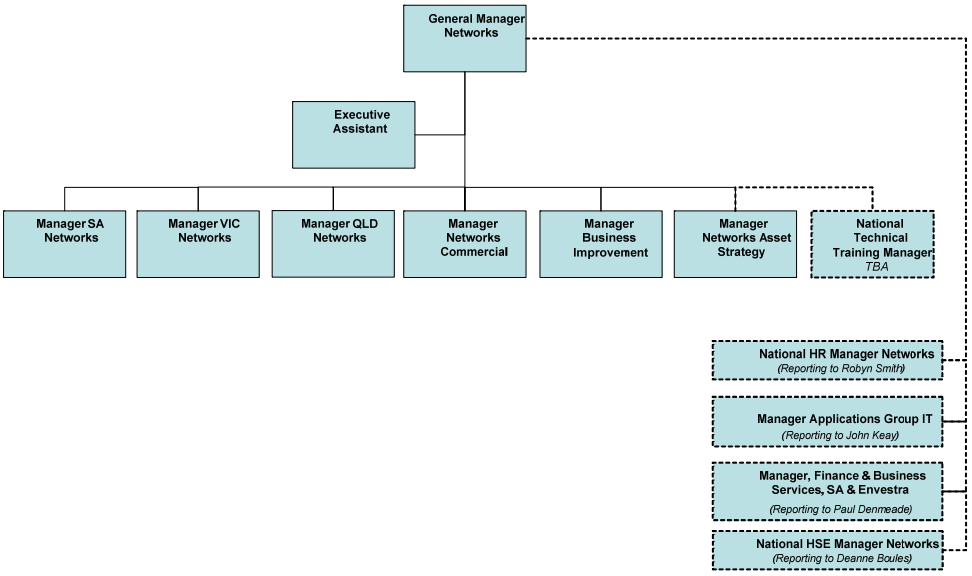
Envestra has an Operating and Management Agreement with APA to operate and manage its gas transmission and distribution assets.

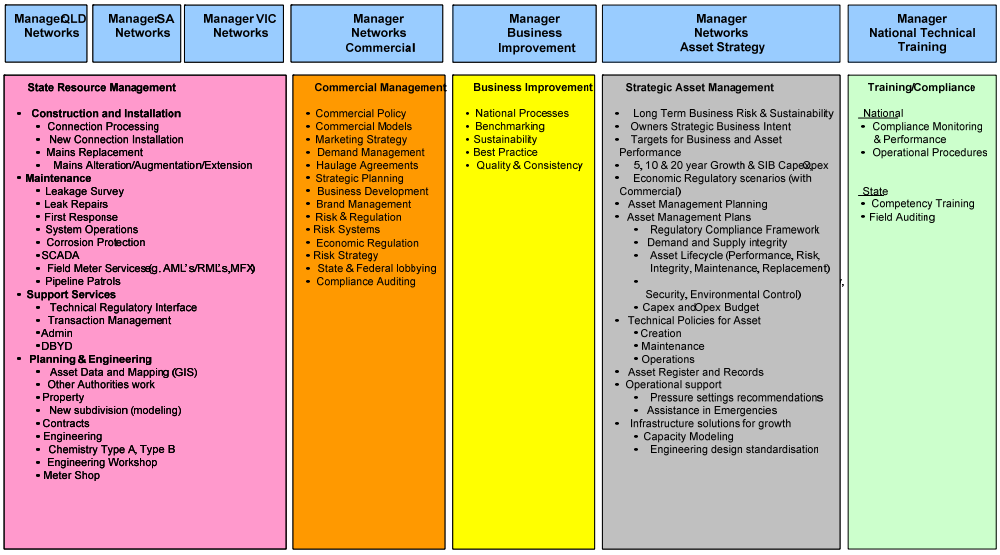
The key APA Services obligations under this agreement are:

1. Managing the haulage of gas through each network;
2. Operating and maintaining each network;
3. Planning, designing and constructing network extensions;
4. Assisting Envestra with submissions to regulators;
5. Promoting natural gas as a fuel;
6. Preparing and settling with Envestra the budget for each financial year;
7. Providing Envestra with regular information on financial and other management issues; and
8. Reading meters and billing retailers

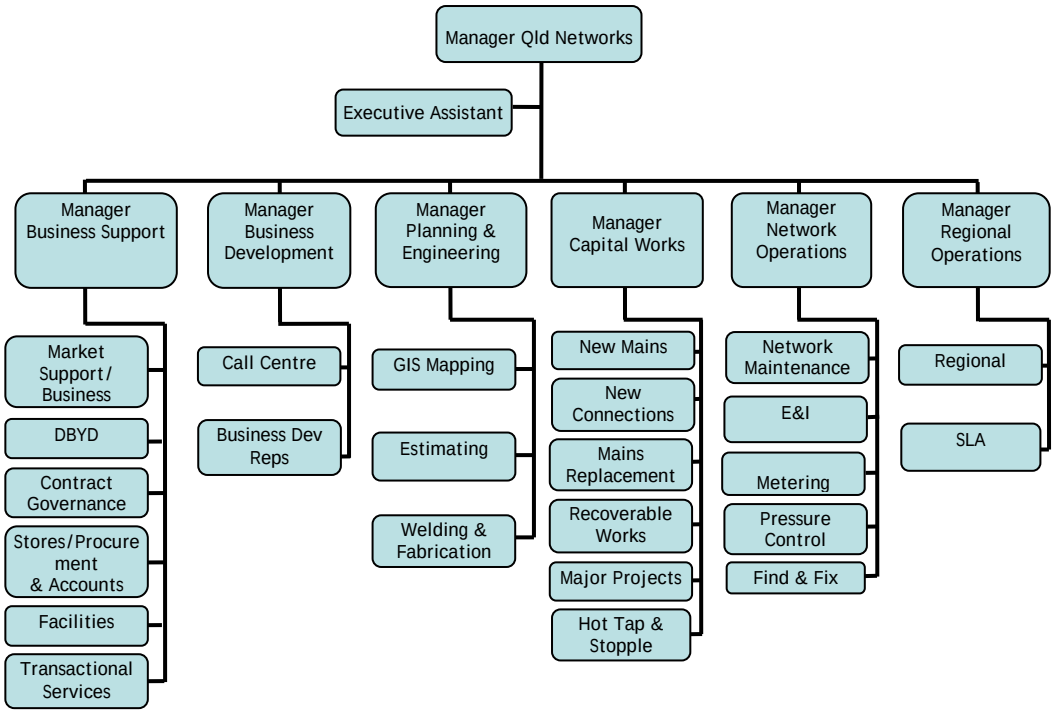
2.6.2 APA Management

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





Queensland Networks – Key Personnel and Areas of Responsibility



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 License
3. Environmental - To maintain and operate assets so that the risks to the environment are kept at 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

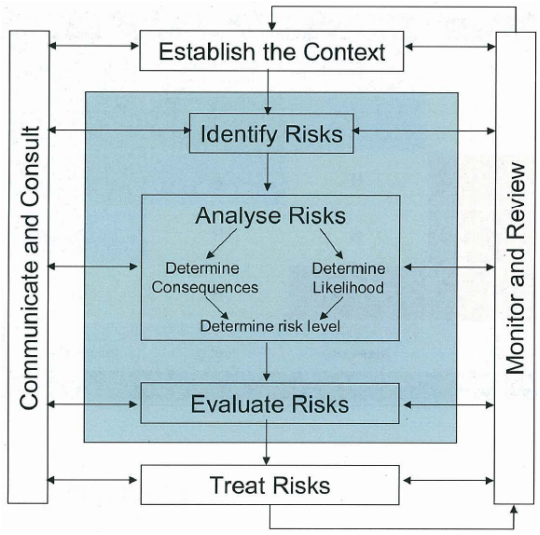
Envestra has adopted a formalised and systematic approach to risk management.

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. AS 4645.1:2008 Gas Distribution Networks – Network Management
5. AS 4645.2:2008 Gas Distribution Networks – Steel Pipe Systems
6. AS 4645.3:2008 Gas Distribution Networks – Plastic Pipe Systems

The risk management process is summarised in the following diagram:



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.
- **Quality Assurance audits** – Conducted by SAI Global as a means of ensuring corporate governance and associated QA is managed in accordance with Corporate Policy and ISO 9001 requirements in order to maintain their Quality Assurance status.

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 nationally scheduled 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 through formal methods.
- **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 on a July – June cycle is filed with the Queensland Department of Mines and Energy Gas Inspectorate as required by the Petroleum and Gas (Production and Safety) Act 2004.

2.9.3 Measuring Network Reliability

The reliability of the 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 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 Queensland which allows network customers to raise complaints in relation to network related service levels or procedures to an independent authority for follow up.

Envestra has a complaints procedure that outlines the process for handling network-related customer complaints in a courteous, timely and effective manner. The Procedure 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 & KPI's

The asset KPI's detailed in Section **Error! Reference source not found.** are the primary measures of asset performance. For each asset group, specific data is collected and KPI's 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 (BRMPs) 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 BRMPs 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 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.

About 5,000 new connections have been made to Envestra's Queensland networks in the past two years giving rise to additional network mains, services and new meters. On going marketing of natural gas is aimed at maintaining the existing customer base as well as growing the use of gas.

The Queensland Government initiative of the Sustainable Housing Code, which effectively bans the use of electric storage hot water systems for new homes, has positively impacted on the number of new connections. Greater impact is now expected from the Queensland Government's "Climate Smart 2050" Initiative.

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 domestic consumption is compounded by the use of higher instantaneous flow appliances (space heating and instantaneous gas HWS) causing additional peak demand, 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

There are a number of areas within Envestra's downstream networks where a single point failure of a trunk main or supply regulator could result in a significant disruption to consumers supply.

The review of supply risk within Envestra's networks is an ongoing process to ensure a safe and reliable supply gas is maintained.

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

2.10.4 Meter Replacement

As part of the Queensland Networks Gas Measurement Scheme Version 3, domestic meters are required to be replaced at the end of their nominated "technical" life or a sample tested to extend the field life of the representative family of meters. This requirement gives rise to approximately 1,300 periodic meter replacements per annum.

2.10.5 Third Party Works Programmes

South East Queensland is currently undergoing a massive infrastructure upgrade/expansion program requiring the need to move, modify or relocate existing gas assets in addition to ongoing capital works programs by other authorities operating and maintaining assets in the public domain which may also require, from time to time, gas assets to be moved, modified and or replaced.

2.10.6 Network Risk Reviews

Reviews quality, productivity, service delivery and network integrity issues invariably highlight a risk to the business that that needs to be eliminated or controlled. These issues, in part have been a legacy of past practices and higher standards and controls mandated in the current environment.

2.11 Asset Performance Objectives

2.11.1 Transmission & Distribution Networks

2.11.1.1 Capacity

1. Networks have sufficient capacity to meet a peak hour demand.
2. Network extremity pressures are maintained above recommended minimum values.

2.11.1.2 Network Integrity

1. The total leaks reported per km of installed main reduce over time.
2. The amount of UAFG (rolling 12 month GJ) is reduces over time.
3. The numbers of 3rd party damages per km of mains reduces over time.
4. No 3rd party damage incidents on transmission supply mains result in interruption to supply.

2.11.2 Pressure Regulation 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 Queensland Networks Gas Measurement Scheme Version 3
2. Timeframes for installation, upgrading and maintenance (to restore accuracy) to be in accordance to the requirements as defined in the Queensland Networks Gas Measurement Scheme Version 3.
3. The provision of metering data to be within the required timeframes in accordance to the Retail Market Procedures.

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 Rule Procedures.

2.11.5 Odorising Facilities

The odourant facilities will control injection of odourant such that odourant can be detected at levels defined in the Queensland Petroleum and Gas (Production & Safety) Act 2004 which states that the detectable odour level in the gas is required to be at 20% of the lower flammability level.

2.11.6 Asset Service Life

Network assets will be planned, designed, constructed, operated and maintained to maximise the asset useful life. The following table summarises the expected useful life of Envestra's 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	10
Base Station Hardware	5
Software	5
Odorising Facilities	40

2.12 Planning Horizons

A rolling 5-year forecasts of expected expenditure for the business are 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 Queensland 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 a 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 to supply existing or new consumers with gas. This type of expenditure proceeds on the basis that the NPV of incremental revenue exceeds the capital investment.

The following expenditure types are categorised as Growth CAPEX.

- 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 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 to be assigned based on the Risk Management Matrix.

SECTION 3 – ASSET PERFORMANCE & SERVICE

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

The following table summarises unplanned outages as reported annually.

	07/08	08/09	09/10
Unplanned Outages - 3 rd Party & Internal	190	64	30
Customer Complaint - Poor Supply	4	18	14
Total	194	82	44

The majority of unplanned outages can be attributed to damage by third parties. The increasing use of the DBYD service and the availability of on-site supervision is helping to mitigate this risk.

Poor supply problems are generally associated with ingress of water. Syphon pumping is carried out at various locations to mitigate this risk. Total replacement and upgrade in pressure of low pressure cast iron mains is planned over the next 6 years. When completed this will eliminate supply problems from water ingress.

3.2.2 Gas Quality

Gas is odourised at city gate stations so that it is readily detectable at 20% of LEL. A level above 20% means there is insufficient odorant and does not comply with the regulations.

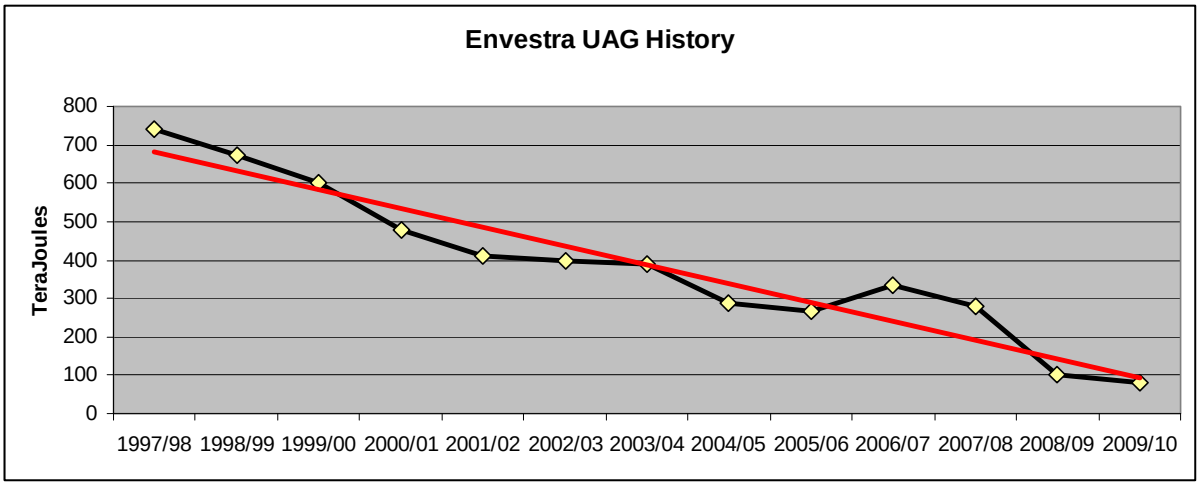
This gas quality criterion is the principal means by which leaks are detected.

Over the last 12 months odorant levels have complied with regulatory requirements.

3.3 Asset Performance & Integrity

3.3.1 UAFG

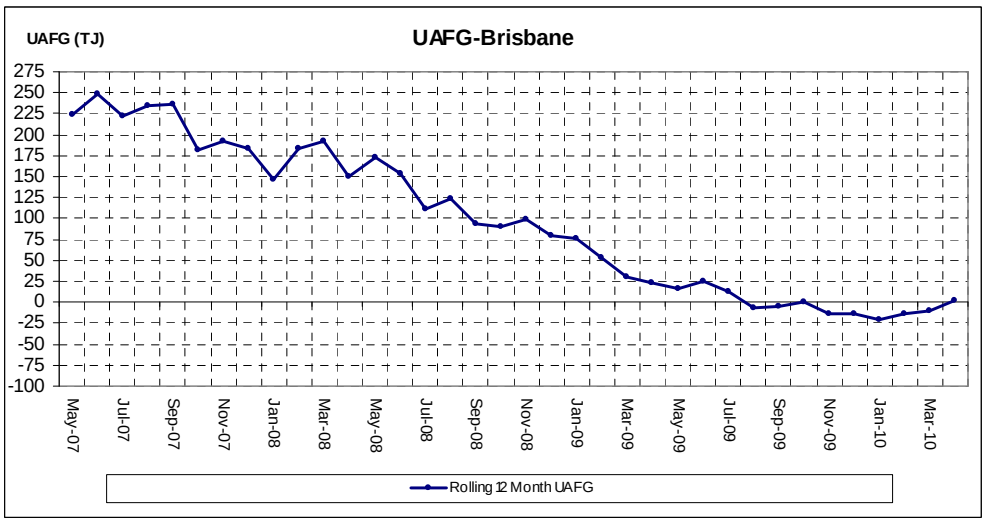
As the chart below indicates there has been a progressive reduction in the UAFG for the Envestra Queensland networks as a whole since the late 1970s.



This reduction in UAFG is attributed to a great extent to the on-going mains and services replacement work which has been carried out since the early 1990s, thus giving solid evidence that constant on-going rehabilitation not only reduces the maintenance requirements of the assets but also the overall UAFG attributable to leakage on mains and services.

The majority (about 80%) of the UAFG in Ipswich is associated with leakage from the 120 km of CI & UPS mains. Replacement of these mains is proposed over the next 6 years with UAFG expected to reduce by about 65 TJ.

The UAFG in Brisbane has been at relatively low levels over the last 12-18 months despite a significant number of leaks on mains and services.



3.3.2 Distribution Network Leaks

An increase in mains replacement has been planned with a focus on reducing risks to the public from cast iron mains leaks.

3.3.3 Metering Accuracy

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

3.3.3.1 Consumer Metering Accuracy

All meters are tested for accuracy prior to installation and at 10 year intervals.

The "Meter In-Test" programme where meters are selected from a meter family, removed, tested and sent out again. The following below summarises the number of meters removed and tested.

	FY 04/05	FY 05/06	FY 06/07	FY 07/08	FY 08/09
Domestic	1152	1610	485	775	648
I&C < 10TJ	169	164	133	131	60
I&C > 10TJ	8	17	12	Nil	Nil

Over 99% of domestic meters tested were within +/- 2% accuracy which is within the DME approved Queensland Networks Gas Measurement Scheme Version 3.

3.3.3.2 Consumer Complaint and Billing

Consumers may request their meter to be tested. The process for consumer requests for meter testing is detailed in Section 17 of the Queensland Networks Gas Measurement Scheme Version 3.

The Table below summarises consumer request for testing of meters.

	FY 05/06	FY 06/07	FY 07/08	FY 08/09	FY 09/10
Total Customer Meter Complaints	1	0	0	5	8
Meters Within Tolerance +/- 2%	1	0	0	5	8
Meters Outside Tolerance +/- 2%	0	0	0	0	0
Meters - Unable to Test	0	0	0	0	0

To date all of these tests show the meters to be accurate.

The number of requests for meter tests is extremely low compared to the total number of consumers (approximately 80,000). Statistically the figure is insignificant and there are no indications that this will change in the future.

3.3.3.3 Gate Station Accuracy

APA undertakes accuracy verification tests to ensure measurements of gas deliveries to Envestra's networks are within tolerances stipulated in Queensland Networks Gas Measurement Scheme Version 3.

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

	Frequency	Billing Adjustments (last 12 mths)
Brisbane City Gate Station	Monthly	0
Ipswich City Gat Station	Monthly	0
Rockhampton Gate Stations	Every 6 months	0
Regional Gate Stations	Every 2 Months	0
Custody Transfer Stations	Quarterly	0

Over the last 12 months there have been no material accuracy issues identified that necessitated billing adjustments.

3.4 Emergency Management

3.4.1 Leak First Response

In accordance with the 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 07/08	FY 08/09	FY 09/10
% Response within 2 hrs	97%	88.7%	95%

3.4.2 Network Incidents

The majority (approximately 77%) of 3rd party damage is associated with damage to consumer services. Although there have been "gas in building" incidents they were quickly contained and dealt with. There have been no "Property Fires" or "Explosions" within the network over the last 5 years. Building evacuations have been carried out, however, where the potential for such an incident existed.

3.4.3 Significant Environmental Incidents

Environmental incidents are reported to the EPA and Envestra as and when they occur. The numbers are recorded monthly in the Operations Risk Management Key Performance Indicators report. 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 Network Utilisation

Gas Volumes (TJ)	FY 07/08	FY 08/09
Total gas delivered	**16,468**	**16,497**
Gas consumed		
Connections taking less than 10 TJ pa	2,148	2,242
Connections taking more than 10 TJ pa	14,320	14,255

3.6 Key Network Parameters

3.6.1 Installed Mains

The following table summarises generally the gas mains in the network by material type and pressure.

	CI (m)	PE/Nylon (m)	UPS (m)	SP (m)	PE/Nylon Inserted (m)	Total (m)	Total (%)
Trans	0	0	0	284,376	0	284,376	10.2%
High	0	126,667	176	128,637	112	255,592	9.1%
Medium	2,868	759,593	3,771	12,750	1,084,357	1,863,338	66.6%
Low	198,591	17,433	145,207	0	31,558	392,789	14.0%
Total	201,459	903,692	149,154	425,763	1,116,027	2,796,095	100.0%
Total (%)	7.2%	32.3%	5.3%	15.2%	39.9%	100.0%	

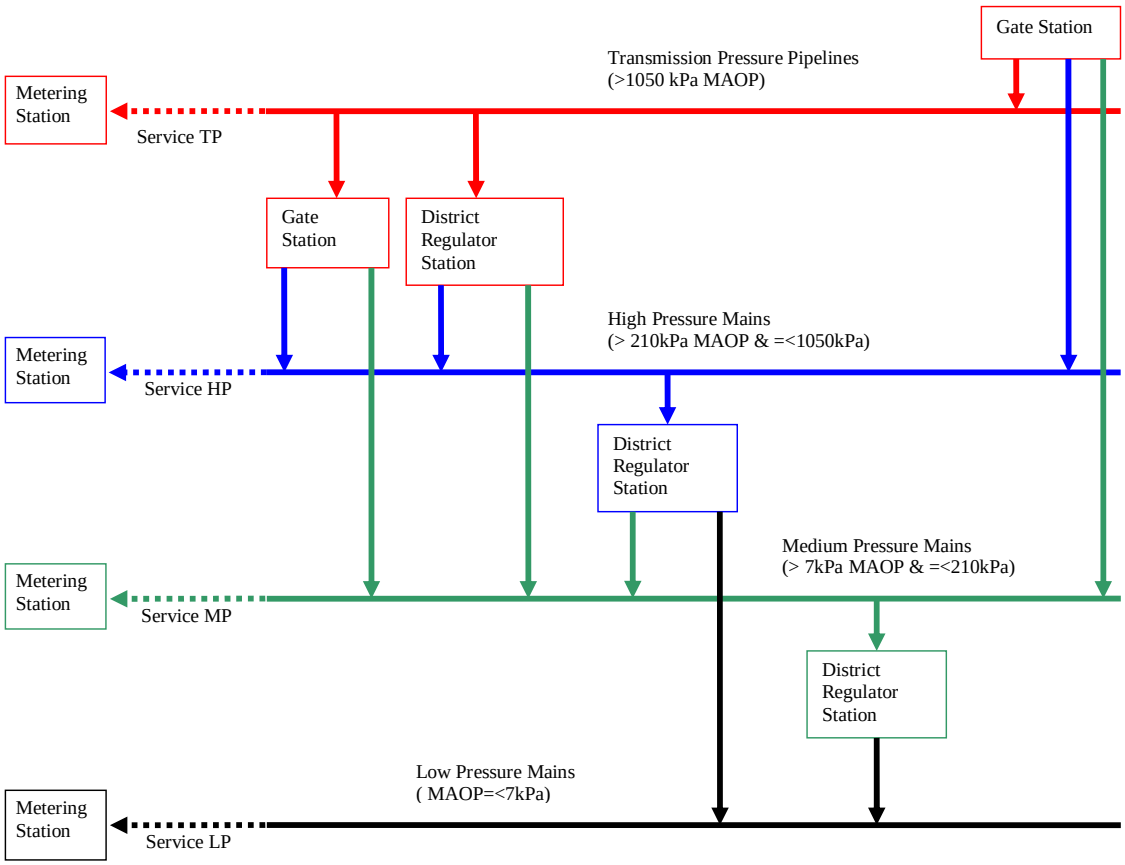
SECTION 4 – NETWORK ASSET OVERVIEW

4.1 Gas Networks Overview

The schematic below provides an overview of gas networks and key network components.

Connections between pipelines at different pressures are achieved through the use of pressure reducing installations (PRIs) such as Gate and District Regulator Stations.

DISTRIBUTION NETWORKS CONFIGURATION



Gas infrastructure components exist at both a physical and a logical level:
Physical: Gate Stations, Pipes, regulators, valves, meters
Logical: Distribution networks (collections of pipes, services and meters).

The management of gas infrastructure components occurs at the physical or logical level depending on the objective of the asset management activity. For example capacity

management is at the logical network level while preventative maintenance is carried out on specific at the physical asset level.

4.2 Sources of Supply

The Envestra Queensland distribution networks are supplied with natural gas from a number of sources.

- The APA owned Roma to Brisbane Pipeline (RBP), operated and maintained by APA Group Queensland Gas Transmission, supplies Natural Gas to the Brisbane, Ipswich, Riverview and Lockyer Valley networks via a 440 km pipeline. This pipeline initially was a 273mm diameter pipeline which has been looped, with the exception of the 'Metro' section which runs from Bellbird Park to Incitec in Lytton, over its entire length by a 406mm diameter pipeline.

- The Queensland Gas Pipeline (QGP) is a 324mm diameter, 532 km pipeline which runs from Wallumbilla (Roma) to Gladstone with a 98 km 219mm diameter extension from Gladstone to Rockhampton. This pipeline is owned and managed by Jemena. This pipeline supplies the Envestra networks in Rockhampton and Gladstone as well as several large industrial users in both Gladstone and Rockhampton.

- At Gladstone the Envestra owned Wide Bay Pipeline starts and then travels approximately 300 km from Gladstone to Maryborough via Bundaberg. This pipeline supplies the networks in Bundaberg, Maryborough and Hervey Bay.

- There are four gas producers (Origin, Epic Energy, Alinta and Santos) based in the Wallumbilla region supplying gas into both the RPB and the QGP. There are two other producers (Scotia and Woodroyd) supplying gas into the RBP via a 250mm diameter, 111 km lateral at Peat. Several additional coal seam gas producers including Cogan North, Windibri and Argyle also supply gas into the RBP.

Gas is delivered into Envestra's networks via gate or custody transfer stations owned by Envestra or the upstream pipeline owner. These stations consist of facilities that filter the gas, odourise the gas, control the delivery pressures and measure and report on the quantity of gas delivered into Envestra's networks.

The table below summarises the locations of the networks and their associated gate stations.

Network	Custody Gate Station Location	Owner
Brisbane Metro Region	Murarrie	Envestra
Ipswich	Redbank	APA
Riverview	Riverview	Envestra
Lockyer Valley - Grantham	Sandy Creek	APA
Lockyer Valley - Coominya	Brightview	APA
Rockhampton	Rockhampton North	Envestra
Rockhampton	Rockhampton South	Envestra
Gladstone City	Gladstone – Breslin Street	Envestra
Wide Bay Pipeline	Gladstone – Yarwun	Envestra
Bundaberg	Bundaberg	Envestra
Maryborough – Hervey Bay	Maryborough	Envestra

4.3 Principal Distribution Networks

Envestra owns 8 principal gas supply networks within Queensland and each one may be made up of a collection of sub networks with assets operating under different pressure regimes. These sub networks are defined based on static or dynamic criteria, including operating pressure, gas flow null points, material type or geographic location in the context of specific asset management activities being addressed.

These networks are highlighted in the following maps:

Figure 1 – North Brisbane, Ipswich and Lockyer Valley Networks

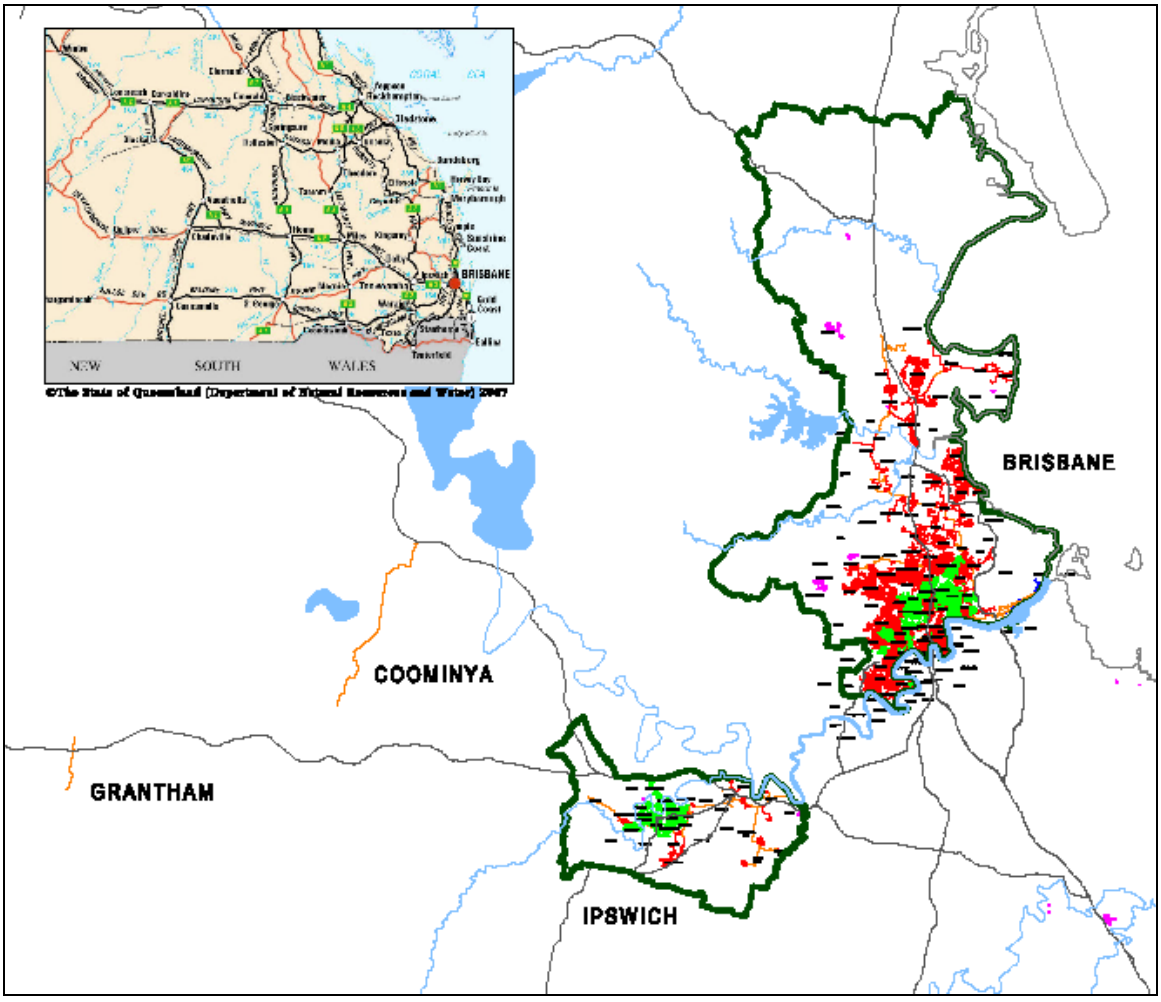


Figure 2 – Wide Bay Network

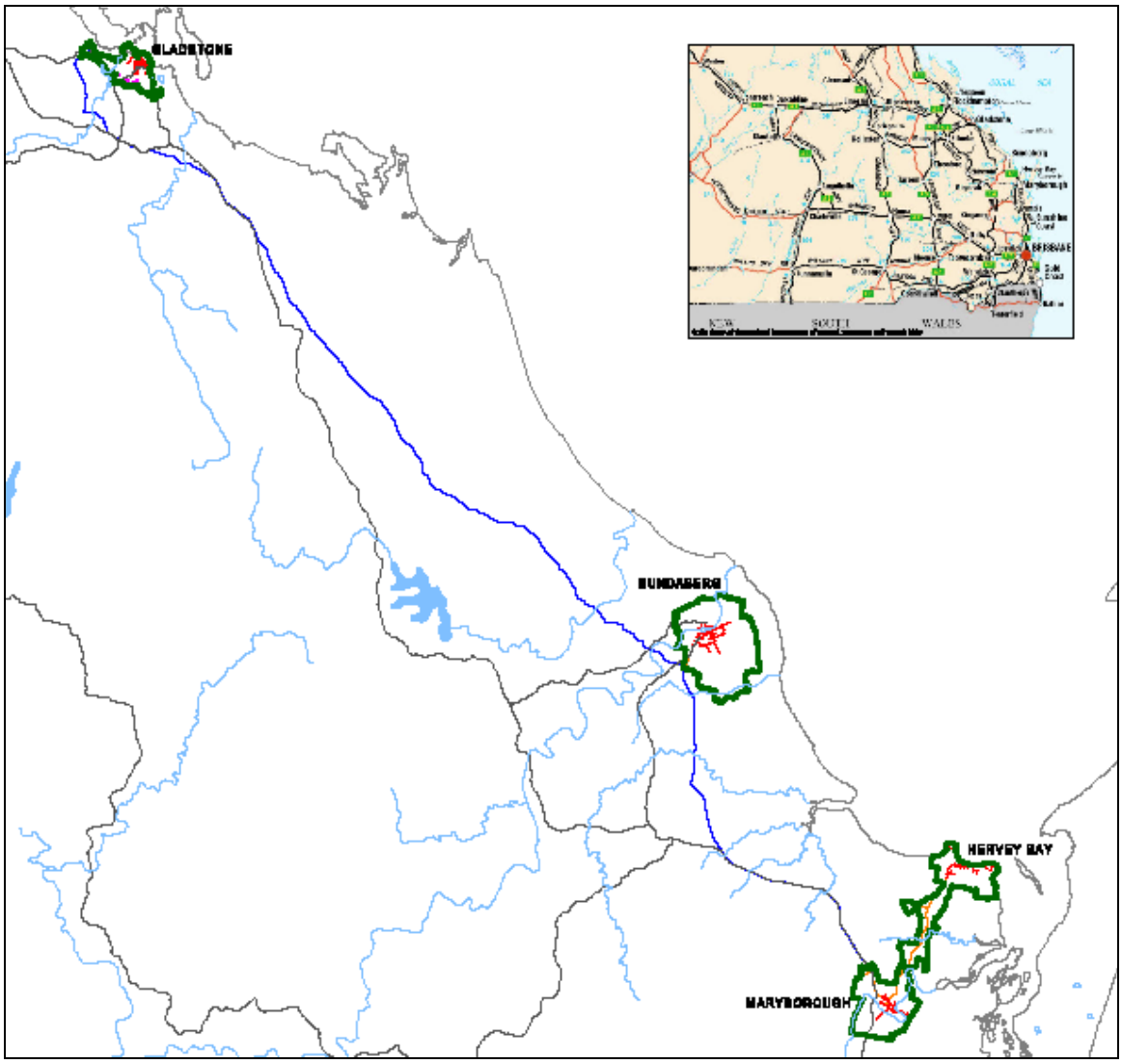


Figure 3 – Gladstone Network

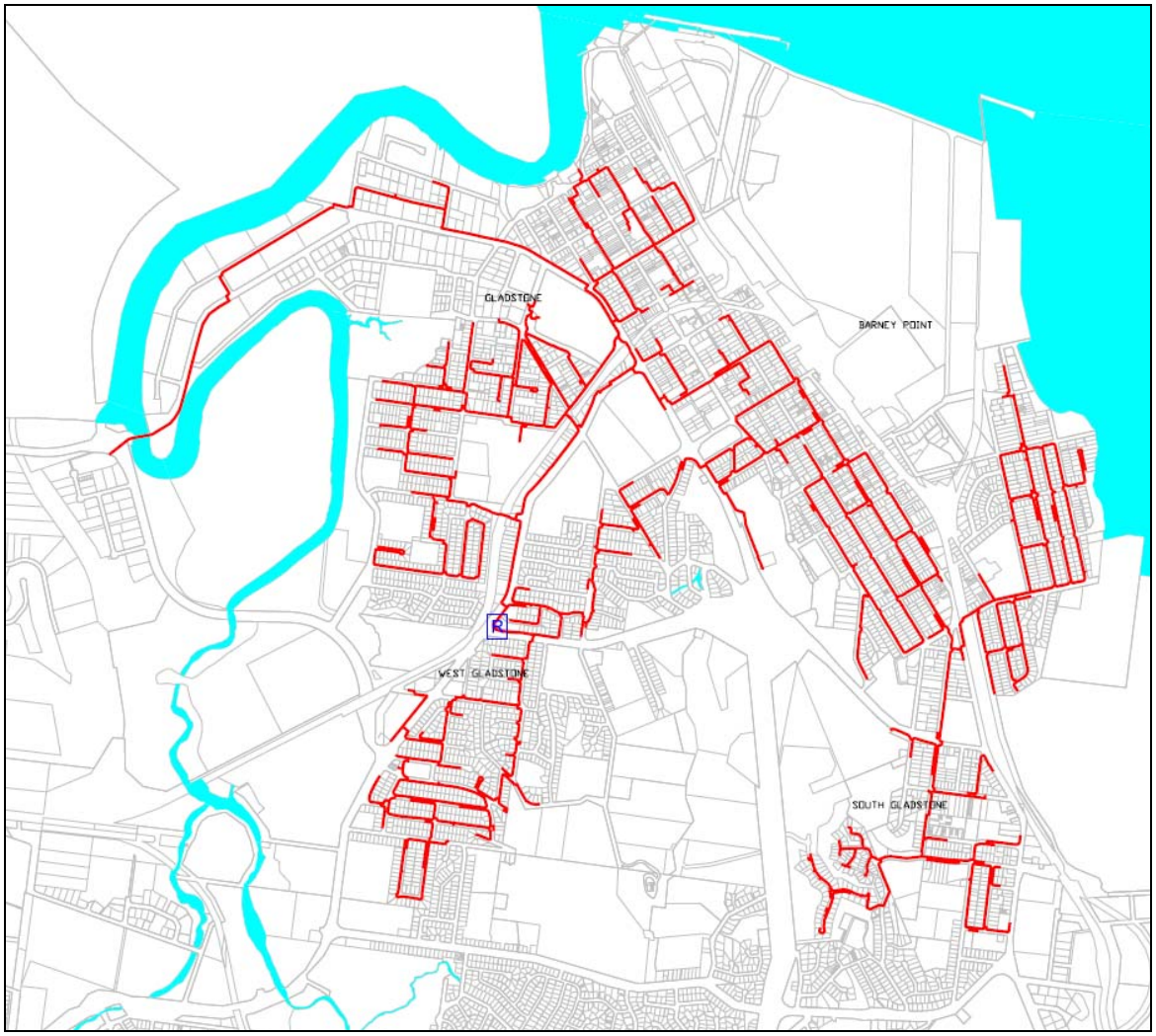
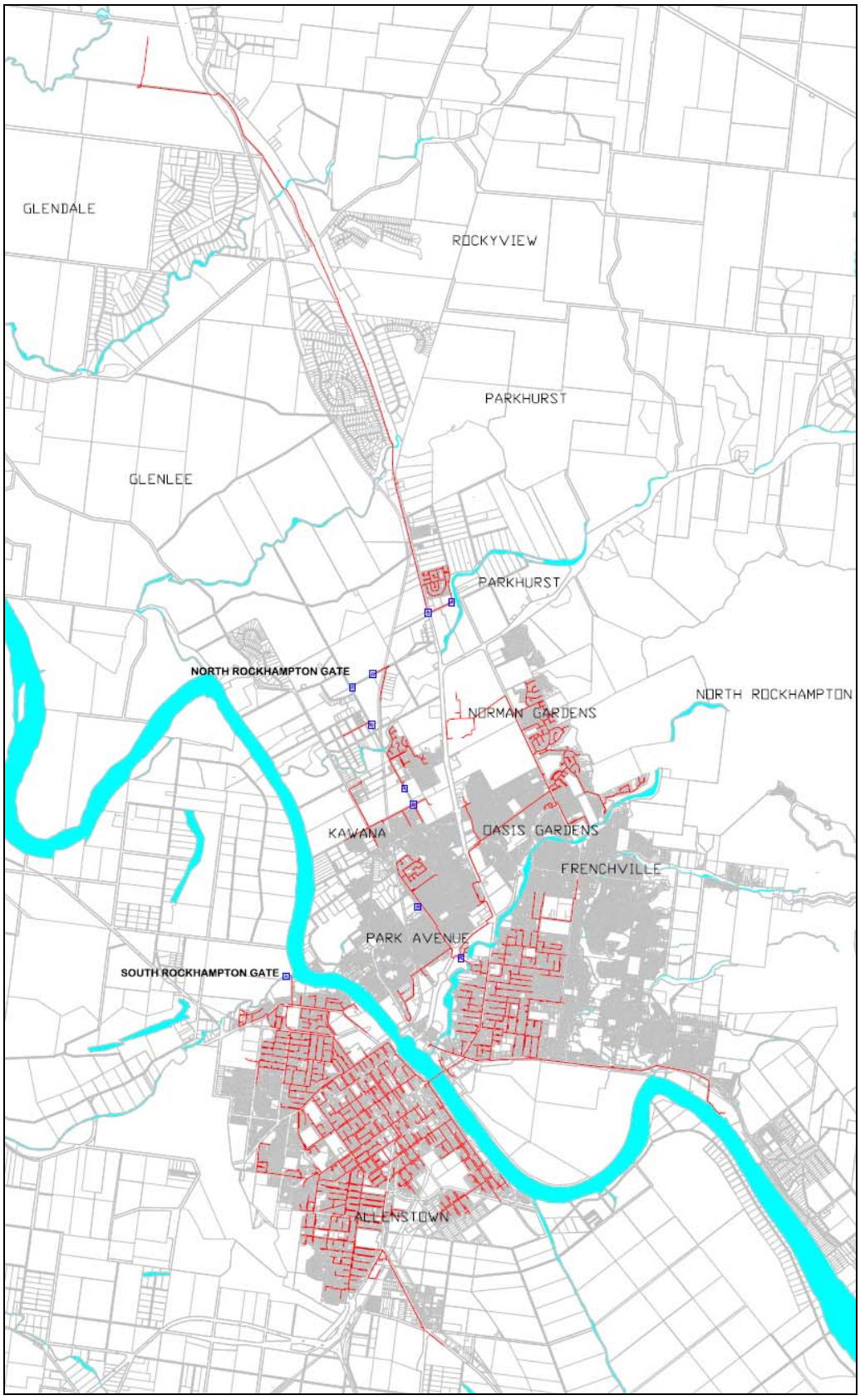


Figure 4 – Rockhampton Network



4.4 Operating Pressure Regimes

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

Pressure Regime	Definition
Transmission Pressure (TP)	Networks with a MAOP* between 1050 kPa and 10,000 kPa
High Pressure (HP)	Networks with a MAOP* between 210kPa and 1050 kPa
Medium Pressure (MP)	Networks with a MAOP* between 7 kPa and 210 kPa
Low Pressure (LP)	Networks with a 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.

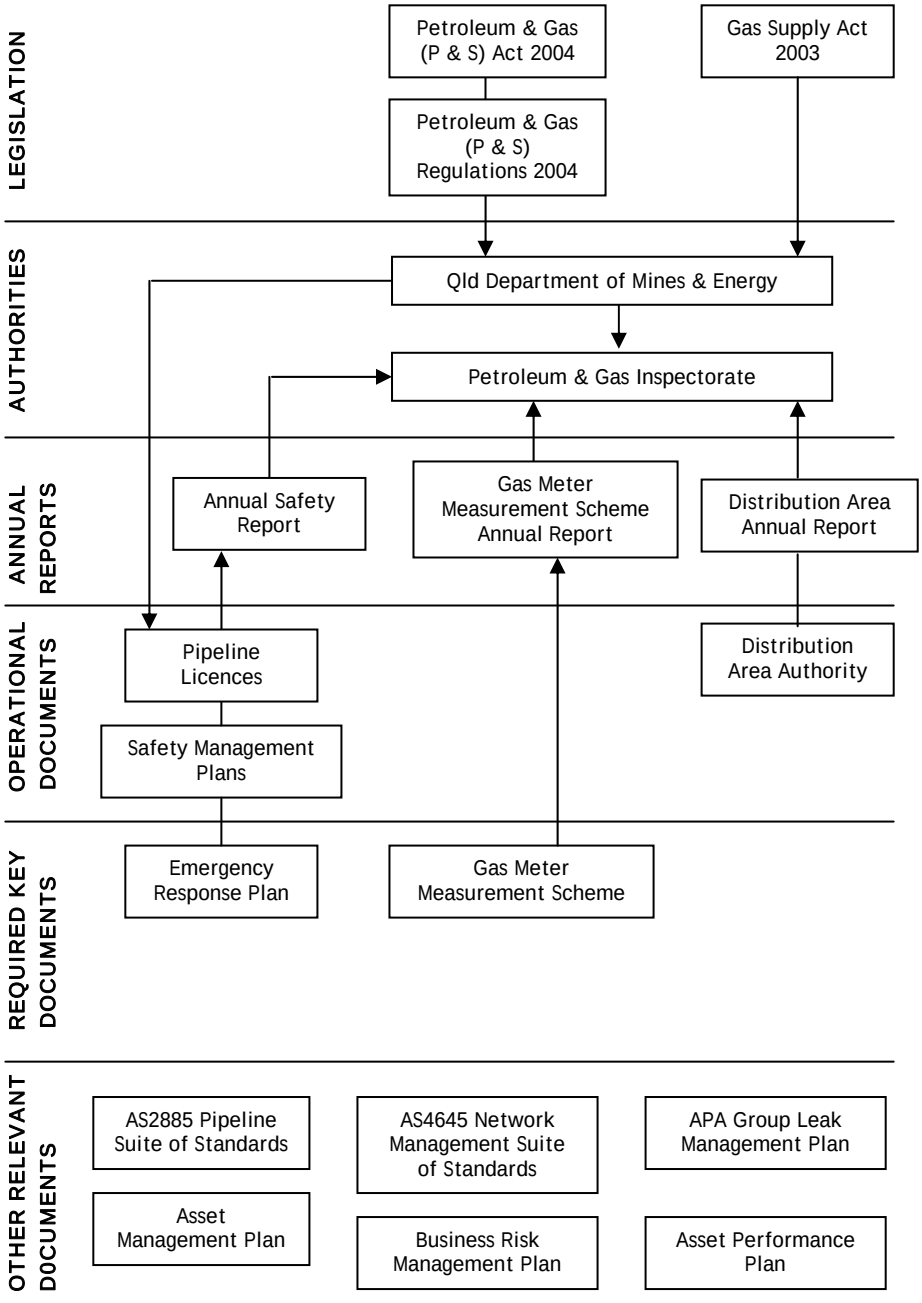
Each network has its own defined operating range depending on the network configuration and capacity requirements. Operating pressures may vary depending on seasonal load demand. Actual operating pressures may vary around these nominal values but in all cases pressures are maintained below the specific MAOP of the network.

SECTION 5 – NETWORK MANAGEMENT PLANS

5.1 Regulatory Compliance Management Plan

5.1.1 Operating Framework

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



The key regulatory instruments with which Envestra and APA must comply are:

Petroleum and Gas (Production and Safety) Act 2004 – 4I
Gas Supply Act 2003
National Gas (Queensland) Act 2008
Workplace Health and Safety Act 1995
Environmental Protection Act 1994 – 9E

5.1.2 Applicable Regulations, Codes and Standards

Petroleum and Gas (Production and Safety) Regulation 2004
National Gas (Queensland) Regulation 2008
Gas Supply Regulation 2007
Disaster Management Act 2003
Environmental Protection Regulation 1998
Workplace Health and Safety Regulation 2008
Clean Energy Act 2008
Integrated Planning Regulation 1998
Energy Ombudsman Act 2006
Energy Ombudsman Regulation 2007
Native Title (Queensland) Act 1993
National Gas Law and Rules
AS 4645.1:2008 Gas Distribution Networks – Network Management
AS 4645.2:2008 Gas Distribution Networks – Steel Pipe Systems
AS 4645.3:2008 Gas Distribution Networks – Plastic Pipe Systems
AS/NZS 2430-2004 Classification of Hazardous Areas
AS 2885.0–2008 Pipelines Gas and Liquid Petroleum – General Requirements
AS 2885.1–2007 and Amendment 1:2009 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 – Operations and Maintenance
AS 2885.5–2002 Pipelines Gas and Liquid Petroleum – Field Pressure Testing
AS 4041-2006 Pressure Piping
AS/NZS 4130-2009 Polyethylene (PE) Pipes for pressure applications
AS/NZS 4944-2006 Gas Meters – In Service Compliance Testing
AS ISO 13443-2007 Natural Gas – Standard Reference Conditions
AS 4564-2005 Specification for general purpose natural gas

5.1.3 Regulatory Reporting

5.1.3.1 Authorities

Queensland Department of Mines & Energy (DME)
Australian Energy Regulator (AER)
Queensland Department of Industrial Relations (DIR)

5.1.3.2 Licences

Pipeline Licences
Area Distribution Authorities

5.1.3.3 Required Documents

Department of Mines & Energy: Safety Management Plan (Also known as: Safety and Operating Plan), Emergency Response Plan
Australian Energy Regulator: Queensland Access Arrangement

5.1.3.4 Required Reports

Area Distribution Authority Annual Report (DME)
Annual Safety Report under the Petroleum and Gas Act (DME)
Audit and Inspection Fee Returns (DME)
Queensland Networks Measurement Management Plan Annual Report (DME)

These annual reports include operational information on:

-The quantity of gas entering the distribution system from each source
-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 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 detectability of gas odour, poor supply pressure etc
-Details of any failure to comply with Acts and/or Regulations.
-Performance Indicators

5.1.4 Regulatory Audits

The Queensland Department of Mines and Energy Gas Inspectorate did not carry out any audits during the 2008/09 year and to-date have not carried out an audit during the 2009/2010 year.

5.1.5 Regulatory Compliance - Risks/Issues/Actions

In general, regulatory codes, standards and regulations are monitored through SAI Global standards watch and state legislative services that indicate changes to Acts and Regulations at State level. Regular internal and external audits also identify how Envestra and APA currently respond to legislative and procedural requirements and where necessary identify actions needed to raise our level of compliance.

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 Queensland networks have been determined by consolidating and reviewing the key risks identified in the October 2008 Review of operational risk assessments.

5.3 Safety and Operating Plan

5.3.1 Overview

Safety and Operating Plans, referred to in Queensland Legislation as the Safety Management Plans, describe activities designed to ensure the operation of the gas distribution network and licensed pipelines in a prudent and efficient manner.

There are separate plans for pipelines or networks. Each plan addresses the following areas of the relevant asset's operation:

- Description of the network/pipeline;
- Risk Management methodology;
- Identification of relevant codes, standards, legislation, APA procedures etc;
- Management of the Network's/pipeline's operations;
- Safety;
- Management of emergency response;
- Organisation structure.

The Safety Management Plan (Safety & Operating 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 Plan are to ensure that:

- A strong focus on safety and reliability is maintained in relation to the operation and management of the Envestra gas networks and Pipelines in Queensland.
- Suitable safety management systems are in place and operating to ensure that the risks relating to the operation of the Envestra gas assets are effectively managed to keep risks As Low As Reasonably Practicable (ALARP).
- All relevant information related to the safe and reliable operation of the Envestra gas assets is communicated to those needing such information.

These plans are written to comply with the requirements of with the Australian Standards AS 4645.1:2008 and AS 2885 with specific reference to the content requirements of Clause 675 of the Queensland Petroleum and Gas (Production & Safety) Act 2004.

5.3.2 Reviews

The Safety Plan is reviewed at the discretion of the Queensland Department of Mines and Energy Gas Inspectorate. It is not audited and reviewed on specific periodical basis. The Safety Management Plans for the Envestra Queensland assets were not the subject of an audit this year.

Internally the Safety Plan is reviewed by APA Queensland Networks 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 BRMPs

In addition a generic formal risk assessment for operating and maintaining a gas distribution network is completed at a frequency of no more than 5 years and, where appropriate, the results of this are incorporated into revised Safety Plans.

5.3.3 Risks/Issues/Actions

No Audit was carried out and there are no outstanding issues/actions.

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 Queensland 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 Government/Council planning authorities 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 Queensland regulated networks using a forward looking methodology that takes into consideration projections of macroeconomic activity, microeconomic behaviour, government policy initiatives and trends in weather.

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

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. The projected gas demand and consumer numbers by segment and tariff zone.
6. Historical data for the 2005/6 – 2008/9 period.

5.5 Capacity Management Plan

5.5.1 Overview

The Capacity Management Strategic Plan is aimed at ensuring Envestra's Queensland Networks have the capacity to provide for forecasted growth. It reviews risks of supply integrity and presents options and scenarios for capacity development for growth in an efficient and prudent manner.

The Capacity Management 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, and
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 within Envestra's' Queensland Distribution Networks.
- The capacity performance of Envestra's Queensland Distribution Networks and the 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.

5.6 Mains Replacement Plan

5.6.1 Overview

This document 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 been recognised over the years that the ageing Cast Iron & Unprotected Steel 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 associated with these mains.

This document outlines the basis and justification for an accelerated mains replacement programme with the objective of reducing maintenance and operational risks and costs within the Brisbane and Ipswich distribution networks.

It is planned to complete mains replacement of the old low-pressure networks located in Ipswich and Brisbane, by replacing all 351km of existing low-pressure mostly cast iron and unprotected steel mains over the next 6 years.

The strategy for replacement focuses on:

1. The replacement of LP 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 will include mains that are identified as high risk.

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 attributable to mains in poor conditions.

5.6.2 Risks/Issues/Actions

The key risk/issues identified within the Mains Replacement Plan are:

- Safety, in particular public safety associated with leaks from CI&UPS mains in high density areas.
- The high level of UAFG in Ipswich.
- LP CI&UPS Mains capacity to service the trend to high instantaneous demand appliances and Urban Consolidation.
- The condition of the CI& UPS network driving increase operating and maintenance costs.

Details of volumes, expenditure and timing are covered in the Mains Replacement Plan.

5.7 Gas Measurement Management Plan

5.7.1 Overview

The Queensland Networks Gas Measurement Scheme Version 3 is required by the Queensland Petroleum and Gas (Production & Safety) Act and Regulations 2004. 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 all current relevant legislative requirements. The Queensland Networks Gas Measurement Scheme Version 3 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 has summary statistical information on:

1. Number of consumers
2. Number and makes of meters
3. Meter test results in the previous year
4. Number of meter changes during the year
5. Number of new meters installed in the previous year
6. Number of consumer requests for meter tests

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

5.7.2 Reviews

The Gas Measurement Management Plan is reviewed annually and modified to address changes in company structure that may have occurred over the previous 12 months and also any proposed changes and or modifications to future metering practices and process. The plan is then submitted to the Queensland Department of Mines and Energy Gas Inspectorate.

5.8 Odorant Control & Maintenance Management Plan (Odorising Manual)

5.8.1 Overview

The Queensland Networks Odorising Manual details the:

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

Natural Gas supplied to Queensland Networks has little or no odour. Odorisation of gas supplied to Brisbane, Ipswich, Bundaberg, Maryborough and Hervey Bay is carried out by APA Queensland Networks. Gas supplied to Rockhampton and Gladstone networks is odorised by upstream parties. Monitoring of network odorisity levels is carried out by APA Queensland Networks.

There are six Envestra owned odorising sites. Three are located at Gate Stations and three are located at network consumer sites where gas is un-odorised.

The Queensland Petroleum and Gas (Production and Safety) Act 2004 states that "the prescribed odour for fuel gas is an odour that is distinct, unpleasant and non-persistent; and is of an intensity indicating the presence of gas down to one-fifth of the lower flammability limit".

The following is a list of the legislation that impacts odorising operations:

- The Petroleum and Gas (Production & Safety) Act 2004
- The Petroleum and Gas (Production & Safety) Regulations 2004
- Workplace Health & Safety Act 1995
- Environmental Protection Act 1994
- Transport Operations, Road Use Management and Dangerous Goods Act 1998
- Dangerous Substance Act 1979

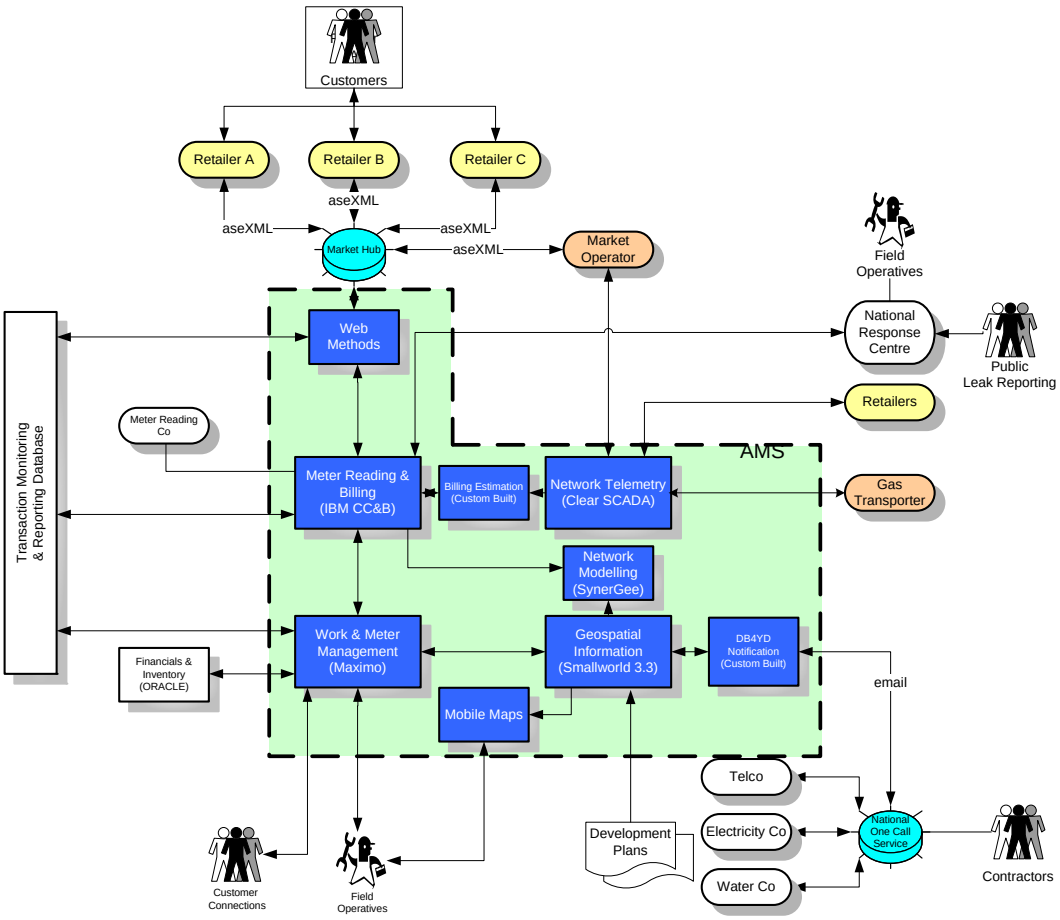
5.9 Asset Information Systems Management Plan

5.9.1 Overview

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

1. Managing 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
7. Recording the configuration and location of assets.

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



The Asset Management System 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 CC&B
   - Transaction Workflow
   - Meter Reading
   - Delivery Point Billing
3. Work Management System – IBM Maximo
   - Planning
   - Dispatching Work
   - Job Completion Details
   - Delivery Pt Status Mgt
   - Preventative Maintenance
   - Contractor Payment
   - Meter Management
4. Geospatial Information System- Infomaster in Qld
   - 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 – Synergge
   - Capacity Strategic Planning
   - Customer Connection Assessment
   - Emergency Response
7. One Call System – Custom Built
   - 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 & TSF Calculation

SECTION 6 –ASSET LIFECYCLE 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. Design Process Controls (Design, Check & Approve)
2. Configuration/Change Management Manual
3. Project Management Manual
4. Risk Assessment Manual (Major Projects)
5. Asset policies, procedures, standards and specifications.
6. Standard Materials & Component Specifications
7. Testing, Inspection & Commissioning policies & procedures
8. 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 and Operating Plan.

Operation and Maintenance involves three principal sub-processes:

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

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

1. Network Surveillance & Monitoring
   - Telemetry pressure point and demand customer monitoring
   - Pressure monitoring using chart recording
   - Pipeline patrol and inspection
   - Cathodic protection monitoring
   - Coating survey
   - Leak Survey
   - Inspection of special crossings
   - Odorant monitoring
   - Gas quality monitoring
2. Preventative maintenance to reduce the probability of failure:
   - Regulator maintenance
   - Valve maintenance
   - Cathodic protection maintenance

- Telemetry system maintenance
- Meter maintenance (I&C)
- Periodic Meter Changes
- Compressor Maintenance
- Maintaining a "Dial Before You Dig" Service

3. Corrective maintenance in response to failures:
   - Repairing leaks
   - Repairing 3rd party damages
   - Clearing water ingress and system blockages
   - Providing standby and emergency callout
   - Resolving metering problems/failures
   - Repairing cathodic protection system faults
   - Repairing pipe coating failures/faults
   - Fault-finding on pressure regulating installations

Maintenance of assets is undertaken to ensure that physical assets continue to fulfil their intended functions (performance levels) within an expected life time.

To ensure these intended functions are maintained, maintenance standards for differing asset types are determined using the following criteria:

- asset type and age
- location and operating environment
- importance of function
- manufacturers recommendations
- asset history
- industry experience
- condition monitoring
- MHQ of metering facilities

The objective is to ensure that all statutory and legal obligations are adhered to and that network performance is maintained to performance levels as agreed with the asset owner at optimal costs.

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

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

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

These procedures also cover:

1. Monitoring the condition of pipeline easements, signage and above ground facilities.
2. Identifying threats to the safety of the pipeline and its ongoing reliable operation.
3. Controlling corrosion in accordance with applicable standards.

4. Monitoring the condition of coatings for both buried and above ground pipe work and structures.
5. Identifying leaks.
6. Ensuring accuracy and reliability of instrumentation associated with measurement of gas flow, monitoring of pipeline conditions, and controlling operation.
7. Ensuring reliable operation of pressure control and pressure relief equipment, Emergency Shut Down and Slam Shut Valves, isolation valves, heaters, filters and other ancillary equipment to design specifications.
8. Testing the effective operation of electrical protection equipment and the adequacy and condition of electrical earthing systems.
9. Inspecting pressure vessels and pig traps for both internal and external corrosion and defects, and the condition of quick acting closure mechanisms and seals.
10. Carrying out special inspections of underwater pipelines, tunnels, casings, foreign crossings, and special zones identified as requiring specific inspection and monitoring.

Operation & Maintenance practices are audited from time to time. Regional licensed pipelines and networks are regularly audited by APA for compliance with the licence conditions and AS2885.3 and AS4564 requirements.

6.1.3 Remove/Replace

The processes of replacing network assets that have reached the end of their technical or economic lives include. It includes the process of removing from service and disposal of physical network assets and the refurbishment of assets to extend their useful life.

Examples are:

1. Replacing mains and services
2. Replacing or refurbishing meters and meter assemblies
3. Replacing or rebuilding 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 Pipeline Life Cycle Plan

6.2.1 Transmission Pipelines Overview

These steel pipelines are the principal supply to the low, medium and high distribution sub networks. In some cases they are the primary supply to major industrial consumers.

Envestra operates and maintains over 284 kilometres of transmission pipelines in Queensland of which 274 km is the Wide Bay Pipeline ("uncovered" network) and the remainder is predominantly within the Brisbane & Ipswich networks ("covered" networks) .

The Wide Bay transmission pipeline and the 1 km Riverview pipeline are licensed under the Queensland Petroleum and Gas (Production and Safety) Act.

It is a requirement of the Queensland Petroleum and Gas (Production and Safety) Act 2004 that all pipelines with a Maximum Allowable Operating Pressure (MAOP) greater than 1050 kPa are designed, constructed and operated to AS 2885.

The growth in transmission pipelines is driven by major projects such as extending supply to new districts and major industrial consumers or augmenting capacity in line with growing demand from existing networks. The following table summarises the age profile of the transmission mains.

Age	Km	%
20-30	1.8	0.6
10-20	2.4	0.8
0-10	280.8	98.5
Total	285	100%

6.2.2 Asset Performance, Condition & Integrity

6.2.2.1 Asset Performance

Asset capacity performance is monitored on an annual basis with the transmission pipeline capacity reported in the Capacity Management Plan. There are no known capacity constraints within the Transmission network.

6.2.2.2 Asset Condition

The transmission pressure pipelines are operated and maintained in accordance with the Safety and Operating Plan for Envestra Transmission Pipelines in Queensland.

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

The configuration of the transmission pipelines is such that internal "pigging" inspections are not possible.

Coating surveys have been limited to new installations at the time of construction. Existing pipeline DCVG surveys are programmed to occur in line with the MAOP Review schedule.

The Brisbane River crossing now falls under the 21-year requirement for an AEI and has therefore been scheduled for a full appraisal in 2010.

The following table summarises planned AS2885 reviews of Envestra Transmission mains in Queensland.

	2010	2011	2012	2013	2014	2015	2016	2017	2018
MAOP Review	2	2	1	1		2	2	1	1
Safety Management Studies	2	2	1	1		2	2	1	1
Coating Survey	2	2	1	1		2	2	1	1
AIE	1			1		1			

To date no "dig ups" on steel transmission pressure pipelines have been carried out however a number are expected as result of Coating Surveys planned over the next 5 years.

6.2.3 Growth

Transmission pipeline growth is governed by infrastructure changes and growth in demand from both residential and industrial development within financially viable distance of the existing networks.

There have been no new transmission pipelines added to Envestra's networks over the last 5 years and none planned over the next 5 years.

6.2.4 Operation & Maintenance

The three most significant threats which affect the useful life of these pipelines 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.

In recognition of changes in the environment, e.g. urban encroachment, the threats to pipelines are regularly assessed and appropriate measures taken to mitigate risk of damage.

A formal risk assessment of transmission pipelines is carried out every 5 years as per requirements of AS 2885.3 – 2001, Pipelines – Gas and Liquid Petroleum Operation & Maintenance.

6.3 Transmission Pipelines Facilities Life Cycle Plan

6.3.1 Overview

Facilities associated with Primary Supply Mains are typically Gate Stations. Gas is delivered into the Queensland Envestra's networks via 11 Gate Stations of which 8 are owned by Envestra and 3 by the upstream pipeline owner.

These sites typically comprise of:

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

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 satisfies the legislative requirement where the detectable odour level in the gas is required to be at 20% of the lower flammability level.

6.3.2 Asset performance, Condition & Integrity

There have been no recorded failures during the lifetime of these assets and generally equipment is maintained on a programmed basis. All the scheduled activities are programmed using Maximo with results and observations entered from hard copy records into the local AMS asset database as they occur.

6.3.3 Growth

There are no new facilities planned over the next 5 years

6.3.4 Operation & Maintenance

All gate station units are checked monthly.

There are no planned replacement/upgrades or abandonment of these facilities.

6.4 Distribution Mains & Services Life Cycle Plan

6.4.1 Overview

Distribution mains move gas from the transmission main infrastructure to the end consumer. Distribution mains are characterised by MAOP less than 1050 kPa with the majority of mains operating at or below 200 kPa.

Gas distribution commenced in Brisbane in the 1860s using low-pressure cast iron mains. Since this period the network has been augmented and expanded using evolving technologies and materials. The current networks are composed of various materials constructed to the codes of the time and operating at various pressures.

All new distribution mains are constructed using polyethylene pipe and between 40mm and 200mm in diameter with occasional use of nylon pipe and suitably sized poly coated steel for higher pressure situations.

An accurate age profile for distribution mains is not available as details of when individual mains segment were laid have not been kept for recent years and although the mains laid books from the beginning of installation in the 1800s exist, an overall list of mains laid and abandoned or inserted has not been created.

Individual consumer services are connected to the distribution mains. With Industrial and Commercial services an emergency isolation valve is fitted at each mains connection. The operating pressure and materials of construction are the same as for distribution mains.

Typically new services to domestic customers are either 10mm - 20mm diameter Polyethylene or nylon pipe with occasional use of 20mm-25mm diameter copper pipe.

6.4.2 Asset Performance, Condition & Integrity

There are significant lengths of cast iron and unprotected steel mains in Brisbane and Ipswich. Those mains are at the end of their economic lives resulting in a high level of UAFG, high maintenance costs, safety issues related to gas escapes and insufficient capacity to meet customer demands. Renewal of the existing mains which are in poor condition is necessary to ensure that the natural gas distribution networks can continue to be safely and economically operated into the future.

On the 1st July 2009, 343 km of the network consists of old cast iron (CI) and unprotected steel (UPS) mains, which are responsible for the majority of mains-related leaks.

It is estimated that these mains are between 40 and 90 years old. The remaining life of these mains is difficult to predict with a number of variables such as soil type, make of pipe, age, construction standards, proximity to trees and traffic loads affecting the mains useful life.

Leaks from the cast Iron (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 of the main leaving it susceptible to cracking/breaking potentially resulting in a major gas escape.

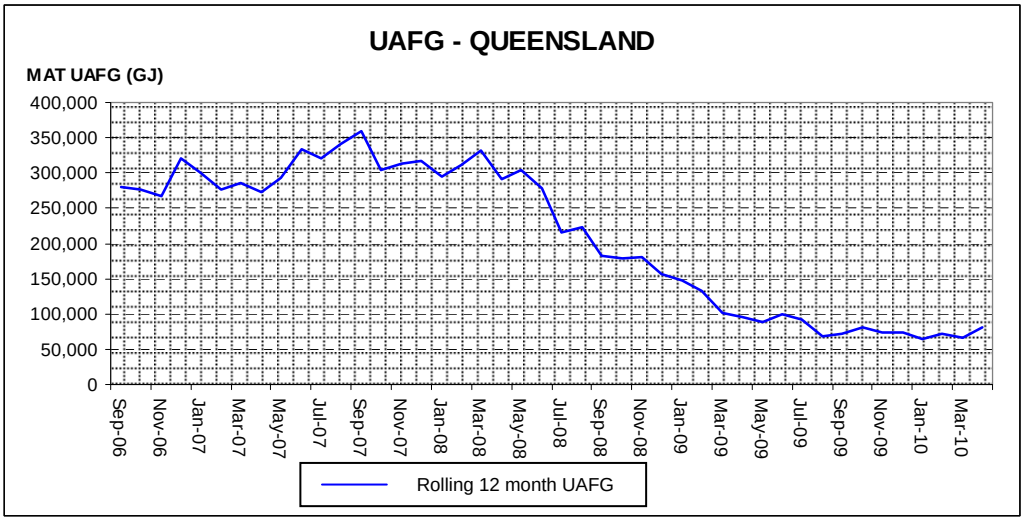
Leaks from unprotected steel (UPS) mains are due to external corrosion of the pipe. Extensive pitting corrosion along the pipe length with replacement, rather than repair, the only option is common.

A major component of Envestra's OPEX relates to locating and repairing leaks. Leaks are also a major contributor to UAFG, adding to Envestra's cost of providing network services.

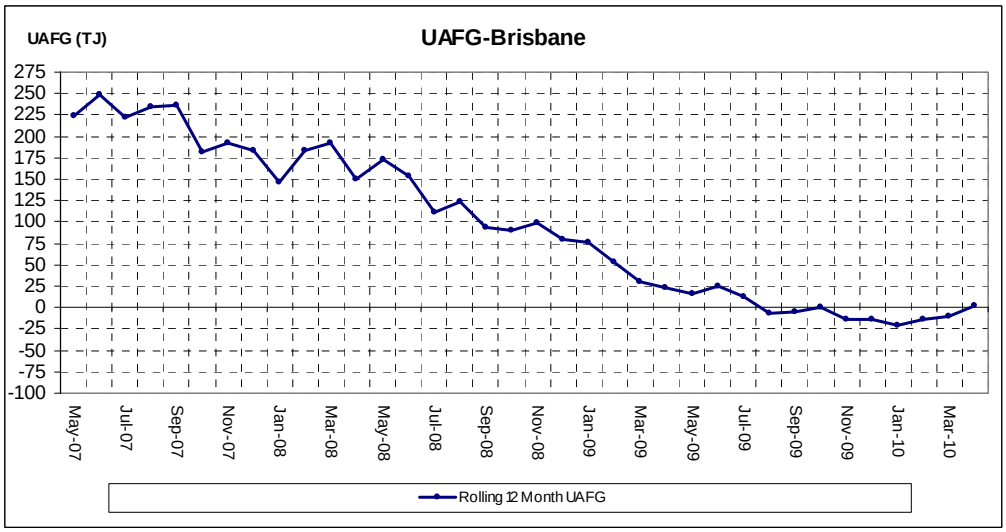
6.4.2.1 UAFG

The volume of gas lost through leaks is determined using data related to the recorded un-accounted for gas and estimates based on field investigations including night flow studies. It is considered that the majority (80%) of UAFG is related to leaks.

The following graph summarises the trend in UAFG since September 2006.



The falling long-term trend has been associated with a reduction in UAFG in the Brisbane network as shown in the following graph.



6.4.2.2 Supply Integrity Issues

Details of capacity performance and network augmentation requirements are provided in the Capacity Management Plan.

6.4.3 Operation & Maintenance

Maintenance of assets is undertaken to ensure that physical assets continue to fulfil their intended functions (performance levels) within an expected life time.

To ensure these intended functions (performance levels) are maintained, maintenance standards for differing asset types are determined using the following criteria:

- asset type and age
- location and operating environment
- importance of function
- manufacturers recommendations
- asset history
- industry experience
- condition monitoring
- MHQ of metering facilities

The objective is to ensure that all statutory and legal obligations are adhered to and that network performance is maintained to performance levels as agreed with the asset owner at optimal costs.

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

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

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

The Leakage Management Plan (LMP) outlines the process for managing gas leaks from the network. 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) details the frequency and scope of work to be carried out for 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 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 12%. The following table summarises the historic and future volumes. An automated DBYD service is scheduled to start in the FY 09/10 to accommodate the increases and response times are expected to be >95% when fully commissioned.

	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		16,334	18,237	20,968	22,559	25300	28300	31700	35500	39800	44600
Response within 48 hrs - %		97%	95%	99%							

6.4.4 Replacement/Upgrade/Disposal

6.4.4.1 Mains & Services Replacement Process

Details of the mains replacement process are included in the Queensland Mains Replacement Plan. A summary of this plan is detailed in Section 5.6

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

To ensure network integrity is maintained it is proposed to replace the remaining CI & UPS mains within the Brisbane and Ipswich Networks. This has been detailed in the Queensland Mains Replacement Plan.

The mains replacement strategy focuses on optimising the use of available CAPEX funds by targeting replacement of mains that:

- are at the end of their asset life cycle and therefore contribute most to leakage;
- incur high maintenance costs;
- leak gas and create subsequent safety issues and;
- have insufficient capacity to meet customer demands.

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.

The volume of piecemeal replacement varies from year to year and can range from a few hundred meters to several kilometres.

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, where the average number of individual service renewals was around 450 per year, it is estimated that approximately 900 inlet service renewals will be required over the next 3 years reducing to about 500 during the subsequent 3 years due to the impact of the proposed planned mains replacement programme.

Inlet Service Renewals	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	Total
No.	300	270	250	250	250	200	1520

6.4.5 Risks/Issues/Actions

The principle issue is the integrity of the LP CI & UPS mains. The cast iron and unprotected steel mains are approaching the end of their useful lives with safety, performance and economic drivers necessitating replacement.

The 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 issues been detailed in the Mains Replacement Plan and the Capacity Management Plan.

In summary, it is planned to replace approximately 360km of existing low-pressure cast iron and unprotected steel mains located in Ipswich and North Brisbane by June 2016.

6.5 Distribution Mains & Services Facilities Life Cycle 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 high (210 to 1,050kPa), medium (7 to 210kPa) and low-pressure (<7kPa) 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 or above ground kiosks. . Larger installations may be fitted with meters, actuated valves and actuated pressure control functions as well as SCADA monitoring.

Various configuration designs are used within Envestra's network but typically they tend to be single stream active-monitor arrangements on small installations, and double stream active-monitor arrangements on the larger installations.

6.5.1.2 Network Isolation Valves

Approximately 1000 mainline and branch isolation valves are installed throughout Envestra's Queensland networks. These provide emergency isolation and control during normal operation, maintenance and emergency response situations. The following table summarises the various types of network isolation valves currently listed in the preventative maintenance program. Polyethylene valves are not included in the preventative maintenance schedule.

6.5.1.3 Cathodic Protection Facilities

A network corrosion protection system is used to protect approximately 413 km of steel mains and pipelines. This system consists of both impressed current and sacrificial anode systems.

There are two impressed current Cathodic Protection (CP) Units consisting of a Transformer Rectifier (TR) and Ground Bed on the Wide Bay pipeline protecting this 280 kilometre transmission steel pipe work.

Anodes on CP systems of other protected pipelines are replaced on an as needs basis as identified from the Cathodic Protection Survey readings.

There are two types of material used in the sacrificial anode systems. There are approximately 343 magnesium anodes and 11 zinc anodes, the latter protecting the Brisbane River crossing.

6.5.2 Asset Performance, Condition & Integrity

The inspections that have been carried out do not indicate that the condition of isolation valves located in underground vaults has deteriorated to the extent that a rehabilitation programme is required to ensure the life of these assets is maximised.

All pressure regulator stations in the Queensland Envestra Networks have been subject to a rigorous upgrade program over the last 18 years which is now completed with all underground installations replaced by prefabricated metal pits which are constructed with the regulator set in them and preset in the workshop prior to despatch ready for instant installation and commissioning on site.

6.5.3 Growth

Augmentation and network growth projects do not detail the number of pressure regulator stations that might be needed as a result of the new mains but, based upon historical data, an estimate is made within the OPEX budget to allow for additional installations on the basis of 2 Pressure Regulator installations per year and 1 high pressure block valve per 15 Kms of transmission pressure pipeline included in each of the project proposals.

There will be small "organic" growth in other valves as the network expands to serve new customers. Typically an average of 140 new I&C primary isolation valves are expected to be added to the network every year.

6.5.4 Operation & Maintenance

6.5.4.1 Operation

Setting pressure regulators to suit winter and summer loads has proven to be unnecessary in Queensland and in recent years has been abandoned in favour of operating the networks at the lowest possible operating pressure to minimise UAFG from the Cast Iron and UPS systems 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 Queensland networks.

The system does provide control functionality for remote operation of regulators and critical valves.

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

Improvements of the existing capability have been proposed as per a strategy based on mitigating network operational risk which 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.

6.5.4.2 *Pressure Regulator Installations Maintenance*

Scheduled maintenance of pressure regulating installations (PRIs) 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.

The maintenance tasks and frequencies are derived from failure mode analysis of the relevant assets and past experience. Maintenance and breakdown records are maintained and provide feedback to the designers and maintenance policy setters.

6.5.4.3 *Network Isolation Valves*

The maintenance of valve installations in the Envestra Queensland Networks comprises:

1. Yearly inspection and maintenance of transmission valves
2. Three yearly inspection and maintenance of other network valves

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.

The following aspects of the corrosion prevention systems are monitored and controlled:

1. The CP effectiveness is measured using a 'close interval potential survey' during which the pipe-to-soil potential is measured using a saturated copper/copper sulphate reference electrode.
2. The integrity of the coating is measured using a direct current voltage gradient to assess the insulating integrity of the coating.

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

Generally, PRIs are not replaced as complete units but are over-hauled (all major components and soft seals are replaced) every five years.

All pressure regulator stations in the Queensland Envestra Networks have been subject to a rigorous upgrade program over the last 18 years which is now completed. Currently there is a project underway replacing the lids of older installations due to weight considerations and water ingress from deterioration of the seals over time. This project is expected to be completed in the FY 09/10 with allowances made in the CAPEX budget for any that might be identified during the FY 10/11.

It is planned to undertake a remediation of critical isolation valves located in underground valve pits as they are identified through the newly installed inspection schedule which has been established to compensate for the poor maintenance performance over previous years.

6.6 Metering Facilities Life Cycle Plan

6.6.1 Overview

Consumer metering ranges from a simple meter-regulator installation for domestic and small I&C installations to more complex assemblies with filters, bypass valves, correcting instruments and telemetry. As part of the Queensland contestability rules all metering installations at sites consuming >100TJ are required to have data logging and telemetry facilities installed. All sites using more than 10 TJ per annum also need to have telemetry installed at the meter installation. Currently all such installations comply with this requirement.

Metering pressures range from 1.125 or 2.75 kPa for domestic installations and up to 200 kPa for I&C consumers.

Management of meters is governed by the Queensland Gas Act, Regulations and Distribution License requirements, as defined in the Queensland Networks Gas Measurement Scheme

Version 3. This Plan was developed by APA and is audited by the Queensland Department of Mines and Energy.

Details of meter families including type of meter volumes and age profiles are given in the Queensland Networks Gas Measurement Scheme Version 3.

There are predominantly 3 main types of meters used:

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

Details including, numbers and age are available in the Gas Measurement Management Plan

New meter specifications mandate that the minimum standard of accuracy of metering installations is within a margin of accuracy of plus or minus 1 percent of the volume of gas delivered at that site which is tighter than the plus/minus 1.5% specified in AG 702 and in the Petroleum and Gas (Production and Safety) Act and Regulations 2004.

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

6.6.2 Growth

In 2008/09 there were 3,080 new meter installations in Queensland. Of these 2,909 were domestic consumer sites and 171 were I&C consumer sites. It is customary to install a new meter for domestic consumers and either a new or refurbished meter for I&C consumers. Domestic consumers are also provided with a meter box for new building sites.

6.6.3 Operation & Maintenance

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:

6.6.3.1 Low Pressure Installations

These sites all have smaller diaphragm meters and no routine maintenance is carried out unless the consumer, retailer or APA personnel report a problem.

6.6.3.2 Elevated Pressure Installations with Remote Telemetry and Correcting Instruments

The sites are 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.

6.6.4 Renewal/Upgrade/Disposal

6.6.4.1 Meter Removal/Replacement

Modern meters are changed under the extended performance using Australian Standard *AS/NZS 4944: 2006 – Gas Meters In Service Compliance Testing*.

Meter replacement is governed by the following criteria detailed in the Queensland Networks Gas Measurements Scheme.

6.6.4.2 Extended Field Life Program – Meters < 25m3/hr

All meters with a capacity less than 25 m3/hr are on a field life extension program. To date they have been extended up to 22 years in the field. Once these meter groups fail they will be removed, repaired or refurbished, tested, calibrated and returned to the field.

6.6.4.3 Fixed 10 year Term - Meters < 25m3/hr

Older meters that fall under the following conditions are changed at intervals not exceeding 10 years. These are all listed in Appendix A of the Queensland Networks Gas Measurements Scheme Version 3.

The field life of a meter family may be extended annually after testing a statistical sample from the meter family. This condition monitoring process may be repeated annually until the end of the technical life of the meter family.

6.6.4.4 Fixed 10 year Term - Meters > 25m3/hr

All meters with a capacity greater than 25 m3/hr are installed with a fixed 10-year life. After this period they are repaired or refurbished, tested, calibrated and then returned to the field.

Meters that do not satisfy accuracy requirements are disposed of.

Each year Envestra requires APA to undertake a meter change-over program to replace meters that have reached their approved life span. All meters are deemed to have a 10 year life unless otherwise approved by the technical regulator. The families of meters that have been approved different life spans are listed in the Queensland Networks Gas Measurement Scheme Version 3.

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

All diaphragm meters that have the fixed 10 year term are not repaired but are condemned and scrapped.

6.7 Network Control & Monitoring Life Cycle Plan

6.7.1 Overview

The SCADA system is used to monitor gas flows, security system, valve status, gas composition, CP potentials, pressures, temperatures as well as various other alarms. Valves may be remotely actuated to turn off various installations. Actuated pressure controllers can be remotely changed to manage the flows throughout the network should an emergency situation arise.

A SCADA system is used for monitoring reporting consumption for Demand customers. This includes:

- Collection of raw data;
- Transmission of data to a central data storage system;
- Calculation and verification;
- Reporting to pipeline transporters and Retailers.

A purpose built database incorporating CITECT SCADA software, remote terminal units (RTUs) and a communications network using telephone (GSM, next G,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 control and 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.

There are 29 district regulator stations and 11 gate stations on the SCADA systems as well as 29 pressure monitoring sites within Envestra's Queensland networks.

6.7.2 Asset Performance, Condition & Integrity

Operational Risk Management KPIs indicate that 100% availability has been maintained within the SCADA system for both consumer metering and pressure surveillance.

6.7.3 Growth

SCADA monitoring points grow "organically" in line with additional I&C customer connections, district regulator installations and expansion of the networks.

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. Over the last 5 years the move to standard communication protocols (GSM/GPRS) has driven changes to field devices using telecommunications.

The technical life of equipment varies depending on its function and design, and breakdown maintenance numbers are monitored so that it can be determined when it is economically viable to replace/upgrade rather than continue to repair.