

Jemena Asset Management Pty Ltd

Safety Case (SAOP) of Jemena Gas Assets (NSW)

Protected

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TABLE OF CONTENTS

Abbreviations	v
1. Safety Case Purpose and Objectives.....	7
1.1 Purpose.....	7
1.2 Safety Case Intended Audience and Benefits.....	8
1.3 Objectives	9
1.4 Scope.....	9
1.5 About Jemena.....	10
1.6 Safety Risk assessment and Risk Management Philosophy.....	11
1.7 Risk appetite.....	12
1.8 Risk based asset management	13
1.9 Overview of risks faced by Jemena.....	16
1.10 Gas safety risks	17
2. Asset description.....	18
3. Operating Environment.....	20
3.1 Stakeholders / community expectations.....	20
3.2 Historical performance and trends	21
3.3 Asset Condition and integrity	24
4. Safety Risk assessment and Management.....	25
5. Safety management system.....	27
5.1 Asset Management System Overview	27
5.2 Safety Management Process	29
5.3 Compliance Assurance Matrix Mapping.....	33
6. Emergency management system	34
7. Governance (Management Review and Assurance).....	35

List of tables

Table 1-1: Safety Case Elements	8
Table 1-2: Jemena Assets.....	10
Table 1-3: Risk acceptability, prioritisation and escalation	12
Table 4-1 Safety Assessments	26
Table 7-1: Key Positions – Accountabilities / Responsibilities.....	37

List of figures

Figure 1-1: Company Structure	11
Figure 1-2: Risk Management Framework.....	14
Figure 1-3 Enterprise Risk Management Framework	16
Figure 3-1 Unaccounted for Gas	22
Figure 3-2 Unplanned Outages	22

TABLE OF CONTENTS

Figure 3-3 Compliance with Priority A Incidents	23
Figure 3-4 Repaired Public Reported Gas Leaks.....	23
Figure 3-5 Third Party Damages.....	24
Figure 5:1: Jemena Asset Management System Document Hierarchy	28
Figure 5:2 Jemena Asset Management Level 2 Processes	29

List of appendices

Appendix A	Asset Description
Appendix B	Safety Management Manual
Appendix C	Compliance Assurance Matrix
Appendix D	Specific Jurisdiction Requirements

ABBREVIATIONS

ABS	Asset Business Strategy
ACM	Asset Class Management
ACS	Asset Class Strategy
ACT	Australian Capital Territory
AIP	Asset Investment Plan
ALARP	As Low as Reasonably Practicable
AM	Asset Management
AMP	Asset Management Plan
AMS	Asset Management System
AMT	Area Management Team
APAIR	Asset Performance and Integrity Review
APSC	Asset and Public Safety Committee
AS	Australian Standard
ASA	Asset Services Agreement
COWP	Capital & Operational Work Plan
D&C	Design & Construction
DAMS	Distribution Management Services
DFA	Delegated Financial Authority
ECMS	Enterprise Content Management System
EGP/VicHub	Eastern Gas Pipeline/VicHub
EMP	Emergency Management Plan
EMT	Emergency Management Team
FSA	Formal Safety Assessment
GIS	Geographic Information System
GSMRC	Gas Safety Management Review Committee
HAZOP	Hazard and Operability Study (HAZOP)
HSEC	Health Safety and Environment Council
HSEQ	Health Safety and Environment Quality
ISO	International Organization for Standardization
JCARS	Jemena Compliance and Risk System

ABBREVIATIONS

JGN	Jemena Gas Networks
NSW	New South Wales
O&M	Operation & Maintenance
QLD	Queensland
RHSEC	Risk, Health, Safety & Environment Committee
SAOP / PMP	Safety and Operating Plan / Pipeline Management Plan referred to as safety case
SD	Service Delivery
SGSPAA	State Grid Singapore Power Australia Assets
SMS	Safety Management Study
VIC	Victoria
WMS	Works Management System

1. SAFETY CASE PURPOSE AND OBJECTIVES

This document is Jemena's Safety Case for its Gas Assets. The document provides a summary of the approach to managing gas safety risks and is made up of the following seven elements:



This Safety Case describes the operation and maintenance of gas assets in a safe and reliable manner. The arguments and evidence for safety is assured by an appropriate Asset Management System operating under a controlled environment in accordance with the applicable gas legislation and regulatory instruments across various Australian jurisdictions.

The Safety Case represents a commitment by Jemena to ensure its assets are operated and maintained in a controlled environment with the purpose and objective that assure:

- The safety of the public and persons working on or near the gas assets
- The protection of property and environment
- The prevention of uncontrolled release of gas
- The commitment to prevent the delivery of out-of-spec Gas and
- The protection of the community from threats to safety arising from overpressure and the loss of supply.

1.1 PURPOSE

The purpose of this Safety Case is to demonstrate and communicate a convincing and evidence-based safety argument for the management of gas assets throughout their life cycle, providing a description of:

- The network, including network design, configuration, asset types, location and geography, and technical and management challenges related to the safety argument;
- The nature of gas safety risks faced by the business;
- The methodologies used to identify and assess network safety risks;
- Risk appetite which is "the amount and type of risk that the organisation is willing to take in order to meet its strategic objectives";
- How gas safety risks are controlled to minimise these risks as far as practicable, including providing evidence of control effectiveness; and
- The extent and role of asset management and safety management systems in ongoing management, monitoring and governance.

1.2 SAFETY CASE INTENDED AUDIENCE AND BENEFITS

The Safety Case is intended to inform and educate external stakeholders including government bodies, economic and technical regulators, local communities and customers. To facilitate understanding by external stakeholders who may have limited knowledge of gas technical matters, the Safety Case provides a simple explanation of the nature of gas safety risks and Jemena’s approach to risk management. The structure of the Safety Case aims to enable stakeholders to review particular areas of interest without reading the entire document. Table 1-1 provides a list of the safety case elements described:

Table 1-1: Safety Case Elements

<ul style="list-style-type: none"> • Asset Description, providing a description of physical infrastructure that make up the asset including in-built component or parts available for use in case of emergency with the purpose to prevent unintended consequences as well as maintain asset objectives. 	Element 2
<ul style="list-style-type: none"> • Operating Environment providing context related to: <ul style="list-style-type: none"> ○ stakeholders ○ community expectations ○ historical performances and trends ○ asset condition and integrity. 	Element 3
<ul style="list-style-type: none"> • Safety Risk Assessment and Management providing an overall framework understanding of Jemena’s <ul style="list-style-type: none"> ○ Risk Identification , analysis and evaluation tiny ○ Risk Management – application of resources and controls to risk processes ○ Significant Risks – provision of asset risk registers. 	Element 4
<ul style="list-style-type: none"> • Safety Management System describing the Safety Management System and supporting processes that Jemena has in place to provide for the safe and reliable operation of gas assets (transmission and distribution) in accordance with Jemena’s operational, societal and environmental objectives as well as legislation, industry standards and specific pipeline licence conditions. 	Element 5
<ul style="list-style-type: none"> • Emergency Management System providing the system for managing events which are impacting on the business and have been classified as being and emergency. 	Element 6
<ul style="list-style-type: none"> • Governance (Management Review and Assurance) providing the basis by which Jemena assures that its asset management systems have adequate processes and systems in place to satisfy the safety case purpose and objectives, meets applicable statutory and regulatory requirements and maintains and improves Jemena reputation and stakeholder expectations. 	Element 7

1.3 OBJECTIVES

1.3.1 BUSINESS OBJECTIVE AND STRATEGIES

Jemena is committed to meeting its legislative and regulatory requirements to operate and maintain a safe and reliable asset in Australia.

Our key corporate objectives and strategies are:

- **Safety:** Embed a world class safety culture by implementing our People Safety and Environment (PSE) strategy to build and continuously improve leadership culture, manage Gas risks and safeguard the health and well-being of all personnel.
- **Customer:** Deliver energy services that are safe, reliable, affordable and responsive to our customers' preferences.
- **People:** Be a high performing and engaged workplace that attracts, develops and retains industry leaders.
- **Performance:** Deliver operational and financial efficiencies aligned to the business plan.
- **Growth:** Grow scale to be an influential market leader with strong customer, regulatory, stakeholder and community relationships. Deliver financial performance that is superior to our industry peers.

Further details of Jemena's business objectives and strategies can be found in the Jemena Business Plan 2015-2020.

1.3.2 SAFETY CASE OBJECTIVES

The objectives of the Safety Case are to:

- Present a set of reasoned safety arguments and evidence that the asset is operated and maintained in a safe and reliable manner within a controlled operating environment in accordance with applicable legislative and regulatory instruments across various jurisdictions in Australia,
- Describe the assets and the controls that are applied to eliminate or mitigate these risks to asset safety, people and environmental to acceptable levels .
- Inform stakeholders of the context, operating environment and challenges faced in identifying, assessing and controlling gas safety risk.

1.4 SCOPE

The scope of the Safety Case is Jemena Gas Networks, Jemena Licenced Gas Pipelines 1,2,3, 7,8 and Jemena Colongra Pipeline 33. Details described in Appendix A.

1 — SAFETY CASE PURPOSE AND OBJECTIVES

This Safety Case addresses the requirements of AS 2885 and AS 4645 standards and includes information as required by the relevant legislative and regulatory requirements.

1.5 ABOUT JEMENA

Jemena Limited owns and operates a diverse portfolio of energy and water infrastructure assets across the east coast of Australia. With more than \$9 billion worth of major utility infrastructure, we supply millions of households and businesses with essential everyday services.

The following Table 1-2 lists 100 per cent ownership by Jemena Limited:

Table 1-2: Jemena Assets

Asset	Description
Jemena Gas Network	Established in 1837, the 25,000 km system delivers gas to more than 1.3 million homes, businesses and industrial customers in New South Wales.
Queensland Gas Pipeline	627 km pipeline delivers gas from the Surat/Cooper Basin to the Gladstone and Rockhampton markets
Eastern Gas Pipeline	797 km pipeline delivers gas from Victoria's Gippsland Basin to Sydney, the ACT and regional New South Wales
VicHub	Our pipeline interconnect enables gas to flow between the Eastern and Tasmanian Gas Pipelines as well as the Victorian gas transmission network
Darling Downs Pipeline	The pipeline is three interconnected gas transmission pipelines in the Darling Downs region in South East Queensland that operate as a single pipeline network and span 292km in length
Colongra Gas Transmission and Storage Facility	pipeline and compressor station transports and stores gas for Delta Electricity's 667 MW gas fired peaking generator
Aquanet Rosehill Recycled Water Scheme	20 km recycled water scheme transports 20 million litres of water per day to the industrial centres of Western Sydney.
Jemena Electricity Network	The 6,301 km system delivers electricity to more than 327,000 homes and business in north-west Melbourne

Jemena Limited is 60% owned by State Grid of China (SG) and 40% by Singapore Power (SP) via State Grid Singapore Power Australian Assets (SGSPAA) Pty Ltd. Figure 1-1 provides the company structure.

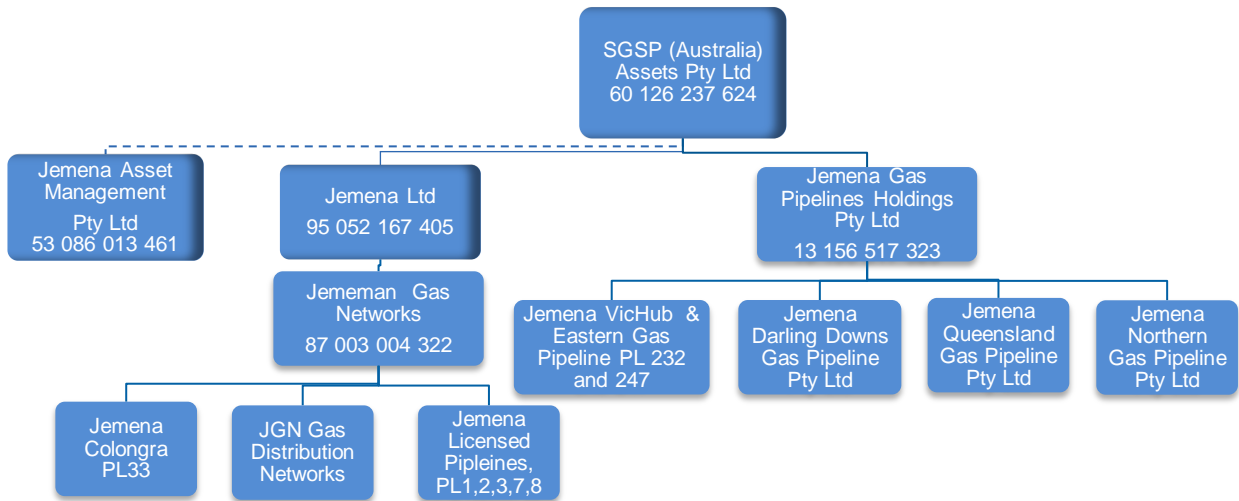


Figure 1-1: Company Structure

1.6 SAFETY RISK ASSESSMENT AND RISK MANAGEMENT PHILOSOPHY

Gas safety risks may arise from a number of issues including failure or deterioration of an asset. On a pragmatic basis, Jemena will seek to remove the risk and if this is not possible, will mitigate the risk as far as practicable. Jemena draws on its safety management policies, philosophies and commitments to risk management. Accordingly, the policies aim at the following:

- Managing our assets without compromising employees, contractors and public safety as per the Jemena Health and Safety Policy and Compliance with the Law Policy;
- Managing our assets in an environmentally sustainable manner in support of the Jemena Environmental Policy;
- Complying with all relevant regulatory and legislative requirements;
- Meeting our stakeholder and customer expectations;
- Ensuring that asset management plans deliver against corporate and business plan objectives;
- Applying the Jemena risk management approach to asset management and related activities; and
- Facilitating continual improvement in the safety, reliability and performance of our assets, through the establishment, maintenance and governance of effective asset and safety management systems.

Jemena’s asset management philosophy is the coordinated activity Jemena undertakes to realise value from assets. It involves the balancing of costs, opportunities and risks against performance of assets to achieve Jemena’s Business Plan. An effective AMS enables Jemena to direct, coordinate and control asset management activities throughout an asset’s whole life. It facilitates an optimal mixture of capital investments, operations, maintenance, resourcing, risks, performance, sustainability and good governance. In order to drive good practice asset management throughout Jemena, a systematic, documented AMS has been established which is consistent with the requirements outlined in ISO 55001, and in alignment with the Institute of Asset Management (IAM) ‘Asset Management – An Anatomy’.

Currently Jemena is working towards certification of its AMS to the international standard ISO 55001 - *Asset Management-Management Systems* (by quarter four 2018) which is underpinned by ISO 31000:2009 Risk Management (a global standard for risk management). ISO 55001 emphasizes identifying and controlling risks affecting internal and external stakeholders of the defined asset portfolio, while looking for opportunities for continuous improvement throughout the asset life cycle.

1.7 RISK APPETITE

Our *Risk appetite* is the amount and type of risk that Jemena is willing to take in order to meet our objectives.

Jemena’s risk appetite is determined by the Board and underpinned by our legislative obligations.

Jemena’s risk appetite is reflected in the Jemena corporate risk matrix which is a table used during risk assessment to define the various levels of risk as the product of the harm probability categories and harm severity categories. (Refer to Table 1-3 for further details).

In general, risks are identified and analysed via workshops which allow the subject matter experts to define the risks, consequences and likelihoods which in turn is used to assign the risk rating. Once the risk is analysed, to minimise the risks as far as practicable, attempts are first made to eliminate the risk and only when the risk cannot be eliminated then the risks are then mitigated using appropriate strategies.

The prioritisation of risk for attention across the different levels of management is set out in the Table 1-3 below:

Table 1-3: Risk acceptability, prioritisation and escalation

Risk Rating	Acceptability	Action	Timing
EXTREME	<p>Generally Intolerable.</p> <p>Cannot be accepted except under extraordinary circumstances with approval at Board-level.</p>	<p>Requires immediate action. Highest priority to treat risk.</p> <p>Senior level monitoring.</p>	<p>Action plans prepared and normally implemented within 1 month.</p> <p>Status of risk should be monitored monthly.</p>

Risk Rating	Acceptability	Action	Timing
HIGH	ALARP or Tolerable Region. Must drive risks towards Broadly Acceptable Region.	Requires immediate attention – must manage with senior level monitoring. Includes Jemena Executive Team oversight of Unlikely Likelihood, Catastrophic Consequence Events.	Action plans prepared and normally implemented within 3 months. Status of risk should be monitored monthly.
SIGNIFICANT	Risks only tolerable if further risk reduction is impracticable and cost of reducing the risk is grossly disproportionate to the benefits gained.	Requires Management attention with a degree of priority. Includes Jemena Executive Team oversight of Rare Likelihood, Catastrophic Consequence Events. High level monitoring.	Action plans prepared and normally implemented within 6 months. Status of risk should be monitored every 6 months.
MODERATE	Broadly Acceptable Region	Requires routine to periodic monitoring.	Action plans prepared and normally implemented within 6 months. Status of risk should be monitored at least every 6 months.
LOW	Risk reduction may be disproportionate to benefits gained	"Business as usual" - should be reviewed at least annually. Managed by routine policies and procedures.	Ongoing control as part of a management system. Risk Facilitators to maintain register of Low risks and reassess annually.

1.8 RISK BASED ASSET MANAGEMENT

Jemena's Risk Management process is in alignment with the AS/NZS ISO 31000 to its Risk Management.

Jemena is committed to risk-based asset management. Risk management is implemented at all functional levels to the appropriate risk appetite to meet the business and safety case objectives. Jemena has a well-developed Corporate Risk Management process tailored to meet all contingencies, in alignment with the Jemena Group Risk Management Manual. These procedures ensure that strategic, tactical and operational decision making is applied consistently across the organization.

Risk assessment is the overall process of risk identification, risk analysis and risk evaluation. Risk assessments are usually completed in workshops facilitated by members of the Asset Risk and Assurance team and attended by managers, subject matter experts, employees and contractors.

The risk assessments are documented within a risk register and they are updated and reassessed periodically to ensure that the risks and their controls are current, relevant and reliable.

Jemena’s Risk Management Framework is shown in Figure 1-2:

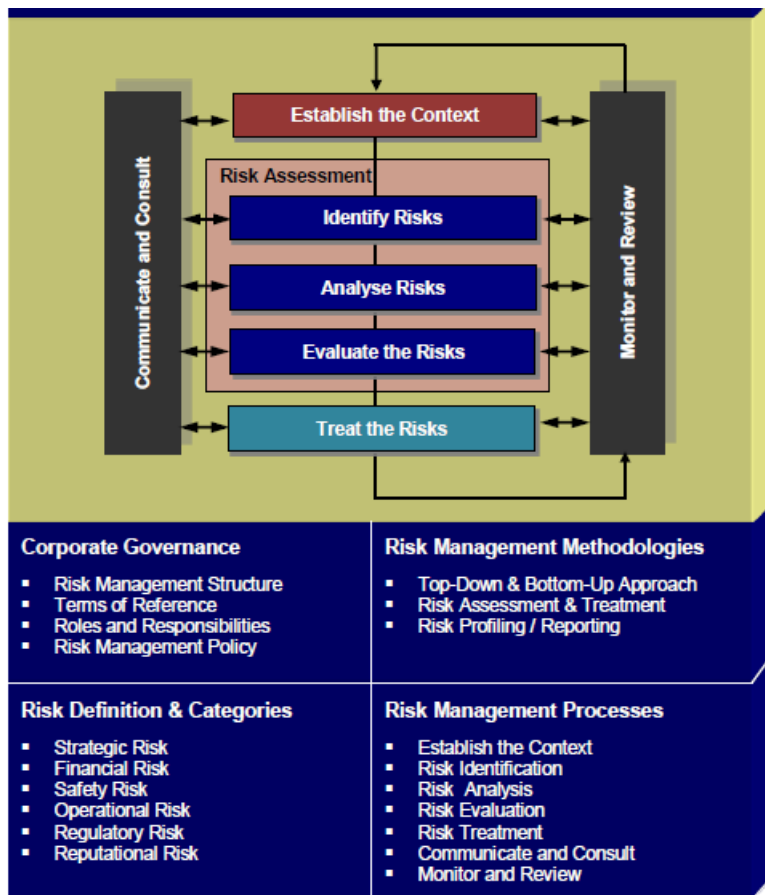


Figure 1-2: Risk Management Framework

The General Manager, Internal audit and Risk (**IA & RISK**) supports the Executive Risk and Management Committee, Managing Director and Risk, Health, Safety & Environment Committee (RHSEC) in their governance roles and has a dual reporting line, with a solid line reporting relationship to the RHSEC and a dotted line reporting to the SGSPAA Managing Director. The Risk Manager is responsible for ensuring regular and structured communication between all External Service providers, Risk Facilitators and the Jemena Risk team.

The following sub-committees function under the RHSEC, which evaluate all relevant risks:

- Health Safety and Environment Council (HSEC) – deals with health, safety and environmental risks.
- Asset Public Safety Committee (APSC) – deals with asset and public safety.
- Asset Management System Review Committee – AMS Management Review
- Gas Safety Management Review Committee (GSMRC) – deals with gas risks.

The Managing Director SGSPAA uses the above committees to facilitate the development of a common risk management approach across SGSPAA by:

- Implementing a Risk Management Framework.
- Sharing information that has broad applicability across all areas of the business
- Reporting on the progress of implementing the Risk Management Framework
- Chairing the Executive Risk Management Committee.
- Integrating risk management as part of business-as-usual activities.

SGSPAA recognises that effective risk management requires three key pillars to be in place, namely:

- SGSPAA Board and Senior Management oversight.
 - Sound risk management policies and procedures.
 - Active participation by all personnel to risk management practices.
- The SGSPAA Board has corporate governance responsibilities and meets on a monthly basis to discuss risk prioritisation, escalation, risk management and reporting requirements to fulfil Jemena's safety objectives and legal requirements.

Figure 1-3 below represents the arrangements for senior management oversight of the Risk Management Platform.

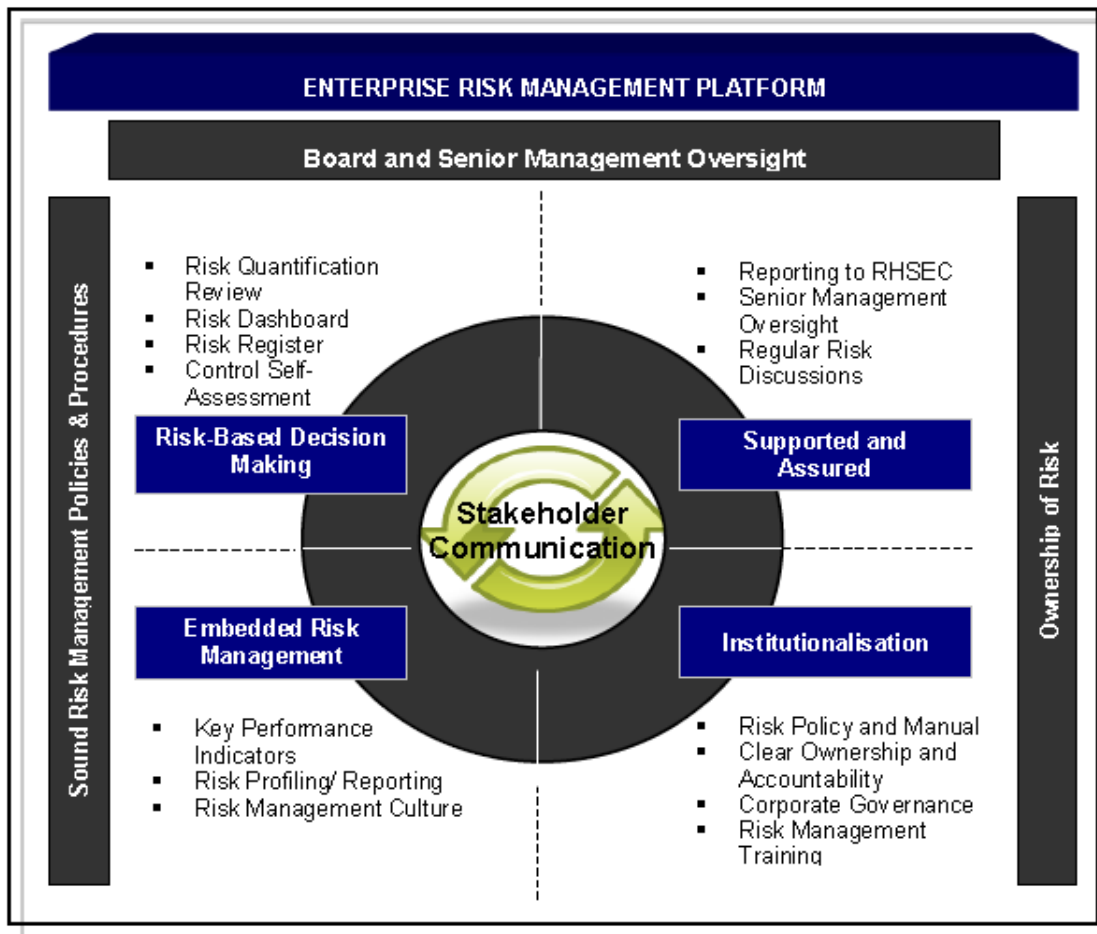


Figure 1-3 Enterprise Risk Management Framework

1.9 OVERVIEW OF RISKS FACED BY JEMENA

For the purpose identifying and efficiently managing risk, Jemena adopts the following six risk categories:

- **Strategic Risk**- Risks that prevent Jemena from achieving its strategic objectives and impacts the business model.
- **Financial Risk**- Risks associated with inadequate financial management or a loss arising from changes in the financial market variables.
- **Safety Risk, including Gas Safety Risk**- Risks associated with Workplace Health and Safety, including physical and mental harm to any person contributed by Jemena’s assets or personnel.
- **Operational Risk**- Risks which have adverse impacts on quality, cost and performance of the gas safety resulting from failed processes, policies, systems and people or from external events. They can broadly be sub-classified as risks associated with *Asset Management, Asset Security, Technical, Project Management, Environment, Disaster Recovery, Emergency Management, Commercial Management, Human Resources, Business Continuity, Information & Communication Technology and Regulatory and Compliance*.

- **Regulatory Risk-** Risks associated with additional scrutiny by a regulator or risks from regulatory/legislative changes or uncertainty emerging from any such changes.
- **Reputational Risk-** Risks attributed to negative publicity that impacts the brand, image or confidence of stakeholders in the business.

1.10 GAS SAFETY RISKS

For the purpose of identifying, assessing and controlling gas safety risk, the following risk categories are considered significant and underpinned by this safety case.:

- Uncontrolled release of gas
- Overpressure of downstream gas supply
- Delivery of 'out of spec' gas quality
- Loss of Supply

2. ASSET DESCRIPTION



The asset description is documented as required by AS 4645 and AS2885 for the specific asset and describes the activities, or operation, and configuration of the asset and details technical and other control measures identified as a result of safety assessment of the pipeline.

The asset description is outlined as follows:

1. Overview Map – Typically a GIS Map and any additional imagery
2. Pipeline system specification
3. Facility Components
4. Operating parameters.

This document includes all the assets associated with the Jemena NSW Gas Distribution Network and Jemena Colongra Pipeline.

JEMENA NSW GAS DISTRIBUTION NETWORK

The Jemena NSW Gas Distribution Networks includes over 26,000km of pipelines and mains of various sizes and Maximum Allowable Operating Pressures (MAOP), ranging from 6,895kPa to 2kPa. The pipes are divided into their MAOP as summarised below and include associated systems and services, such as cathodic protection equipment and valves.

- Trunk Pipelines (MAOP of 6,895 kPa), including :
 - License 1 – Wilton to Horsley Park Natural Gas Pipeline;
 - License 2 – Wilton to Wollongong Natural Gas Pipeline;
 - License 3 – Horsley Park to Plumpton Natural Gas Pipeline;
 - License 7 – Plumpton to Killingworth Natural Gas Pipeline; and
 - License 8 – Killingworth to Kooragang Island Natural Gas Pipeline.
- Primary Mains (MAOP of 3,500 kPa), including :
 - Sydney Primary Mains;
 - Sydney Primary Loop;
 - Penrith Primary Mains; and
 - Wollongong Primary Mains.
- Secondary Mains (MAOP of 1,050kPa); and
- Medium and low pressure mains (MAOP of 400kPa, 300kPa, 210kPa, 100kPa, 30kPa, 7kPa, 2kPa).

The Jemena NSW network distributes natural gas from the transmission pipeline receipt points to gas customers via a series of pipelines.

JEMENA COLONGRA PIPELINE

The Jemena Colongra Pipeline has the pipeline Licence Number 33 which commences at the outlet of the Munmorah Off Take Metering Station (MOMS) and runs approximately 13km to the Colongra Power Stations. The MOMS is located off the Jemena NSW Licence 7 pipeline. There are six sections that make up the Colongra Pipeline :

- The Munmorah Compressor Station (MCS);
- The Munmorah Gas Pipeline (MGP) Feeder (MAOP 13,000kPa);
- The MGP Interconnect (MAOP 13,000kPa);
- The Munmorah Gas Pipeline (MGP) (MAOP 13,000kPa);
- The Munmorah Delivery Station (MDS);
- The Munmorah Delivery Pipeline (MDP) (MAOP 3,600kPa).

Refer to Appendix A for details.

3. OPERATING ENVIRONMENT



Jemena operates in an environment defined by its asset characteristics, ownership and control, stakeholders, regulatory objectives and financial considerations. The operating environment is crucial in managing and future proofing asset safety and reliability and enable the business to remain focussed on the key gas safety risks. Refer 1.10

Jemena's view of its operating environment aims to meet expectations and commitments as set out by the following business drivers and in compliance with applicable legislative and regulatory requirements:

- Stakeholders / Community expectations
- Historical performances and trends
- Asset condition and integrity.

3.1 STAKEHOLDERS / COMMUNITY EXPECTATIONS

Ownership, operation and maintenance of public utility gas asset infrastructure places *inherent* (implied) and *stated* expectations on Jemena and is collectively viewed under the stakeholder and community expectations.

Jemena stakeholders include investors (typically the board), technical and commercial regulators, emergency services, voluntary subscription entities, the local communities and customers, retailers, market determinants, contractors and employees.

The '*stated*' requirements are nominally dictated by the various gas safety codes and the legislative requirements. In addition, the '*implied*' requirements (perceived or collated expectation) is captured through various consultative and communication channels with the community/public and other stakeholders. This allows Jemena to respond to changes or emerging business needs and remain focussed to evolving operating environments. Also included is the ability to provide the necessary assurance to the communities with respect to asset safety and reliability, the emergency response arrangements through various community engagements and involvements processes.

The asset management system (underpinned by Jemena corporate objectives) is the system by which these expectations are satisfied. The system allows a process for effective decision (strategic, tactical and operational) making and deployment of effective interventions to operate and maintain assets satisfying stakeholder / community expectations

3.2 HISTORICAL PERFORMANCE AND TRENDS

Jemena demonstrates performance to the technical or other regulators and internal management with regards to safety. The key reporting is against a set of specified requirements by the regulators as well as those established internally by Jemena. The results of reported performance that are publicly available and help support stakeholders towards planning and assessments needs. Gas Networks and Pipelines reports reflect status of distribution and transmission assets respectively to the community.

The publicly available reports on performance and trends can be accessed from the respective regulatory entity websites and includes a status summary of the following performance measures.

- Asset Information
- Network Integrity and Safety information
- Network Reliability and Consumer Related Matters
- High Pressure (unlicensed) Pipelines Activities
- Accidents Escapes and Ignition
- Operational Performance

Key parameters reported in the “Energy Network Australia National Benchmarking Report” include the following

- **Unaccounted for Gas** Figure 3-1,
- **Reliability and Safety** (Unplanned Outages Figure 3-2)
- **Compliance with Priority A Incidents** (Figure 3-3),
- **Repaired Public Reported Gas Leaks** (Figure 3-4)
- **Third Party Damages** (Figure 3-5)

Feedback included in the publicly available reports notes that the network operations continue to manage and grown the assets in a safe and reliable manner.

3 — OPERATING ENVIRONMENT

2. Unaccounted for gas

Chart 2.1: Unaccounted for gas

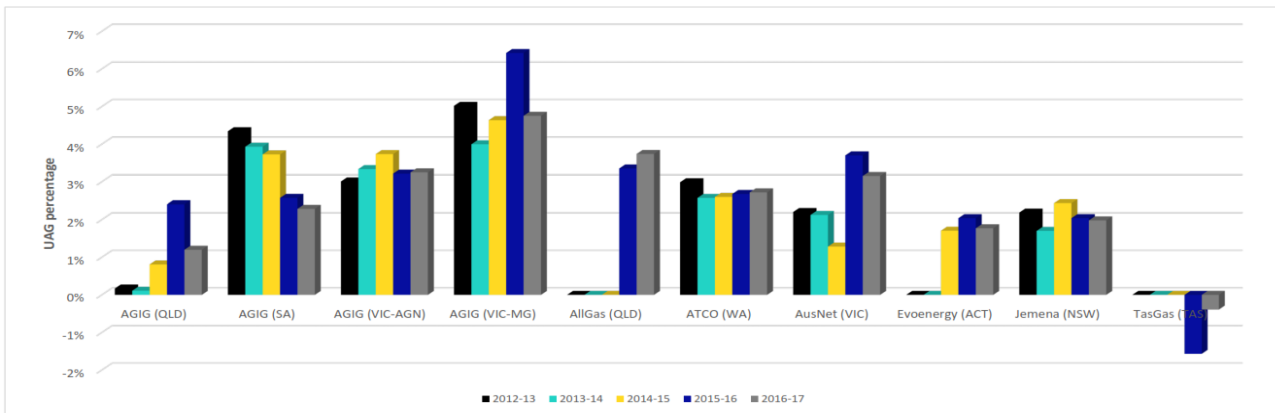


Figure 3-1 Unaccounted for Gas

3. Reliability and safety

Chart 3.1: Unplanned outages affecting 5 or more customers, per 1,000 customers

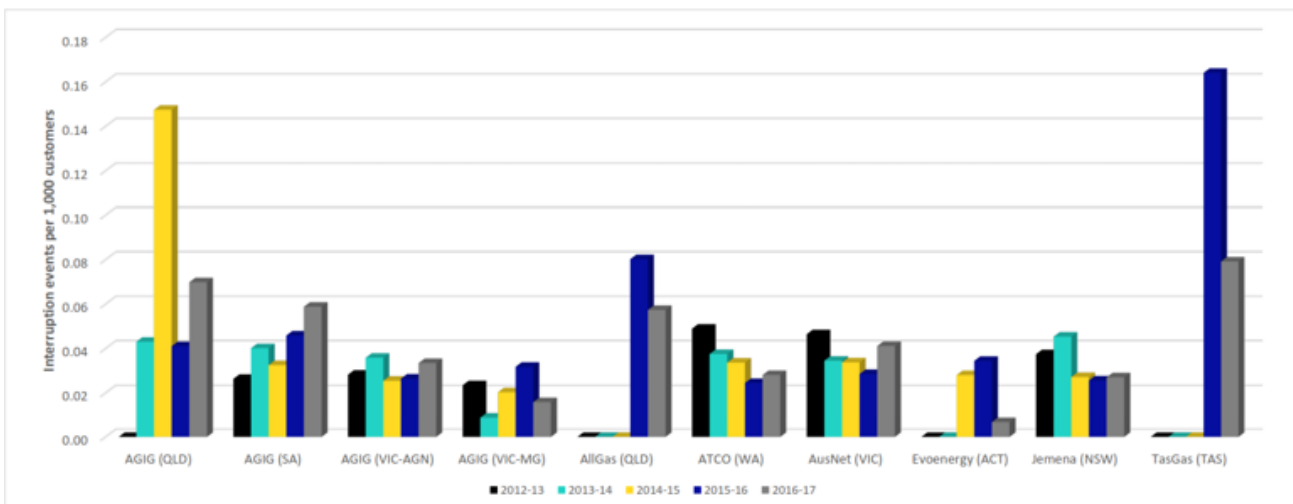


Figure 3-2 Unplanned Outages

Chart 3.15: Compliance with Priority A incidents (the percentage of the time that someone arrives on site within 60 minutes)

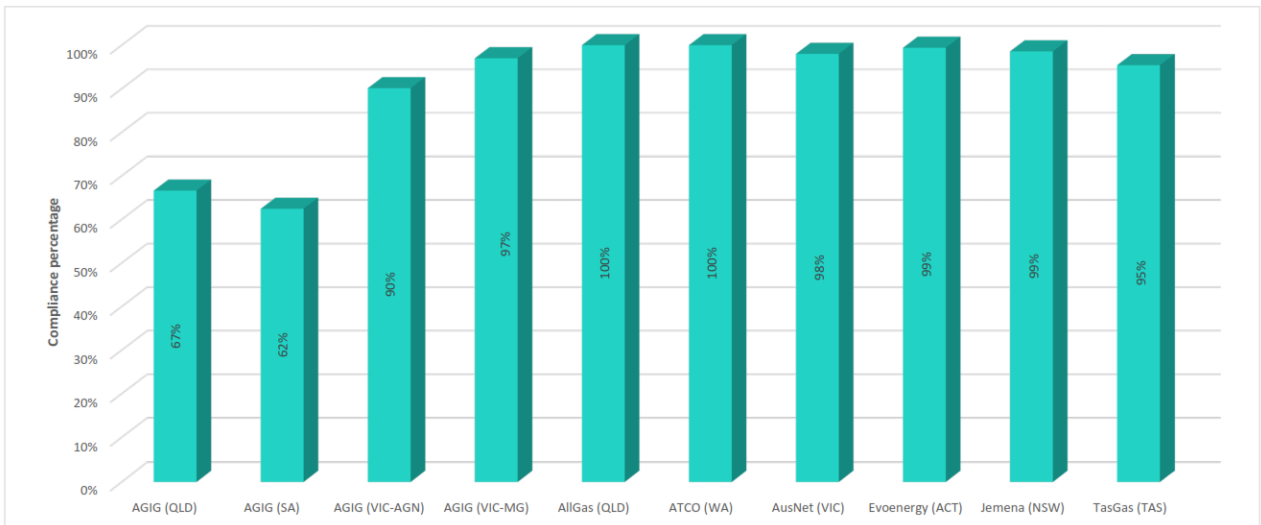
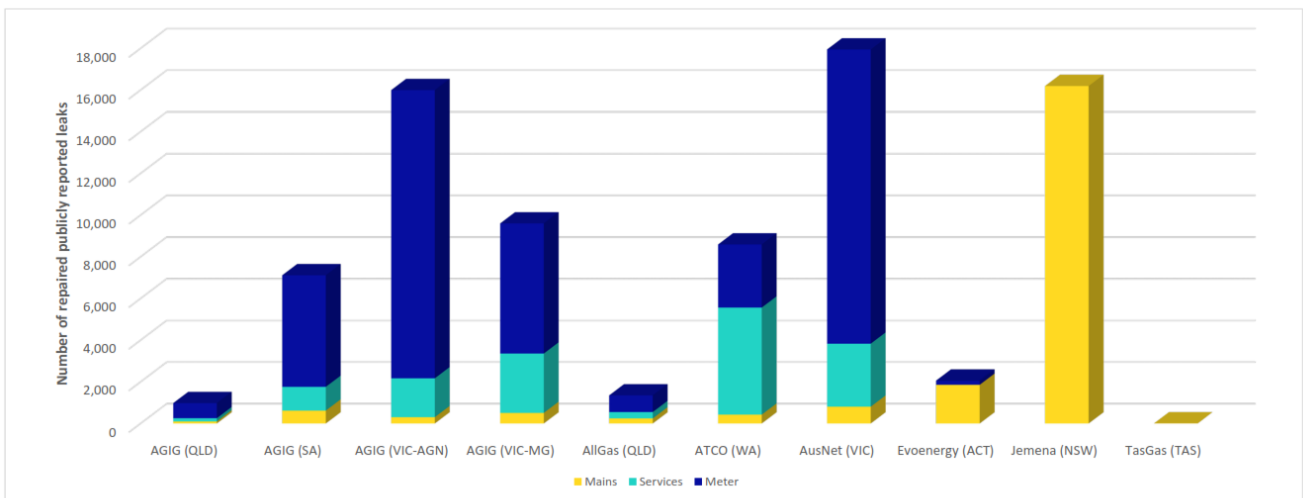


Figure 3-3 Compliance with Priority A Incidents

Chart 3.8: Repaired publicly reported leaks



Note: Jemena and Evoenergy reported all the reported leaks as 'Mains'.

Figure 3-4 Repaired Public Reported Gas Leaks

Chart 3.11: Third party damages - services and mains

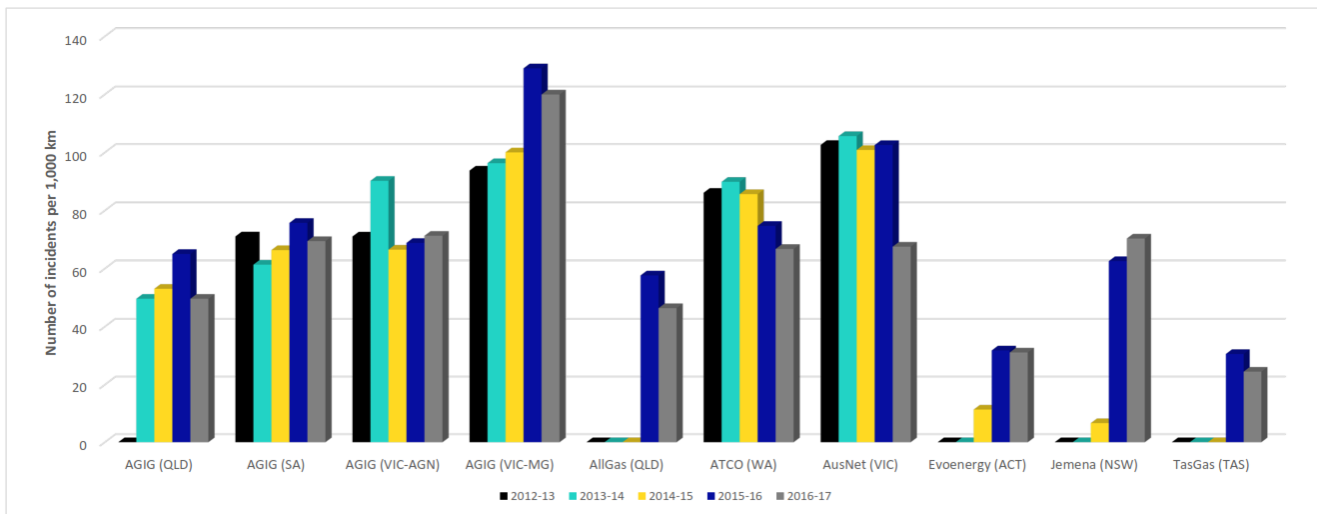


Figure 3-5 Third Party Damages

Internally Jemena monitors and reports monthly on key performance indicators for each asset (as per its operating licence). The measures enable to respond to changing operating environment with appropriate asset management intervention and meet its core business objectives. These include:

- Asset Safety
- Asset Performance
- Emergency Response and Customer Outages
- Asset Condition
- Control Effectiveness
- Network Imbalance..

3.3 ASSET CONDITION AND INTEGRITY

Asset safety and performance can be impacted in many ways along the lifecycle of the asset. These include a range of issues from poor design and construction to inadequate maintenance or operational procedures through to third party activities. The case for safety of the assets must therefore consider these various aspects that affect asset condition and integrity and thereby to asset safety. The process of assessing this done through periodical monthly monitoring and reporting as referred in section 3.2 and internal reporting through the annual Asset Performance and Integrity Review (APAIR) process. APAIR allows the effective application of asset management strategies and plans to meet its core business strategy and objectives and help maintain asset safety within the operating environment i.e., exposure and proximity to communities, impacts to environment and people safety working with or near gas assets.

4. SAFETY RISK ASSESSMENT AND MANAGEMENT



The gas asset safety risk assessment and management is an assessment, or series of assessments essentially reinforced by risk principles as noted in element 1 of this document. These asset risk assessments includes the following structured methodologies.

- Safety Management Study
- Formal Safety Assessment
- Hazard and Operability Study (HAZOP)

To establish the 'line-of-sight' from the perspective of the AMS, the Strategic Business Objective level risks are flowed down into asset specific risks and maintained via the asset risk register loaded in the Jemena Compliance and Risk System (JCARS).

AMS risks are periodically evaluated to determine if they are at As Low as Reasonably Practicable (ALARP) (or continue to remain) at a level that is within the risk appetite taking into consideration a robust control effectiveness assessment. These assessments occur through a combination of self-evaluation and facilitated workshops (via Asset Risk and Assurance, an independent function within Jemena Asset Management).

The requirements to assess asset safety is underpinned by:

- Asset Risk Management Guideline (JEM-AM-GU-0007)
- Safety Management Manual GAS-999-OM-HSE-001.

Table 4-1 summarises the various safety assessments applied within the business.

Table 4-1 Safety Assessments

Safety Assessment	Purpose/ Intent	Reference
Asset Risk Register ISO 31000	Platform to capture risk against each asset class	JCARS - Asset Risk Register
Formal Safety Assessment(FSA) AS 4645	A process to identify gas distribution network threats and hazards and assess the risk of these threats and determine controls required to meet the acceptable risk level	GAS-999-PR-RM-001
Hazards and Operability Study (HAZOP) AS 2885, AS 61882	A structured and systematic technique to identify and assess hazards inherent in the design, operation and maintenance of the facilities	JEM AM PR 0018
Safety Management Studies(SMS), AS 2885	A process to identify pipeline system threats and hazards and assess the risk of these threats and determine controls required to meet the acceptable risk level	GTS-999-PR-RM-001

Embedded in this document are links to the original source documents of the safety assessments. These documents are maintained by relevant functional groups and are subject to periodical audits by the regulator.

Refer to Appendix B and Appendix D for further information.

5. SAFETY MANAGEMENT SYSTEM



Jemena’s safety management system is described in **Safety Management Manual GAS-999-OM-HSE-001**. Please refer Appendix B

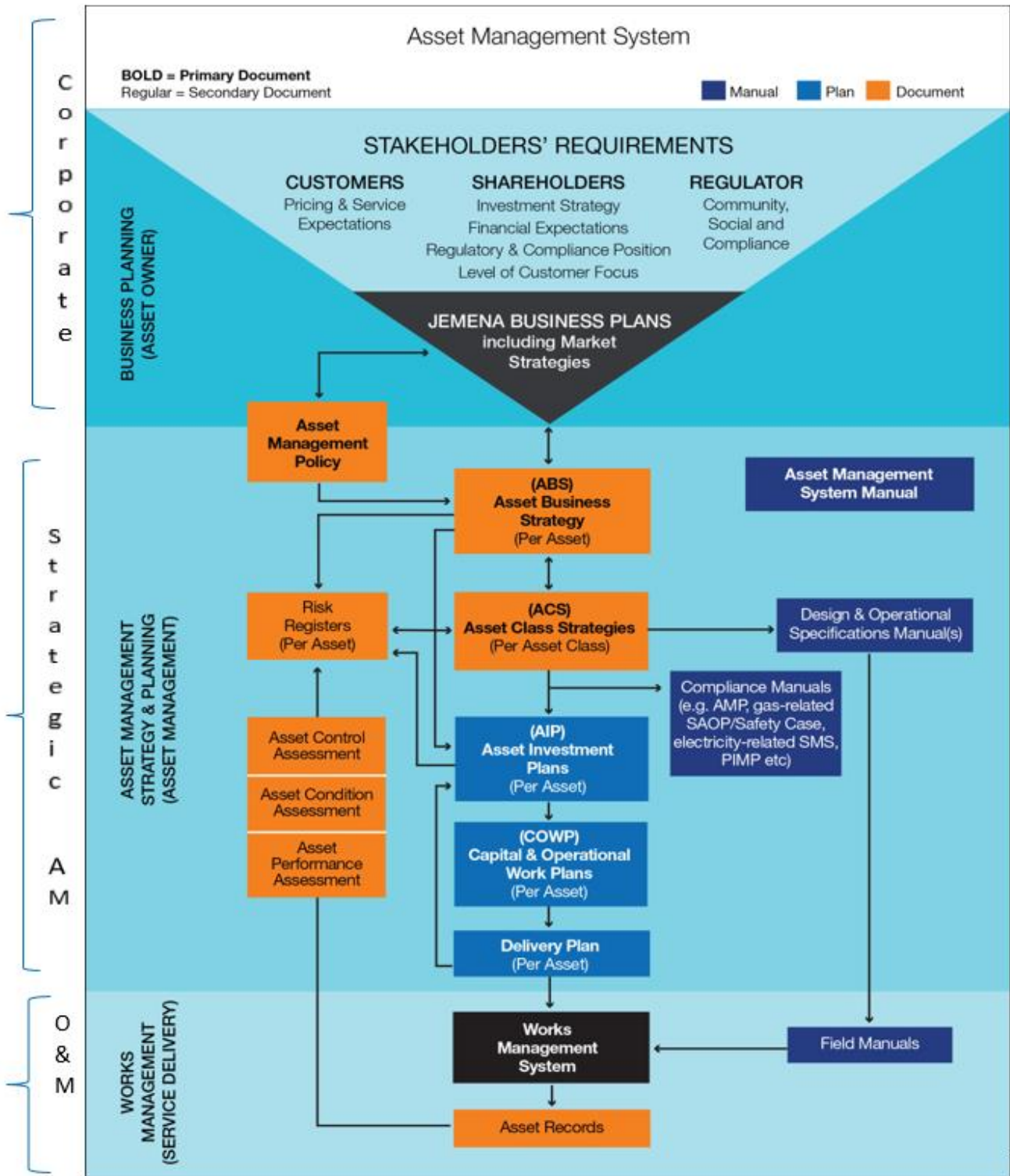
5.1 ASSET MANAGEMENT SYSTEM OVERVIEW

Jemena has an overall Asset Management System (AMS) within which Safety Management is a key element. The Asset Management System provides the principle framework for the organization to direct, coordinate and control asset management activities and provides assurance that Jemena’s operational, societal and environmental objectives are achieved on a consistent basis. It brings together the external influences, asset management drivers, business values and selected strategies to deliver sustained performance for the benefit of all stakeholders.

Jemena’s strategy for asset management is explained in detail in Asset Management System Manual JEM-AM-MA-0001.

The Overall Asset Management System document hierarchy is summarised in Figure 5:1 which details the document hierarchy that transforms Jemena’s strategic objectives into the required actions that underpin the asset management function. Figure 5:1 also shows secondary documents that support the strategy and planning documents.

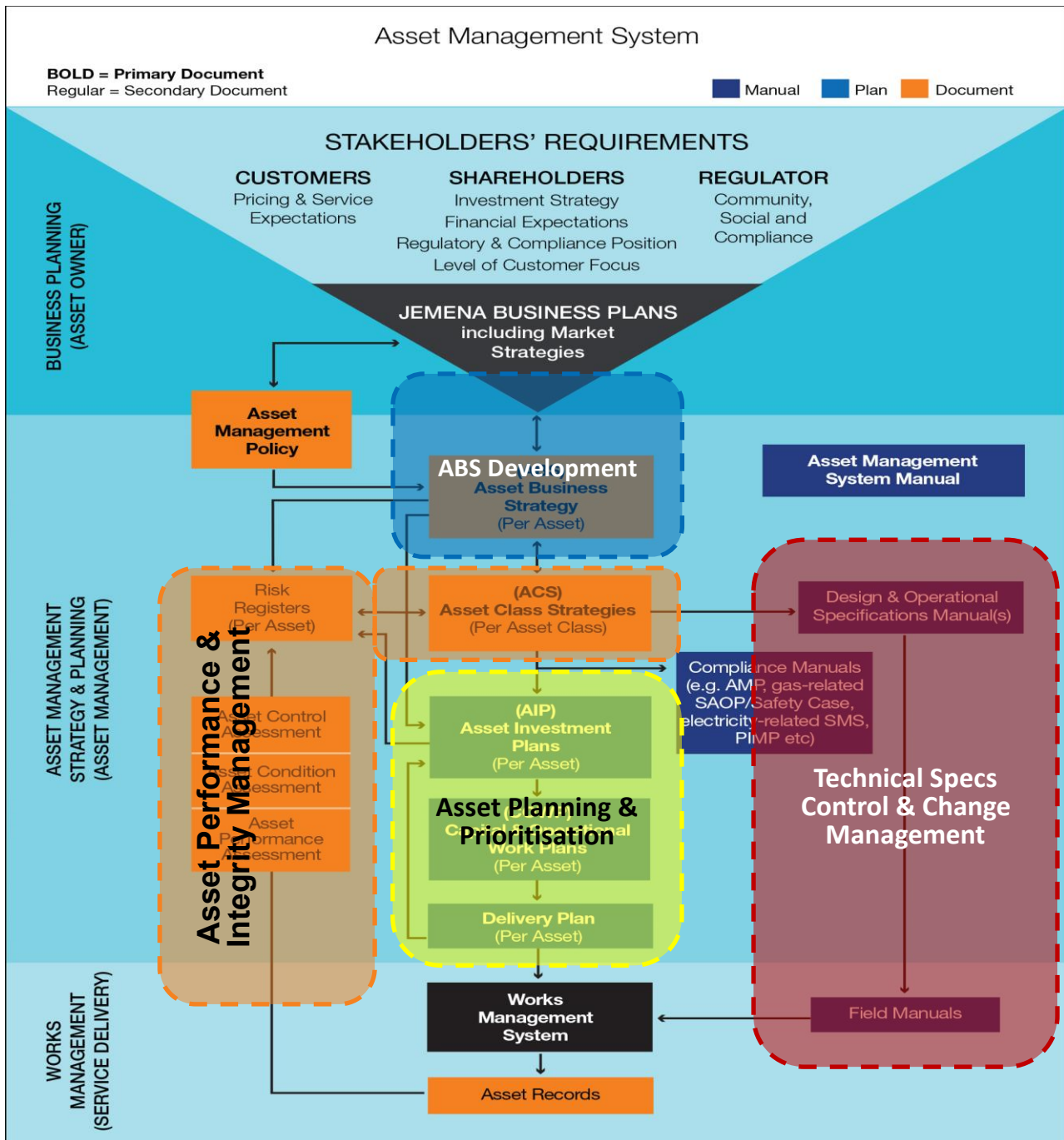
Figure 5:1: Jemena Asset Management System Document Hierarchy



5.2 SAFETY MANAGEMENT PROCESS

The overall Safety Management process is defined in the context of the level 2 processes, shown in Figure 5:2 below.

Figure 5:2 Jemena Asset Management Level 2 Processes



5.2.1 ASSET BUSINESS STRATEGY DEVELOPMENT

5.2.1.1 Asset Business Strategy

The Asset Business Strategy (ABS) translates Jemena's organisational objectives including safety into individual Asset objectives, e.g. profitability, cash flows, desired performance, current and expected performance, etc. It is also, used to confirm with customers whether the Asset is meeting their expectations.

5.2.2 ASSET PLANNING AND PRIORITISATION

Asset specific activities are prioritised and planned in accordance with Asset Investment strategy as well as the results of asset condition and performance assessments and risk assessments to ensure the safe operation of the assets. The planning and prioritisation cascades down from Asset Class Strategies (ACS), Asset Investment Plans (AIP), Capital and Operational Work Plans (COWP) to Delivery Plans as described in the following sections. This includes engineering assessments, business plans, minor business plans etc as required for the size of the work.

Once works are approved, the work is passed to Service Delivery, via a confirmed Scope of Work, within the Works Management System.

5.2.2.1 Asset Class Strategy

The Asset Class Strategy (ACS) explains the approach and principal methods by which each asset class contributes to delivering Asset Management objectives as stated in relevant ABS, considering the age, criticality and condition profile of the class. It may also include scenario analysis for various strategies (e.g. replacement vs. refurbishment, non-asset solutions, etc), and demonstrates how the Asset Management activities for the asset class are to be prioritised or optimised to achieve Asset Management objectives (as defined in ABS).

5.2.2.2 Asset Investment Plan (AIP)

Each AIP is a response to one or more ACS, and it defines an optimum set of Asset Management activities (OpEx & CapEx with budgetary financial information) to achieve Asset Management objectives set for the Asset as defined in the relevant ACSs. The AIP sets out proposed costs and activities for the next 7 years as a feed to corporate planning and forecasting.

The content of the AIP in our new format has been substantially reduced to provide the list of proposed projects in the programs of work and explanatory notes on the prioritisation of competing programs of work and any mitigation actions required to maintain targeted risk levels.

5.2.2.3 Capital & Operational Work Plan (COWP)

The COWP contains details on optimised capital and operational expenditures for next two years, linking each expenditure item to one or more Asset objective(s). It sets out the detailed programs of work, resource requirements and costs that feed the Jemena business planning and budgeting process.

5.2.2.4 Delivery Plan

The delivery plan describes how our Service Delivery function will deliver to requirements of COWP including management of supply contracts, resource planning, etc. It provides assurance to Senior Management and the Board that our proposed business plan and budget can be delivered.

5.2.3 ASSET PERFORMANCE AND INTEGRITY MANAGEMENT

All field work is completed by Jemena's Service Delivery functional group under the Works Management System, as directed by Asset Planning and Prioritisation process and/or Technical Specifications. As a result of these activities, Asset Records are prepared as specified by the Work Codes or as defined by an AM prepared Scope of Work.

These asset records are provided to AM who carry out a series of assessment to confirm the asset condition and performance (Asset Performance and Integrity Management). These assessments are described in the following sections.

As a result of these assessments, anomalies (technical risk items that may require corrective action to ensure continued safe operation) are identified and are risk assessed to determine criticality. These are recorded and tracked in the Risk Registers.

Facility risk assessment are also performed on a continuous basis as asset information is updated. The risk assessments include Safety Management Studies, Formal Safety Assessments and HAZOPs. These are described in detail in Appendix B

5.2.3.1 Asset Condition Assessment Report

Asset condition assessments evaluate how the condition of the assets has changed over time in comparison to set targets. For example, the level of corrosion observed during inspections. The condition of the asset includes not only the physical condition but also the age and criticality of the asset. The condition assessment reports help to inform the expected life expectancy of the asset, when preventative actions are required and if there is a need to be make changes to the frequency of inspections.

5.2.3.2 Asset Performance Assessment Report

The performance report compares the performance of the Asset Classes against set targets and identifies trends in performance. Examples of the performance measures assessed include:

- engineering investigations and incident report findings;
- plant availability;
- failure rates or frequencies;
- Asset Performance
- reliability;
- asset-specific costs;

- mean time between failure;
- plant defects and cause codes;
- corrective maintenance rates;
- Major Incidents

5.2.3.3 Asset Control Assessment Report

Controls are processes or actions designed to eliminate, control or mitigate key business risks. The asset control assessment report evaluates the annual compliance to these controls and effectiveness of the control. This is achieved by reviewing:

- JCARS;
- PM compliance;
- internal and external audits
- work in backlog; and
- rework.

5.2.3.4 Risk Register

Asset Class registers are used to record and track all "Above appetite risks" which are under active management, held in JCARS by agreement with the ACM

The risk register and identified risks are used to underpin the asset class strategy considerations to ensure the safe operation of the gas assets

Risks and controls are owned by the ACMs.

5.2.4 TECHNICAL SPECIFICATIONS

Technical Specifications are the suite of documentation defining the minimum technical requirements for the creation and management of gas assets to meet Jemena safety and performance objectives and legislative requirements. These specifications underpin the safety management process by ensuring "industry best practices" are adopted in all design, construction, inspection, maintenance, assessment and repair activities carried out by Jemena.

Specifications are prepared by Asset Management to address the following:

- Design and construction of pipelines, facilities and networks;
- Operational monitoring, control and response of pipelines and networks;
- Field operations and maintenance of pipelines, facilities and networks;
- Gas measurement and reconciliation.

These Technical Specification address the following:

- Compliance with applicable codes and standards;
 - Approved, "industry best practice" inspection techniques;
 - Preventative and corrective maintenance activities;
 - Methods to determine frequency of activities e.g. fixed interval, risk based;
 - Anomaly assessment methods;
 - Repair methods.
-

These Specifications interface with Service Delivery (SD) to provide the basis for asset specific Field Manuals, thus ensuring that best practices and consistency is provide in the management of all Jemena Assets.

Field manuals provide the specific activities (type, frequency and procedures) which will be carried out for the asset via Work Codes.

Routine, prescriptive works as defined in the Field Manuals are automatically input into the Work Management System, unless there is a strategic change which would cause a change to the Specifications.

5.2.4.1 Technical Change Management

Review and updates to Technical Specifications will be carried out on a periodic basis. The suitability of any changes will be demonstrated by an assessment to ensure the change is in compliance with legislation and Jemena's objectives and all changes will be carried out in accordance with Jemena Change Management Manual. All changes will need to be approved by the Asset Strategy Manager.

Changes in the Technical Specifications will be reflected in subsequent updates to the relevant Work Codes, which are referenced in the Service Delivery field manual. Updates to Work Codes will be carried out by Asset Strategy and approved by the Asset Strategy Manager, for execution by Service Delivery.

5.2.5 WORKS MANAGEMENT SYSTEM

The delivery of the tasks/activities needed to operate and maintain Jemena assets is performed by the Works Management System (Service Delivery). These tasks/activities are governed by the design basis manuals and operational/maintenance specifications established by asset management, as previously described.

Routine, prescriptive works as defined in the Field Manuals (i.e. Work Codes as described above) would be automatically input into the WMS, unless there was a strategic change which would cause a change to the AM Specification and hence a change to the SD field manuals.

5.3 COMPLIANCE ASSURANCE MATRIX MAPPING

The Compliance Assurance Matrix is designed to demonstrate to the Regulator and the external auditor (nominated by the regulator) that safety management system requirements stated in the Acts/Regulations and standards are effectively mapped against current processes and procedures. The matrix maps relevant artefacts to AS 2885 and AS 4645 as well as applicable additional requirements placed by technical regulators.

The compliance assurance matrix will act as a "sole source of truth" during external audits. The currency of these supporting processes/procedures will be maintained by the functional areas that own them.

All procedures set out or referred to in the Compliance Assurance Matrix are in place and have been tested and proved.

Refer to Appendix C - Compliance Assurance Matrix

6. EMERGENCY MANAGEMENT SYSTEM



The Emergency Management Plan (EMP) and its annexes are intended to support the actions of the Emergency Management Team (EMT) and Area Management Team (AMT) and includes guidance on:

- effective decision-making for significant incident and emergency events;
- effective identification, assessment and escalation of events;
- effective recording of EMT/AMT actions and decisions;
- supports the post-event review of EMT/AMT management to support recommendations for future improvement; and
- provision of training.

The "JEM PL 0013 Jemena Emergency Management Plan" can be accessed via the following link:
<http://ecms/otcs/livelink.exe/properties/305832340>

7. GOVERNANCE (MANAGEMENT REVIEW AND ASSURANCE)



The Jemena governance process described below fundamentally provides the management review and assurance of gas assets.

The HSE Council provides overall HSE leadership and assists Jemena to fulfil its overall responsibilities in relation to HSE matters as they affect workers (employees and contractors), customers and the community. Membership of the Council includes the Managing Director as the Chair, all Executive General Managers and the General Manager of HSEQ.

The HSE Council has established an Asset and Public Safety Committee (APSC), which monitors and reports on the effectiveness of strategies and practices to manage risks. The APSC includes all Asset Management and Delivery General Managers as well as HSE and Risk Management. The APSC chair reports to the HSE Council on the asset and public safety performance of its Jemena gas assets.

The APSC oversees a number of operational and review committees which have specific objectives, including the Gas Safety Management Review Committee (GSMRC). Through the GSMRC, the APSC reviews and monitors the operation of gas safety management processes and systems.

The GSMRC oversees the following areas insofar as they relate to asset and public safety as detailed in the GSMRC charter (refer to compliance matrix for the charter). Typically the review inputs include:

- Technical specifications and allied artefacts;
- Acts, Regulations, Codes, Standards and other applicable requirements;
- Audit and incident investigations;
- Performance, integrity and condition monitoring;
- Good industry practice, research and innovation.

The GSMRC reports to the APSC, on a quarterly basis, the current status of the asset and public safety program and management system including:

- Performance against key performance indicators;
- Trend analysis of significant events;
- Major incident logs and major incident review completed;
- Formal Safety Assessments and Safety Management Studies;

7 — GOVERNANCE (MANAGEMENT REVIEW AND ASSURANCE)

- Legislative and regulatory compliance;
- Status of relevant management system audit or corrective actions;
- Changes to the status of risks and controls.

The GSMRC is supported by the AS2885 Pipeline Code Committee and the AS4645 Code Committee.

In addition to the above committees and management reviews, Jemena utilises its risk based asset management (note the risk in section 1.10), APAIR and control assessments that relate to gas safety. The control assessments include periodical evaluations and other monitoring and measurements through reported data on asset condition and performance.

Jemena also utilises JCARS (Jemena Compliance and Risk System) to support the assurance processes by continuous monitoring of its commitment to comply with laws, regulations and other subscribed requirements. Outputs from the management review processes may trigger a review of the safety case. The management recommends a periodic review of the safety case once every 2 years. In some jurisdiction, the safety case review is required once every 5 years.

The organization's role responsibilities accountabilities and authorities is largely addressed within the Jemena Accountability Model and the [GAS-999-PA-DM-004 GAS AS 2885 Document Approvals Structure](#). Figure 7-1 depicts organisation structure.

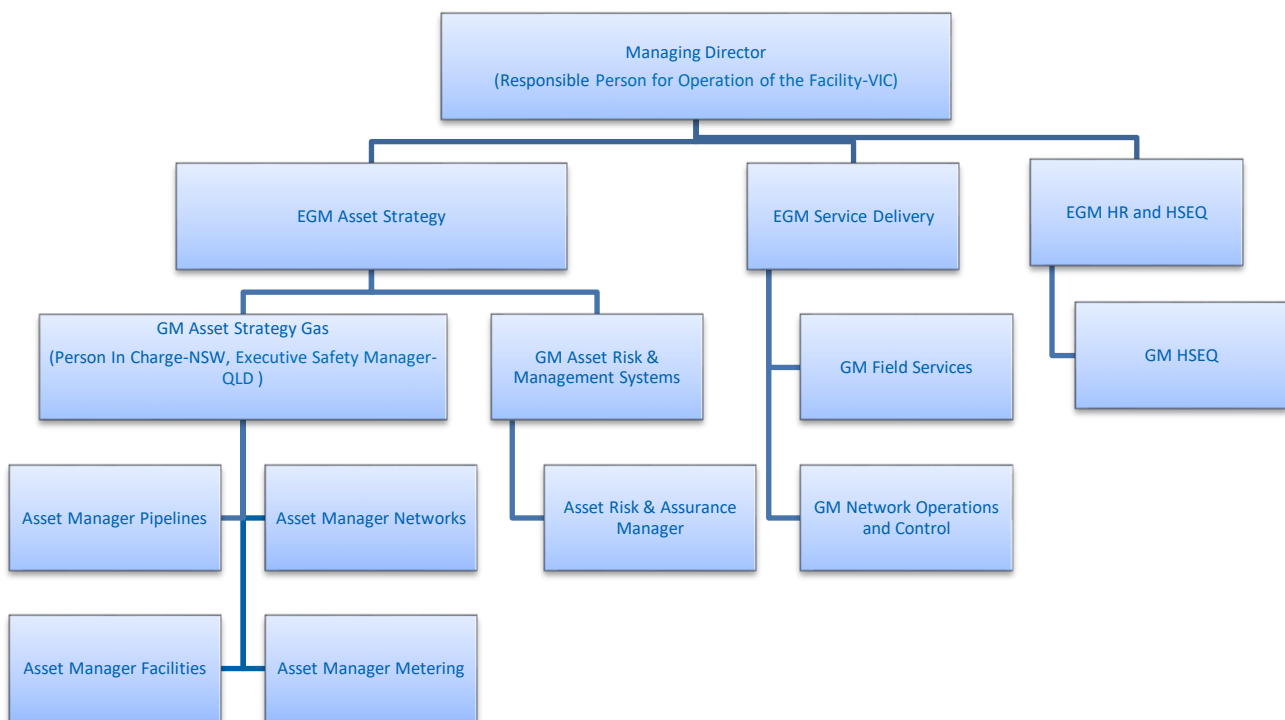


Figure 7-1: Organisation Structure

The Table 7-1 below briefly describes accountabilities and responsibilities.

Table 7-1: Key Positions – Accountabilities / Responsibilities

No	Key Position	Accountabilities/ Responsibilities
1	Managing Director (level 1) (Paul Adams)	<p>Person Responsible for Operation of the Facility (VIC) and his accountabilities</p> <p>Approve the Jemena Health and Safety Policy</p> <p>Approve the Jemena Asset Management Policy</p> <p>Approve budgets and resource plans</p> <p>Approve Service Provider contracts (as required by) State Grid Singapore Power (Australia) Assets Pty Ltd (SGSPAA) Delegated Financial Authority (DFA) Policy)</p> <p>Delegate responsibilities for management of the assets</p> <p>Approve the EGP(232) and VicHub (247) Safety Case</p> <p>567 Collins Street, Melbourne VIC 3000</p> <p>Note: Due to Paul's retirement on 14 October 2018, the new Jemena Managing Director, Frank Tudor will be the responsible person following this date.</p>
2	GM Asset Strategy Gas (level 3) (Peter Harcus)	<p>Person-In-Charge (NSW)</p> <p>Executive Safety Manager (QLD)</p> <p>Approve the Jemena Safety Case for all Jemena Gas Assets except for those within Victoria.</p> <p>Represents the asset owner and is responsible for all asset and investment related issues including engineering strategy and planning, asset delivery, network development, commercial services and business services. This position is also the Person In-Charge and the Licensee. The position is also responsible for the approval of business cases in accordance with the SPI (Australia) Assets, Delegations of Financial Authority (DFA). Business cases requiring approval in excess of this position and the appropriate authority levels are also detailed in the DFA</p> <p>99 Walker St, North Sydney, NSW 2060</p>
3	Asset Class Managers Pipelines (level 4) Networks (level 4) Facilities (level 4) Metering (level 4)	<p>Prepare Asset Management Plans and Asset Strategies</p> <p>Prepare and manage the Works Program to ensure the long term integrity of the asset.</p> <p>Monitor Works Delivery performance</p> <p>Monitor Asset Performance to ensure it meets regulatory, code and business requirements</p> <p>Coordinate and assist operations management in the implementation of the requirements of the Safety Management System. Undertake the role of Principal Engineer for the pipelines design and operations engineering sectors;</p>
4	Asset Risk & Assurance Manager (level4) (Ian Russom)	<p>Report to the GM- Asset Risk and Management Systems with regards to the monitoring and auditing programme for the Safety Case compliance</p> <p>Develop and implement the auditing program for Safety Case compliance</p> <p>Provide reports to the Executive Compliance Committee and the Jemena Board on the performance of the Safety Case</p> <p>Liaise with safety regulators about matters relating to the Safety Case and the Compliance Management System</p> <p>Liaise with relevant positions within Jemena to ensure operational input into the Management Systems and specifications including this Safety Case.</p>

7 — GOVERNANCE (MANAGEMENT REVIEW AND ASSURANCE)

No	Key Position	Accountabilities/ Responsibilities
		Communicate and manage compliance with regulatory, industry and code obligations and requirements. 567 Collins Street, Melbourne, 3000, VIC. Note: Person responsible for the preparation, revision and submission of the Safety Case in Victoria.
5	GM Field Services Gas (level 3)	Responsible for the strategic oversight of end to end maintenance and operations activities including scheduling, dispatching, logistics and ensuring work standards and quality are upheld
6	GM Network Operations & Control (level 3)	Responsible for overall operational control of the network and leading Jemena's emergency response approach, including policies, documentation and user training. This role is also responsible for management of call answering, work scheduling and dispatch, incident investigation and overseeing the operations of the emergency management system & emergency incident simulations
7	GM HSEQ (Level3)	responsible for the provision of Health, Safety, Environment & Quality strategy, policies and programs throughout Jemena

Note: names in the table is to satisfy VIC gas safety case regulation 2008 and is subject to changes.

Appendix A Asset Description

Note : The appendix is provided to accommodate specific Jemena gas asset during external audits or for regulatory submission.

For this instance, the asset description includes all JGN gas assets within NSW. However, during regulatory audit, the auditor should consider the necessary Inclusions / exclusions to remain in scope for the audit.

1. JGN NSW Distribution networks (Includes gas assets operating at Low, Medium and Secondary Pressure (Below 1050kPa) and Unlicensed Primary Pipelines (above 1050kPa) and facilities within NSW and will exclude Licensed Pipelines as noted below.
2. JGN Licensed Pipelines 1(including Wilton pressure reduction station),2,3,7,8 and Jemena Colongra Pipeline Licence 33 within NSW and exclude the gas networks and unlicensed pipelines.

Periodical audits for the distribution networks occur during May-June and for the licensed pipelines during September-October of each year.

ASSET DESCRIPTION

JEMENA NSW GAS ASSETS

INTERNAL

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TABLE OF CONTENTS

1	OVERVIEW OF ASSETS	3
1.1	INTRODUCTION	3
1.1.1	JEMENA NSW GAS DISTRIBUTION NETWORK	3
1.1.2	JEMENA COLONGRA PIPELINE	3
2	PIPELINE SYSTEM SPECIFICATIONS	6
2.1	TRUNK PIPELINES	6
2.1.1	DESCRIPTION	6
2.1.2	SAFETY PARAMETERS	6
2.2	PRIMARY MAINS SYSTEM	7
2.2.1	DESCRIPTION	7
2.2.2	SAFETY PARAMETERS	8
2.3	SECONDARY MAINS SYSTEM	8
2.3.1	DESCRIPTION	8
2.3.2	SAFETY PARAMETERS	8
2.4	MEDIUM & LOW PRESSURE MAINS SYSTEM	9
2.4.1	DESCRIPTION	9
2.4.2	SAFETY PARAMETERS	9
3	FACILITY COMPONENTS	10
3.1	CUSTODY TRANSFER STATIONS	10
3.1.1	JEMENA NSW GAS DISTRIBUTION NETWORK	10
3.1.2	JEMENA COLONGRA PIPELINE	10
3.2	REGULATING STATIONS	11
3.2.1	JEMENA NSW GAS DISTRIBUTION NETWORK FACILITIES	11
3.2.2	JEMENA COLONGRA PIPELINE FACILITIES	12
3.3	COMPRESSOR STATION	12
3.4	HEATING REQUIREMENTS	13
3.4.1	JEMENA NSW GAS DISTRIBUTION NETWORK	13
3.4.2	JEMENA COLONGRA PIPELINE	13
3.5	SECONDARY REGULATOR SETS (SRS)	14
3.6	DISTRICT REGULATOR SETS (DRS)	14
4	OPERATING PARAMETERS	15
4.1	PRESSURE	15
4.2	FLOW	16
4.2.1	JEMENA GAS DISTRIBUTION NETWORK	16
4.2.2	JEMENA COLONGRA PIPELINE	16
4.3	GAS COMPOSITION / QUALITY	17
4.4	SCADA SYSTEM	18

1 OVERVIEW OF ASSETS

1.1 INTRODUCTION

This document will describe all the assets associated with the Jemena NSW Gas Distribution Network and Jemena Colongra Pipeline.

1.1.1 JEMENA NSW GAS DISTRIBUTION NETWORK

The Jemena NSW Gas Distribution Network includes over 26,000km of pipelines and mains of various sizes and Maximum Allowable Operating Pressures (MAOP), ranging from 6,895kPa to 2kPa. The pipes are divided into their MAOP as summarised below and include associated systems and services, such as cathodic protection equipment and valves.

- Trunk Pipelines (MAOP of 6,895 kPa), including :
 - License 1 – Wilton to Horsley Park Natural Gas Pipeline;
 - License 2 – Wilton to Wollongong Natural Gas Pipeline;
 - License 3 – Horsley Park to Plumpton Natural Gas Pipeline;
 - License 7 – Plumpton to Killingworth Natural Gas Pipeline; and
 - License 8 – Killingworth to Kooragang Island Natural Gas Pipeline.
- Primary Mains (MAOP of 3,500 kPa), including :
 - Sydney Primary Mains;
 - Sydney Primary Loop;
 - Penrith Primary Mains; and
 - Wollongong Primary Mains.
- Secondary Mains (MAOP of 1,050kPa); and
- Medium and low pressure mains (MAOP of 400kPa, 300kPa, 210kPa, 100kPa, 30kPa, 7kPa, 2kPa).

The Jemena NSW network distributes natural gas from the transmission pipeline receipt points to gas customers via a series of pipelines. Figure 2 illustrates how the pressure steps down from 14,895 kPa to a minimum of 2 kPa via a series of pressure regulating stations and regulator sets.

The customers then receive gas via a meter at the appropriate pressure. Residential and small commercial customers are generally connected to the medium pressure mains, whilst larger commercial and industrial customers are connected at secondary pressures.

1.1.2 JEMENA COLONGRA PIPELINE

The Jemena Colongra Pipeline has the pipeline Licence Number 33 which commences at the outlet of the Munmorah Off Take Metering Station (MOMS) and runs approximately 13km to the Colongra Power Station. The MOMS is located off the Jemena NSW Licence 7 pipeline, described above and shown in Figure 3. There are six sections that make up the Colongra Pipeline :

- The Munmorah Compressor Station (MCS);
- The Munmorah Gas Pipeline (MGP) Feeder (MAOP 13,000kPa);
- The MGP Interconnect (MAOP 13,000kPa);
- The Munmorah Gas Pipeline (MGP) (MAOP 13,000kPa);
- The Munmorah Delivery Station (MDS);
- The Munmorah Delivery Pipeline (MDP) (MAOP 3,600kPa).

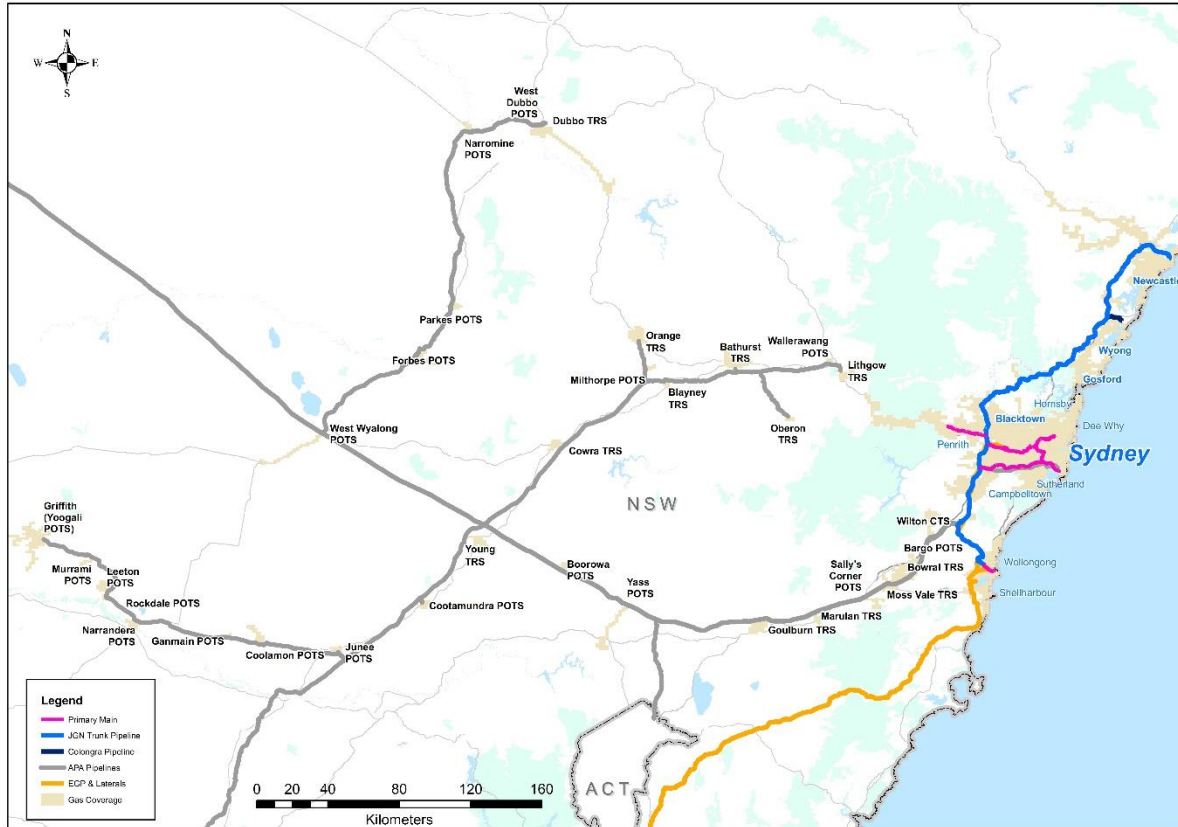


Figure 1 : Overview of the Jemena NSW Gas Distribution Network.

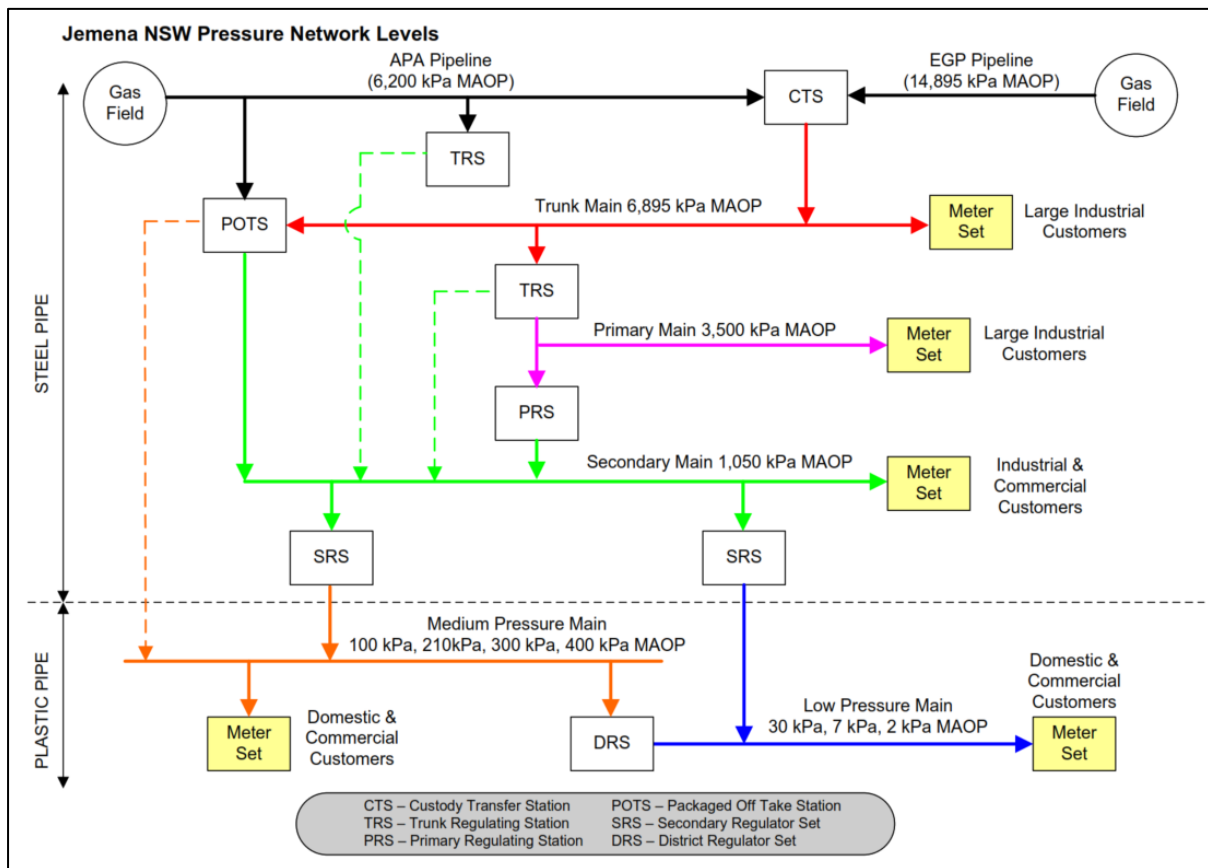


Figure 2 : Jemena NSW Pressure Levels Schematic

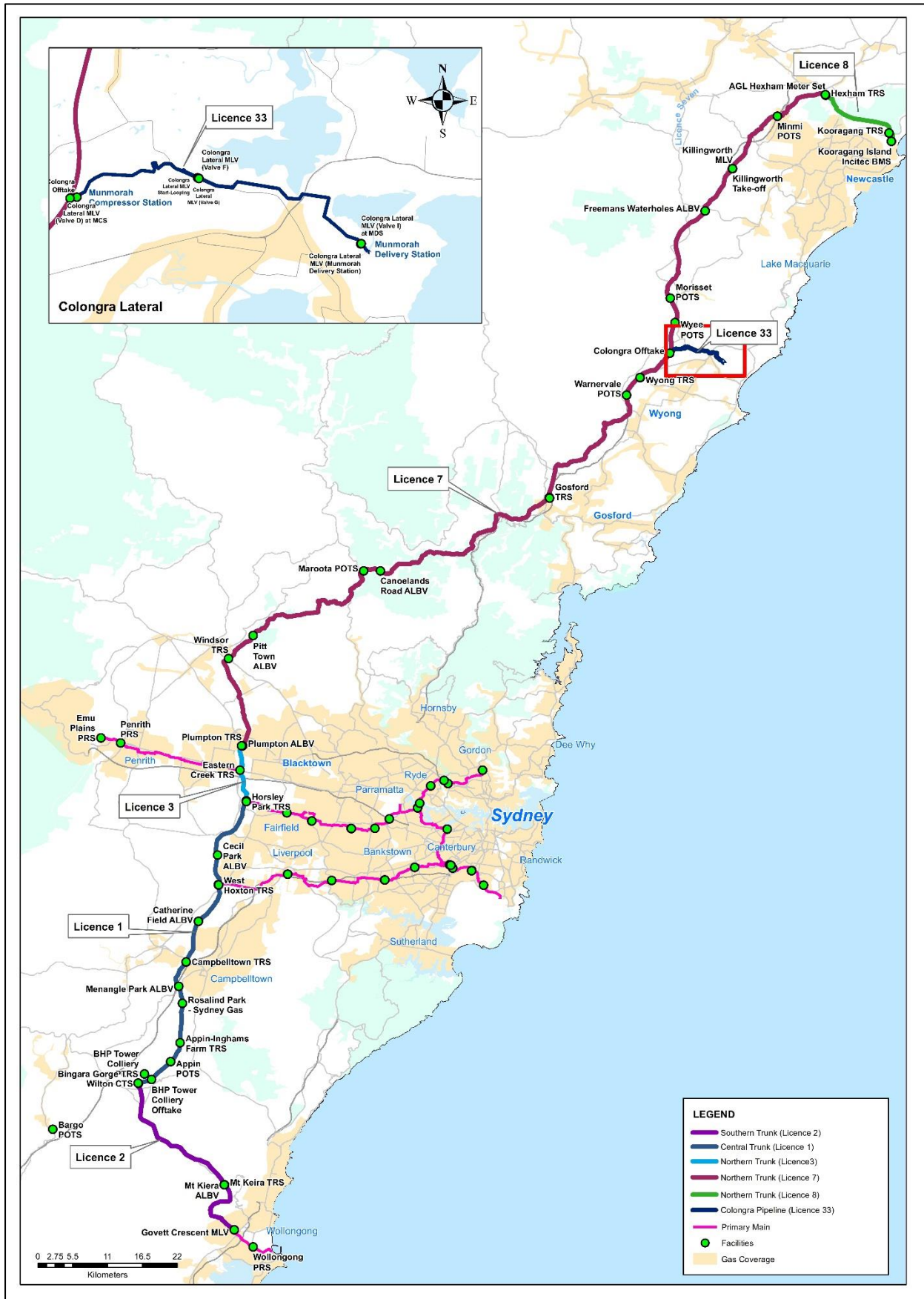


Figure 3 : Overview of the Jemena NSW Licenced Pipeline Sections.

2 PIPELINE SYSTEM SPECIFICATIONS

2.1 TRUNK PIPELINES

2.1.1 DESCRIPTION

The trunk pipelines consist of approximately 284km of high strength steel with a MAOP of 6,895kPa (Licence 1,2,3,7,8) and MAOP of 13,000kPa (Licence 33), and is externally protected against corrosion by an anti-corrosion pipe coating and has an internal lining for flow efficiency. Additional protection is also achieved via a Cathodic Protection (CP) system. A breakdown of all the licenced trunk pipelines are found below in Table 1.

Table 1 : Trunk Pipelines Detail

Mains Section	Construction / Licence Date	Diameter (mm)	Length (km)
Licence 1 – Wilton to Horsley Park (Licence includes the Wilton TRS Facility and associated ALBV's along the pipeline and contained within a 24m wide easement)	1974	DN850	52.5
Licence 2 – Wilton to Covett Cr MLV (Licence includes the associated ALBV along the pipeline and contained within a 24m wide easement)	1975	DN500	32.6
Licence 3 – Horsley Park to Plumpton (Licence includes the associated ALBV along the pipeline and contained within a 24m wide easement)	1975	DN500	9.4
Licence 7 – Plumpton to Killingworth Offtake (Licence includes the associated ALBV's along the pipeline and contained within a 24m wide easement)	1978	DN500	143.3
Licence 8 – Killingworth Offtake to Kooragang Island (Licence includes the associated ALBV's along the pipeline and contained within a 24m wide easement)	1979	DN250 / 350 / 500	32.8
Licence 33 – Munmorah Off-take to Colongra Power Station (Licence includes the associated MLV's along the pipeline and contained within various 20m, 30m, 60m wide easements)	2007	DN250 / 400 / 1050	13.0
Total Length			283.6 km

2.1.2 SAFETY PARAMETERS

The pipeline condition of the Trunk Pipelines are assessed and confirmed based on the :

- Licence conditions;
- Jemena Safety Management Manual;
- Australian AS2885 standards; and
- Jemena Pipeline Integrity Management Plan (PIMP).

The PIMP provides an integrated and structured pipeline operation and maintenance management system and outlines key processes and assessment methodologies to maintain pipe integrity. The

integrity of the trunk pipeline is based on pipeline conditions derived from data by inspection and testing which includes :

- Inline Inspection (ILI), also referred to as 'Pigging', to assess metal loss or mechanical damage;
- CP Monitoring, providing additional pipe protection against corrosion at locations of damaged pipe coating;
- Direct Current Voltage Gradient (DCVG) measurement, providing an indication of coating defects which may lead to potential corrosion and carried out on unpiggable pipelines every five years and piggable pipelines every ten years;
- Validation Digs, provide direct measured pipe data at selected locations following an ILI; and
- Safety Management Studies (SMS), which enables pipeline safety and risk assessments to identify threats, review controls and implement additional protection measures where existing controls are inadequate. The SMS also considers all relevant data obtained from the inspection and testing activities to determine the pipeline integrity for purposes of confirming or validating the pipeline MAOP.

In the event of a pipeline failure or required maintenance activity where gas flow must be stopped, the trunk pipelines have various Main Line Valves (MLV) and Automatic Line Break Valves (ALBV) located along on the trunk main to either mitigate risk (lessen the consequence) and provide safe isolation to the public and staff.

2.2 PRIMARY MAINS SYSTEM

2.2.1 DESCRIPTION

The Primary Mains System (MAOP 3,500kPa) in the Jemena NSW Distribution Network is supplied natural gas via the upstream Trunk Pipelines as above, through various Trunk Regulating Stations (TRS).

The primary mains consist of approximately 147km of high strength steel pipe and are externally protected against corrosion by an anti-corrosion pipe coating and internal lining for flow efficiency. Additional protection is also achieved via a CP system. The Primary Mains were predominantly constructed in the mid-1970s and mid-2000s with the new Emu Plains Primary Main section constructed in 2012 and summarised below in Table 2.

Table 2 : Primary Mains Detail

Mains Section	Construction Date	Diameter (mm)	Length (km)
Sydney Primary Main ¹	1969 - 1987	DN150 / 250 / 500 / 550	75.1
Sydney Primary Loop ²	1987 & 2007	DN500 / 550	42.6
Penrith Primary Main ³	2003 & 2012	DN200	22.1
Wollongong Primary Main	1982	DN150 / 250	7.3
Total Length			147.1 km

(1) The Sydney Primary Main consists of various diameter pipe, built and extended during the period over the years.

(2) The West Hoxton to Casula section was built in 1987 (14km) and the Casula to Tempe section of the loop completed in 2007.

(3) The Eastern Creek to Penrith section was built in 2003 (19km), with a further 3km built in 2013 from Penrith to Emu Plains.

2.2.2 SAFETY PARAMETERS

The Primary Mains System operation complies with AS2885 to ensure “continued pipeline integrity during the life of the pipeline” to prevent risk to community safety, property and environmental damage and loss of gas supply. The integrity of the primary mains are based on pipeline conditions derived from data by inspection and testing which includes :

- Inline Inspection (ILI), also referred to as ‘Pigging’, to assess metal loss or mechanical damage;
- CP Monitoring, providing additional pipe protection against corrosion at locations of damaged pipe coating;
- Direct Current Voltage Gradient (DCVG) measurement, providing an indication of coating defects which may lead to potential corrosion and carried out on unpiggable pipelines every five years and piggable pipelines every ten years;
- Validation Digs, provide direct measured pipe data at selected locations following an ILI; and
- Safety Management Studies (SMS), which enables pipeline safety and risk assessments to identify threats, review controls and implement additional protection measures where existing controls are inadequate. The SMS also considers all relevant data obtained from the inspection and testing activities to determine the pipeline integrity for purposes of confirming or validating the pipeline MAOP.

In the event of a pipeline failure or required maintenance activity where gas flow must be stopped, the primary mains have various Main Line Valves (MLV) and Automatic Line Break Valves (ALBV) located along on the primary mains to either mitigate risk (lessen the consequence) and provide safe isolation to the public and staff.

2.3 SECONDARY MAINS SYSTEM

2.3.1 DESCRIPTION

The Secondary Mains System (MAOP 1,050kPa) in the Jemena NSW Distribution Network is supplied natural gas via the upstream Primary Mains System and the APA transmission pipeline for the regional Jemena country networks through various gas regulating facilities.

The Secondary Mains System consists of approximately 1450km of steel pipe, which is externally coated with High-Density Polyethylene (HDPE) or Tri-laminate product to protect it from corrosion and internally lined to reduce frictional losses and provide some internal corrosion protection. There is also approximately 10km of 250mm HDPE secondary pipe inserted into a 350mm steel main, constructed in 2011. This section of secondary pipe has 9 MLV's and is protected by the 350mm steel conduit.

2.3.2 SAFETY PARAMETERS

The Secondary Mains are operated and maintained with the Safety Management Manual and the requirements of AS4645. The integrity of the secondary mains is assessed through integrity and performance assessments which use indirect monitoring and performance methods including :

- Providing Cathodic Protection (CP) to the network and maintaining it;
- CP and Leakage surveys;
- Publicly reported leaks;
- Field Reports and feedback;
- Pipeline Patrol / Surveillance; and
- Conducting Formal Safety Assessments (FSA).

It should be noted that Secondary mains are not piggable.

In the event of a secondary mains failure or required maintenance activity where gas flow must be stopped, the system has many high risk and isolation valves of varying sizes to either mitigate risk (lessen the consequence) and provide safe isolation to the public and staff.

2.4 MEDIUM & LOW PRESSURE MAINS SYSTEM

2.4.1 DESCRIPTION

The Medium & Low Pressure Mains and services supply natural gas to domestic, commercial and industrial users through approximately 25,000km of largely plastic pipe, with approximately 10% being cast iron and steel. The network comprises of mains, services, valves, boundary regulators and exposed mains. The medium pressure networks have a MAOP of 210kPa, 300kPa and 400kPa, with a small number of networks operating a MAOP of 30kPa and 100kPa. The low pressure networks have a MAOP of 2kPa and 7kPa.

The mains and services are predominantly plastic (polyethylene and nylon) with a small number of galvanised mains. Valves are devices used to stop the flow of natural gas. This includes both standard isolation valves and high risk sector valves.

Boundary regulators are used to reduce the medium pressure at the property boundary to low pressure. The low pressure end user service then supplies high density housing such as units and townhouses.

Exposed mains are the mains that are not directly buried in the ground. Typically exposed mains are located in or under bridges, culverts and across storm water channels, etc.

2.4.2 SAFETY PARAMETERS

The medium pressure network is complex and continuously expanding into new estate growth areas. The integrity and condition of the mains are assessed in accordance with Australian Standard AS4645 through numerous integrity and performance assessments including :

- Network leakage tests;
- Leakage survey;
- Network incident assessments via Incident Cause Analysis Method (ICAM);
- Formal Safety Assessments (FSA);
- Field failure reports; and
- Poor supply report reviews.

Leakage surveys are a maintenance strategy employed by distribution businesses to locate leaks in gas distribution networks. The frequency with which these surveys are undertaken are based upon risk and past performance, with all sections being surveyed at least once every five years (the minimum requirements of AS4645). More frequent surveys are undertaken in high risk areas and where previous surveys indicated an excessive level of leaks. All gas leaks located are assessed and actioned.

Network incidents are another indicator of network integrity and performance. An incident can be caused by a component failure. Failed components (pipe and fittings) are sent to a laboratory for analysis. Network reliability is monitored closely and remains focused on improving asset integrity and management practises to reduce installation related field failures on the plastic distribution system.

3 FACILITY COMPONENTS

3.1 CUSTODY TRANSFER STATIONS

3.1.1 JEMENA NSW GAS DISTRIBUTION NETWORK

The Jemena NSW Gas Distribution Network is currently supplied natural gas via six Custody Transfer Stations (CTS), those being :

- Wilton APA CTS - owned by APA Group, measure the gas received from the Moomba to Sydney Pipeline, also owned by APA Group, entering the Jemena NSW Gas Distribution Network, particularly the Jemena NSW Licence 1 Pipeline.
- Wilton EGP CTS - owned by Jemena, measures the gas received from the Eastern Gas Pipeline (EGP), also owned by Jemena, entering the Jemena NSW Gas Distribution Network, particularly the Jemena NSW Licence 1 Pipeline.
- Horsley Park EGP CTS - owned by Jemena, measures the gas received from the Eastern Gas Pipeline (EGP), also owned by Jemena, entering the Jemena NSW Gas Distribution Network, particularly the Jemena NSW Licence 3 Pipeline.
- Port Kembla EGP CTS - owned by Jemena, measures the gas received from the Eastern Gas Pipeline (EGP), also owned by Jemena, entering the Jemena NSW Gas Distribution Network, particularly the Wollongong Primary Main.
- Rosalind Park AGL CTS - owned by AGL, measures the gas received from the Rosalind Park Gas Plant, also owned by AGL, entering the Jemena NSW Gas Distribution Network, particularly the Jemena NSW Licence 1 Pipeline.
- Hexham AGL CTS - owned by AGL, measures the gas received from the Newcastle Gas Storage Facility (NGSF), also owned by AGL, entering the Jemena NSW Gas Distribution Network, particularly the Jemena NSW Licence 8 Pipeline.

All these stations are equipped with metering facilities to accurately measure gas transfer and gas quality through the CTS. These meters are used for billing purposes and are calibrated in accordance with appropriate measurement standards. These CTS's are not included in the Jemena NSW Gas Distribution Network but play an integral part in securing the natural gas supply.

3.1.2 JEMENA COLONGRA PIPELINE

The Jemena Colongra Pipeline (Licence 33) is supplied from the Munmorah Offtake Metering Station (MOMS) owned by Jemena, and is the custody transfer metering and gas quality measurement facility off the Jemena NSW Licence 7 pipeline. The MOMS is not included as part of the Jemena Colongra Pipeline.

3.2 REGULATING STATIONS

3.2.1 JEMENA NSW GAS DISTRIBUTION NETWORK FACILITIES

This section includes the Trunk and Primary Regulating Stations and Packaged Off-Take Stations that are included in the Jemena NSW Gas Distribution Networks and summarised in further detail in Table 3.

Trunk Regulating Stations (TRS) are gas pressure reduction and filtration facilities that are supplied at trunk pressure and deliver gas at the appropriate pressure to the downstream network.

Packaged Off-Take Stations (POTS) are generally smaller capacity installations combining or 'packaging' the functions of measurement, filtration and pressure reduction. They are supplied at trunk pressure and deliver gas at the appropriate pressure to the downstream network.

Primary Regulating Stations (PRS) are gas pressure reduction and filtration facilities located at each off-take on the primary mains. They reduce the pressure from 3,500kPa to 1,050kPa to supply the secondary network or lower metering pressures to a specified customer.

Bulk Metering Stations (BMS) are metering stations used to deliver gas to a single user who is generally a large industrial customer. The only two BMS's located within the Jemena NSW Distribution Network are Botany STA Buses BMS and Incitec BMS.

The facility components within these stations include above and below ground pipework, isolation valves, insulating joints, control valves / regulators, filters, SCADA and other related components to promote the safe delivery of gas to the network.

As described in Section 3.4, various stations also have heating located on site, used to preheat the gas to ensure that the temperature reduction (Joule Thompson Effect) caused by large pressure drop through regulators does not adversely affect the facility and downstream gas networks.

Table 3 : List of Jemena NSW Gas Distribution Network Facilities

TRS Locations		POTS Locations		PRS Locations	
Albion Park	Kooragang	Appin	Minmi	Auburn	Willoughby
Bathurst	Lithgow	Appin (Inghams)	Morisset	Banksmeadow	Wollongong
Bingara Gorge	Marulan	Appin (Tower	Murrarni	Emu Plains	
Blayney	Moss Vale	Bargo	Narranderra	Flemington	
Bowral	Mount Keira	Boorowa	Narromine	Haberfield	
Campbelltown	Oberon	Coolamon	Parkes	Horsley Park	
Cootamundra	Orange	Dubbo West	Rockdale	Lane Cove	
Cowra	Plumpton	Forbes	Wallerawang	Mascot	
Dubbo	Sally's Corner	Ganmain	Warnervale	Moorebank	
Eastern Creek	West Hoxton	Junee	West Wyalong	North Ryde	
Gosford	Wilton	Leeton	Wye	Penrith	
Goulburn	Windsor	Maroota	Yass	Riverwood	
Griffith	Wyong	Milthorpe		Tempe	
Hexham	Young				
Horsley Park					

3.2.2 JEMENA COLONGRA PIPELINE FACILITIES

The Munmorah Delivery Station (MDS) is a gas regulating station which receives gas from the Munmorah Gas Pipeline (MGP) and regulates the gas pressure into the Munmorah Delivery Pipeline (MDP), in turn, supplying the Colongra Power Station.

The facility components within the MDS include above and below ground pipework, isolation valves, insulating joints, regulators, filters, SCADA and other related components to promote the safe delivery of gas to the Colongra Power Station. A Water Bath Heater is also located on site, used to preheat the gas to ensure that the temperature reduction (Joule Thompson Effect) caused by large pressure drop through regulators does not adversely affect the facility and downstream assets.

3.3 COMPRESSOR STATION

The Munmorah Compressor Station (MCS) is a gas compression facility located on the Jemena Colongra Pipeline (Licence 33). Its purpose is to compress gas from the Jemena Licence 7 pipeline (MAOP 6,895kPa) into the Jemena Colongra Pipeline (MAOP 13,000kPa).

The minimum inlet design pressure and temperature of the MCS is 2,500kPa and -10oC respectively. The maximum outlet (discharge) design pressure and temperature of the MCS is 13,000kPa and 45oC respectively. These few design parameters ensure the safe operational limit of the MCS.

3.4 HEATING REQUIREMENTS

Due to the nature of the gas supply chain from the APA Pipeline (MAOP 6,200kPa) and EGP pipeline (MAOP 14,900kPa) into the Jemena NSW Gas Distribution Network, large pressure drops across the gas regulating stations can occur, known as the Joule Thompson Effect. To mitigate this effect, the gas is preheated via either Water Bath Heaters or Electrical Insulated Heaters (EIH) to protect the downstream equipment / pipelines / networks.

3.4.1 JEMENA NSW GAS DISTRIBUTION NETWORK

The Jemena NSW gas distribution network consists of 15 Water Bath Heaters (WBH) and 2 Electrical Insulated Heaters (EIH), located at various facilities across the network, where large pressure cuts exist and require gas heating as summarised below in Table 4.

Table 4 : Location of WBH & EIH

Facility Location	Commissioning Date	Heating Type	Heat Power (Rated)
Albion Park TRS	2011	WBH	555 kW
Bathurst TRS	2007	WBH	320 kW
Blayney TRS	2005	WBH	40 kW
Cootamundra TRS	2008	WBH	88 kW
Cowra TRS	2005	WBH	30 kW
Dubbo TRS	2010	WBH	278 kW
Dubbo West POTS	2010	WBH	32 kW
Forbes POTS	2010	WBH	82 kW
Junee POTS	2008	WBH	40 kW
Lithgow TRS	2007	WBH	40 kW
Milthorpe POTS	2008	EIH	N/A
Narromine POTS	2010	WBH	24 kW
Oberon TRS	2007	WBH	160 kW
Orange TRS	2006	WBH	200 kW
Parkes POTS	2010	WBH	82 kW
Young TRS	2008	WBH	114 kW
Wallerawang	2008	EIH	N/A

3.4.2 JEMENA COLONGRA PIPELINE

As described in Section 1.1.2, there are six sections that make up the Colongra Pipeline. The Munmorah Delivery Station (MDS) section consists of a 6MW Water Bath Heater (WBH) commissioned in 2009, Australia's largest. The WBH is required to regulate the gas supply down to 2,900kPa from the Munmorah Gas Pipeline (MGP) feeder operating up to 13,000kPa, hence the large pressure cut.

3.5 SECONDARY REGULATOR SETS (SRS)

Secondary Regulator Sets (SRS) are used to describe the Regulator Sets that supply the medium pressure networks. The SRSs reduce the pressure from the secondary network to supply the medium pressure networks. Most SRSs are located in public land and are installed in underground boxes, with a small number installed above ground. There are currently approximately 520 SRSs in service in Jemena Gas Distribution Network.

The Secondary Regulator Sets are operated and maintained in accordance with the Safety Management Manual and Australian Standard AS4645.

The integrity and condition of the SRSs are assessed through numerous activities including :

- Network incident assessments via Incident Cause Analysis Method (ICAM);
- Formal Safety Assessments (FSA);
- Field failure reports; and
- Poor supply report reviews.

3.6 DISTRICT REGULATOR SETS (DRS)

District Regulator Sets (SRS) are used to describe the Regulator Sets that supply the low pressure networks. The DRSs reduce the pressure from the medium pressure network to supply the low pressure networks. Most DRSs are located in public land and are installed in underground boxes. There are currently approximately 50 DRSs in service in Jemena Gas Distribution Network.

The District Regulator Sets are operated and maintained in accordance with the Safety Management Manual and Australian Standard AS4645.

The integrity and condition of the SRSs are assessed through numerous activities including :

- Network incident assessments via Incident Cause Analysis Method (ICAM);
- Formal Safety Assessments (FSA);
- Field failure reports; and
- Poor supply report reviews.

4 OPERATING PARAMETERS

4.1 PRESSURE

The different network systems within the Jemena Gas Distribution Networks operate at various pressures, throughout the day and year based on the network gas demand at any given time. Jemena Colongra also has these cyclic effects on the pipeline as the pipeline fills and discharges depending on the operational requirements for the day. Hence, the network operates within these given operating pressure envelopes as shown in Table 5 below.

Table 5 : Jemena NSW Distribution and Jemena Colongra Operating Pressures

Network System	Jemena NSW Distribution							Jemena Colongra
	Trunk	Primary	Secondary	Medium Pressure Systems	Low Pressure System			Pipeline
Maximum Allowable Operating Pressure (kPa)	6,895	3,500	1,050	400, 300, 210, 100	30	7	2	13,000
Minimum Operating System Pressure (kPa)	1,750	1,750	525	70	10	3.5	1.5	3,400
Minimum Emergency System Pressure (kPa)	1,500	1,500	400	40	5	2.8	1.4	2,500
Standard Metering Pressure (kPa)	Floating*	Floating*, 100kPa	100	35, 5, 2.75	5, 2.75, 1.38	2.75, 1.38	1.38	Floating*

*Note : Floating pressure effectively means the customer receives the network / pipeline pressure.

4.2 FLOW

4.2.1 JEMENA GAS DISTRIBUTION NETWORK

The Jemena Gas Distribution Network is supplied natural gas via 31 Gas Regulating Stations (TRS, POTS) off the APA Moomba – Sydney Pipeline to service the Country areas and in turn, 5 Custody Transfer Stations (CTS) at Wilton (2), AGL Rosalind Park (1), Horsley Park (1), and AGL Hexham (1) supply the Sydney Metropolitan region (Sydney to Newcastle and Wollongong), as mentioned in Section 3.1.

The typical maximum winter peak gas demand for the Sydney Metro Region and Country Region is approximately 325 TJ/day and 40 TJ/day respectively, which is delivered to the networks via either of the CTS's, TRS's or POTS mentioned above, depending on the gas market demand, its drivers or its constraints.

There are also generally three seasonal gas loads on the system, those being, Summer, Winter and the Shoulder Period. For a sense of magnitude, the Total Winter load in the Jemena Distribution Network, is generally 60% more than that of the Total Summer load. A normal winter's gas day also has a morning peak, evening peak and off-peak period.

4.2.2 JEMENA COLONGRA PIPELINE

The Jemena Colongra Pipeline takes a maximum gas rate of 1.8TJ/hr from the Jemena Licence 7 Trunk pipeline and stores approximately 43TJ's of gas. The pipeline can then provide up to 5 hours of continuous operation to the 667 MWe Colongra Power Station.

The pipeline is effectively a gas storage "bottle" that cycles throughout the day and year, depending on the operational requirements of the Colongra Power Station.

4.3 GAS COMPOSITION / QUALITY

Gas composition must comply with Australian Standard AS4564 (Specification for General Purpose Natural Gas), and the key requirements are listed below :

- Wobbe Index 46.0 – 52.0 MJ/Sm³
- Higher Heating Value Maximum 42.2 MJ/Sm³
- Oxygen Maximum 0.2 mol%
- Hydrogen Sulphide Maximum 5.7 mg/Sm³
- Total Sulphur Maximum 50 mg/Sm³
- Water Content Maximum Dewpoint 0oC at MAOP (Max 112.0 mg/Sm³)
- Hydrocarbon Dewpoint Maximum 2.0oC at 3500 kPag
- Total Inert Gases Maximum 7.0 mol%
- Oil Maximum 20 mL/TJ

The instruments used to measure the key requirements are :

- Gas Chromatographs (GCs) are instruments which analyse the components of gas. From the components, they calculate the specific gravity and heating value of the gas. This is important for billing in general and in particular, when there are different sources of gas supplied into a gas network. The Jemena NSW gas distribution networks receive gas from a number of sources. As a result, Jemena installs GCs in strategic locations to accurately measure the resulting mixture of gases. Currently, these strategic locations are at West Hoxton, Horsley Park, Plumpton, Wyong and Hexham.
- Hydrocarbon and Water Dewpoint analysers are used to see if gas is out of specification. It is possible that water and liquid hydrocarbons could drop out of the gas as the gas pressure is regulated and reduced. This material could block regulators and pipes and stop supply of gas to townships and end users. Hydrocarbon and Dewpoint temperature analysers are installed in meter stations to monitor the gas quality and provide alerts when the gas is out of specifications.

4.4 SCADA SYSTEM

The Jemena gas network Supervisory Control and Data Acquisition (SCADA) and Real Time System (RTS) assets are infrastructure put in place to enable the safe and efficient delivery of gas to Jemena's gas customers, and timely business and operational management decisions to be made.

SCADA and RTS assets are critical infrastructure to core business functions, such as gas billing, gas dispatch / distribution and demand management. Sites are designed to be unmanned and any loss of communication with SCADA does not impact the safe operation and control of the site.

The Jemena SCADA and RTS assets comprise of :

- Custom designed software that runs on the Jemena Gas Network's GENE SCADA system and OSI Pi Data Historian system;
- A number of Remote Telemetry Units (RTU) and Remote Units (RU) connected to field control and instrumentation facilities (flow, pressure, and temperature monitoring and control equipment installations) located at strategic locations (Gas Regulating Facilities) throughout the Jemena gas networks; and
- A SCADA telecommunications network that ensures that information acquired from the strategic locations throughout the Jemena gas networks (via the RTUs and associated flow, pressure, temperature monitoring devices, etc) and back to the central SCADA system.

Appendix B Safety Management Manual

Note : Manual embedded

Jemena Asset Management Pty Ltd

Safety Management Manual

Gas Assets

Protected

30 January 2017



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TABLE OF CONTENTS

1. Introduction1

 1.1 Purpose.....1

 1.2 Scope.....1

 1.3 Applicable Assets.....1

2. Legislative Compliance2

 2.1 Applicable Legislation.....2

 2.2 Compliance Assurance Matrix2

3. Safety Management System3

 3.1 General.....3

 3.2 ASset Management System Overview3

 3.3 Safety Management Process.....5

 3.4 Supporting Elements.....9

4. Risk Management10

 4.1 Risk Management Principles10

 4.2 Facility Risk Assessments10

5. Asset Integrity Assurance12

 5.1 General.....12

 5.2 Asset Creation12

 5.3 Inspection and Maintenance.....12

 5.4 Operations.....13

 5.5 Management of Change.....13

 5.6 Safe Work Systems.....13

6. Incident Investigation and Reporting15

7. Emergency Management System16

8. Competency and Training.....17

9. System Audits.....18

 9.1 External Audits.....18

 9.2 Internal Audits.....18

 9.3 Audit follow up and Continuous Improvement.....18

10. Safety Performance Management and Governance.....19

11. Asset Information Management.....21

1. INTRODUCTION

1.1 PURPOSE

The purpose of this Safety Management Manual (Gas Assets) is to describe the Safety Management System and supporting processes that Jemena has in place to provide for the safe and reliable operation of gas assets (transmission and distribution) in accordance with Jemena's operational, societal and environmental objectives as well as legislation, industry standards and specific pipeline licence conditions.

1.2 SCOPE

The scope of the safety management system applies to the following Asset Classes:

AS2885 Pipelines: includes primary mains network and transmission pipelines including pipeline scraper stations for assets operating above 1050kPa.

AS4645 Networks: includes distribution line pipe networks and associated pressure regulating devices operating below 1050kPa.

Facilities: includes gas facilities operating above 1050kPa. These asset are grouped into sub-classes as

- Compressor/engine packages
- Pressure Equipment (Pressure equipment includes all piping, filter and regulator skids)

1.3 APPLICABLE ASSETS

This manual is applicable for the following Jemena gas assets:

- Evoenergy ACT Distribution Network (ACT)
- Jemena NSW Gas Distribution Network (NSW)
- Evoenergy L29 Pipeline (NSW)
- Jemena Gas Pipelines L1,2,3,7,8 (NSW)
- Evoenergy NSW Distribution Network (NSW)
- Jemena Colongra Pipeline L33 (NSW)
- Eastern Gas Pipeline PL 26 (NSW) and PL 232, 247 (VIC).
- Darling Downs Pipeline PL90, 133, 134 (QLD)
- Queensland Gas Pipeline PL30 (QLD)
- Northern Gas Pipeline (HOLD)

2. LEGISLATIVE COMPLIANCE

2.1 APPLICABLE LEGISLATION

Jemena gas assets are created, operated and maintained in accordance with the following Legislation and industry standards:

Legislation:

- Gas Industry Act 2001 (Victoria)
- Pipelines Act 2005 (Victoria)
- Pipelines Regulations 2017 (Victoria)
- Gas Safety Act 1997 (Victoria)
- Gas Safety (Safety Case) Regulations 2008 (Victoria)
- Pipelines Act 1967 No 90 (NSW)
- Pipelines Regulation 2013 (NSW)
- Gas Supply Act 1996 (NSW)
- Gas Supply (Safety and Network Management) Regulation 2013
- Petroleum and Gas (Production and Safety) Act 2004 (Queensland)
- Petroleum and Gas (Production and Safety) Regulation 2004 (Queensland)
- National Gas (Northern Territory) Act 2014
- Utilities Act 2000 (ACT)
- Utilities (Technical Regulation) Act 2014 (ACT)
- Gas Safety and Operating Plan Code 2000 (ACT)

Primary Standards:

- AS2885.1 2012 Pipelines – gas and liquid petroleum Part 1: Design and construction
- AS2885.3 2012 Pipelines – gas and liquid petroleum Part 3: Operations and maintenance
- AS 4645.1 2008 Gas distribution network management

2.2 COMPLIANCE ASSURANCE MATRIX

The Compliance Assurance Matrix is designed to demonstrate to the Regulator of Jemena's processes and procedures in compliance with applicable requirements stated in the Acts/Regulations and standards. The matrix presented into two categories, one tab each for AS 2885 and AS 4645. AS 2885 matrix will mirror Jemena's process corresponding to all gas transmission assets. Likewise the AS 4645 will be for network assets.

The matrix document will be utilised as "sole source of truth" for all regulatory external audits. It will point to various supporting processes/procedures. The currency of these supporting processes/procedures will be maintained by the functional areas that own them.

3. SAFETY MANAGEMENT SYSTEM

3.1 GENERAL

Jemena management is committed to ensuring that all operations meet or exceed its corporate standards and the requirements of relevant state and federal legislation, as well as meeting customer and community expectations for the management of health, safety, environment and quality performance. This includes ensuring that assets are managed safely whilst ensuring the reliable supply of gas for the duration of the asset life cycle. The Jemena Health and Safety Policy outlines management commitments, requirements and goals for Safety performance, including the following:

- Providing a safe and healthy workplace where the risk of injury and illness is minimised;
- Having systems and processes that enhance the way our people work, thus maximising reliable performance;
- Complying with applicable statutory obligations, standards, codes of practice and other regulatory requirement relevant to our assets and our operations;
- Designing, operating and maintaining our assets in a way that protects or enhances community safety; and continuity of supply

This manual describes how Jemena achieves these safety performance goals.

3.2 ASSET MANAGEMENT SYSTEM OVERVIEW

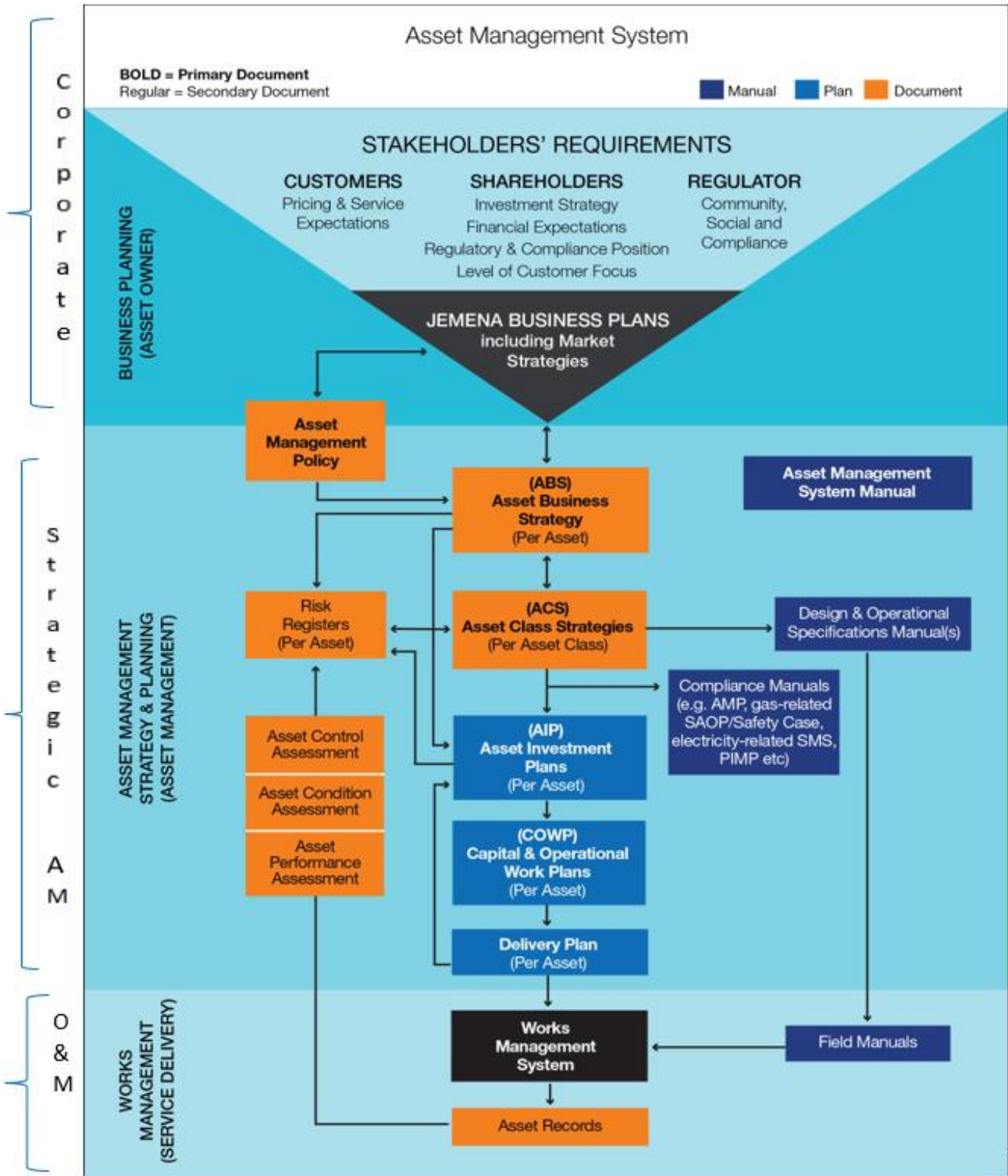
Jemena has an overall Asset Management System (AMS) within which Safety Management is a key element. The Asset Management System provides the principle framework for the organization to direct, coordinate and control asset management activities and provides assurance that Jemena's operational, societal and environmental objectives are achieved on a consistent basis. It brings together the external influences, asset management drivers, business values and selected strategies to deliver sustained performance for the benefit of all stakeholders.

Jemena's strategy to asset management is explained in detail in Asset Management System Manual JEM-AM-MA-0001.

The Overall Asset Management System document hierarchy is summarised in Figure 3.1 below

Figure 3.1 details the document hierarchy that transforms Jemena's strategic objectives into the required actions that underpin the asset management function. Figure 3.2 also shows secondary documents that support the strategy and planning documents.

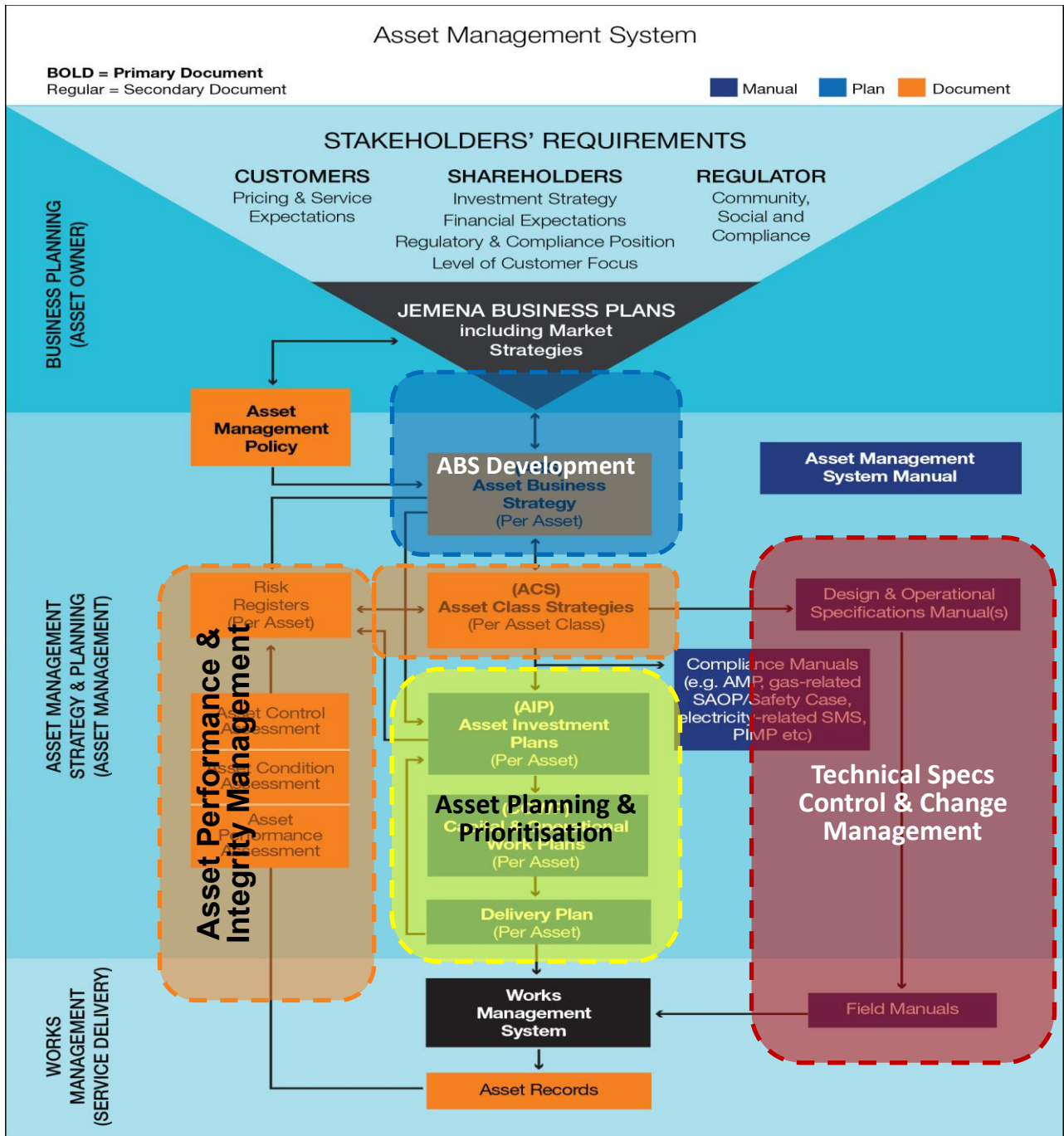
Figure 3:1: Jemena Asset Management System Document Hierarchy



3.3 SAFETY MANAGEMENT PROCESS

The overall Safety Management process is defined in the context of the level 2 processes, shown in Figure 3.2 below.

Figure 3:2 Jemena Asset Management Level 2 Processes



3.3.1 ASSET BUSINESS STRATEGY DEVELOPMENT

3.3.1.1 Asset Business Strategy

The Asset Business Strategy (ABS) translates Jemena's organisational objectives including safety into individual Asset objectives, e.g. profitability, cash flows, desired performance, current and expected performance, etc. It is also used to confirm with customers whether the Asset is meeting their expectations.

3.3.2 ASSET PLANNING AND PRIORITISATION

Asset specific activities are prioritised and planned by Asset Investment (AM) based on the results of asset condition and performance assessments and risk assessments to ensure the safe operation of the assets. The planning and prioritisation cascades down from Asset Class Strategies (ACS), Asset Investment Plans (AIP), Capital and Operational Work Plans (COWP) to Delivery Plans as described in the following sections. This includes engineering assessments, business plans, minor business plans etc as required for the size of the work.

Once works are approved, the work is passed to Service Delivery, via a confirmed Scope of Work, within the Works Management System.

3.3.2.1 Asset Class Strategy

The Asset Class Strategy (ACS) explains the approach and principal methods by which each asset class contributes to delivering Asset Management objectives as stated in relevant ABSs, considering the age, criticality and condition profile of the class. It may also include scenario analysis for various strategies (e.g. replacement vs. refurbishment, non-asset solutions, etc), and demonstrates how the Asset Management activities for the asset class are to be prioritised or optimised to achieve Asset Management objectives (as defined in ABS).

3.3.2.2 Asset Investment Plan (AIP)

Each AIP is a response to one or more ACS, and it defines an optimum set of Asset Management activities (OpEx & CapEx with budgetary financial information) to achieve Asset Management objectives set for the Asset as defined in the relevant ACSs. The AIP sets out proposed costs and activities for the next 7 years as a feed to corporate planning and forecasting.

The content of the AIP in our new format has been substantially reduced to provide the list of proposed projects in the programs of work and explanatory notes on the prioritisation of competing programs of work and any mitigation actions required to maintain targeted risk levels.

3.3.2.3 Capital & Operational Work Plan (COWP)

The COWP contains details on optimised capital and operational expenditures for next two years, linking each expenditure item to one or more Asset objective(s). It sets out the detailed programs of work, resource requirements and costs that feed the Jemena business planning and budgeting process.

3.3.2.4 Delivery Plan

The delivery plan describes how our Service Delivery function will deliver to requirements of COWP including management of supply contracts, resource planning, etc. It provides assurance to Senior Management and the Board that our proposed business plan and budget can be delivered.

3.3.3 ASSET PERFORMANCE AND INTEGRITY MANAGEMENT

All field work is completed by Service Delivery under the Works Management System, as directed by Asset Planning and Prioritisation process and/or Technical Specifications. As a result of these activities, Asset Records are prepared as specified by the Work Codes or as defined by an AM prepared Scope of Work.

These asset records are provided to AM who carry out a series of assessment to confirm the asset condition and performance (Asset Performance and Integrity Management). These assessments are described in the following sections.

As a result of these assessments, anomalies (technical risk items that may require corrective action to ensure continued safe operation) are identified and are risk assessed to determine criticality. These are recorded and tracked in the Risk Registers.

Facility risk assessment are also performed on a continuous basis as asset information is updated. The risk assessments include Safety Management Studies, Formal Safety Assessments and HAZOPs. These are described in Section 4.

3.3.3.1 Asset Condition Assessment Review

Asset condition assessments evaluate how the condition of the assets has changed over time in comparison to set targets. For example, the level of corrosion observed during inspections. The condition of the asset includes not only the physical condition but also the age and criticality of the asset.

The condition assessment reports help to inform the expected life expectancy of the asset, when preventative actions are required and if there is a need to be make changes to the frequency of inspections.

3.3.3.2 Asset Performance Assessment Review

The performance report compares the performance of the Asset Classes against set targets and identifies trends in performance. Examples of the performance measures assessed include:

- engineering investigations and incident report findings;
- plant availability;
- failure rates or frequencies;
- Asset Performance
- reliability;
- asset-specific costs;
- mean time between failure;
- plant defects and cause codes;
- corrective maintenance rates;
- Major Incidents

3.3.3.3 Asset Control Assessment Review

Controls are processes or actions designed to eliminate, control or mitigate key business risks.

The asset control assessment report evaluates the annual compliance to these controls and effectiveness of the control. This is achieved by reviewing:

- JCARS;
- PM compliance;
- internal and external audits
- work in backlog; and
- rework.

3.3.3.4 Risk Register

Asset Class registers are used to record and track all “Above appetite risks” which are under active management, held in JCARS by agreement with the ACM

The risk register and identified risks are used to underpin the asset class strategy considerations to ensure the safe operation of the gas assets

Risks and controls are owned by the ACMs.

3.3.4 TECHNICAL SPECIFICATIONS

Technical Specifications are the suite of documentation defining the minimum technical requirements for the creation and management of gas assets to meet Jemena safety and performance objectives and legislative requirements. These specifications underpin the safety management process by ensuring “industry best practices” are adopted in all design, construction, inspection, maintenance, assessment and repair activities carried out by Jemena.

Specifications are prepared by Asset Management to address the following:

- Design and construction of pipelines, facilities and networks;
- Operational monitoring, control and response of pipelines and networks;
- Field operations and maintenance of pipelines, facilities and networks;
- Gas measurement and reconciliation.

These Technical Specification address the following:

- Compliance with applicable codes and standards;
- Approved, “industry best practice” inspection techniques;
- Preventative and corrective maintenance activities;
- Methods to determine frequency of activities e.g. fixed interval, risk based;
- Anomaly assessment methods;
- Repair methods.

These Specifications interface with Service Delivery (SD) to provide the basis for asset specific Field Manuals, thus ensuring that best practices and consistency is provide in the management of all Jemena Assets.

Field manuals provide the specific activities (type, frequency and procedures) which will be carried out for the asset via Work Codes.

Routine, prescriptive works as defined in the Field Manuals are automatically input into the Work Management System, unless there is a strategic change which would cause a change to the Specifications.

3.3.4.1 Technical Change Management

Review and updates to Technical Specifications will be carried out on a periodic basis. The suitability of any changes will be demonstrated by an assessment to ensure the change is in compliance with legislation and Jemena's objectives and all changes will be carried out in accordance with Jemena Change Management Manual. All changes will need to be approved by the Asset Strategy Manager.

Changes in the Technical Specifications will be reflected in subsequent updates to the relevant Work Codes, which are referenced in the Service Delivery field manual. Updates to Work Codes will be carried out by Asset Strategy and approved by the Asset Strategy Manager, for execution by Service Delivery.

3.3.5 WORKS MANAGEMENT SYSTEM

The delivery of the tasks/activities needed to operate and maintain Jemena assets is performed by the works management system (Service Delivery). These tasks/activities are governed by the design basis manuals and operational/maintenance specifications established by asset management, as previously described.

3.4 SUPPORTING ELEMENTS

The key elements which support the Safety Management System process and ensures the safe operation of the gas assets are:

- Risk Management;
- Asset Integrity Assurance;
- Incident Investigation and reporting;
- Emergency Management System;
- Competency and Training;
- Management Review and System Audits;
- Asset Information Management.

These elements are described in the following sections.

4. RISK MANAGEMENT

4.1 RISK MANAGEMENT PRINCIPLES

Risk Management provides the basis of Jemena's Asset Management System. Jemena's approach to risk management is described in the Jemena Asset Risk Management Guideline [JEM AM GU 0007 Asset Risk Management Guideline](#).

Safety and performance management is ensured through the following application of risk management:

- Training of staff in Company HSE systems as well as operations safe work systems and associated processes;
- Pre-job planning, including task step identification and job hazard analysis, involving personnel undertaking the tasks;
- Use of safe work systems including Permit to Work Procedure to ensure that no work is undertaken on the pipeline or associated facilities without appropriate control;
- Regular workplace inspections to identify and control hazards;
- Timely reporting and investigation of hazards, near misses and incidents and the assignment of appropriate corrective and preventative action;
- Development and use of Risk Registers to identify and track risks;
- Use of pipeline and facility integrity risk review information and recommendations;
- Undertaking asset risk assessments for all new projects and where there is a change or modification to existing plant, equipment or processes or as required by legislation. The type of hazard/risk identification and assessment process applied is dependent on the nature of the activity being assessed.

4.2 FACILITY RISK ASSESSMENTS

Jemena undertakes risk assessments for all new projects and periodic risk assessment for all existing facilities as required by Jemena Corporate Risk Manual and the applicable codes and standards.

The following sections describe the risk assessments undertaken by Jemena to ensure the safe operation of the gas facilities, which includes the method of assessment based on the gas asset class. These risk assessments are maintained by relevant functional groups and are subject to periodical audits by the regulator.

These risk assessments are undertaken to:

- Ensure, and provide assurance that the asset is operated safely;
- Identify and assess threats to the assets that have the potential to impact on integrity;
- Identify procedural and design measures necessary to eliminate or reduce significant risks to a level regarded as either low or ALARP;
- Provide a link with the Emergency Response Plan;
- Demonstrate that the entire gas asset meets or exceeds code requirements and the level of risk is low or ALARP.

The following facility risk assessments are performed:

4.2.1 SAFETY MANAGEMENT STUDIES

Safety management studies (SMS) identifies threats to AS2885 pipeline systems and applies controls to them, and (if necessary) undertakes assessment and treatment of any risks to ensure that residual risk is reduced to an acceptable level. Safety management studies also include remaining life reviews.

Safety management studies are carried out in accordance with AS 2885.1.

Safety management studies are conducted as a result of the following:

- During design process and at final design approval;
- At intervals not exceeding five years;
- At any review for changed operating conditions;
- At any review for life extension;
- At any time when new threats are identified
- Or as required by AS2885.3.

4.2.2 FORMAL SAFETY ASSESSMENTS

Formal safety assessments (FSA) are used to identify specific threats and hazards associated with gas networks and metering systems and the mitigation of threats and hazards operating at or less than 1050kPa. As for Safety Management Studies, formal safety studies identify threats to the gas network and applies controls as required to ensure that the residual risk is reduced to an acceptable level.

FSA are carried out in accordance with AS4645.

4.2.3 HAZARD AND OPERABILITY STUDIES

Hazard and Operability Studies (HAZOP) are a process aimed at the systematic review to identify and assess hazards inherent in the design, operation and maintenance of the facilities. HAZOPS are carried out for all Jemena gas facilities in accordance with AS2885.1 and AS IEC 61882.

4.2.4 ENCROACHMENT MANAGEMENT

Jemena employs an encroachment management system to monitor and assess the impact of developments occurring within the vicinity of gas assets. The encroachment management system uses the AS2885.1 Safety Management Study process to assess the impact of any development and advise the proponent of the impact identified as a result of the change in land use and to define appropriate mitigation measures to be implemented.

5. ASSET INTEGRITY ASSURANCE

5.1 GENERAL

Asset safety and performance can be impacted in many ways along the lifecycle of the asset. These include a range of issues from poor design and construction to inadequate maintenance or operational procedures through to third party activities. The case for safety of the assets must therefore consider these various aspects that affect asset integrity and thereby to asset safety.

Jemena ensures gas asset system integrity by performing design, construction, commissioning, inspection, operations and maintenance activities in accordance with Jemena Specifications, practices, procedures and applicable codes and standards, as described in the following sections.

5.2 ASSET CREATION

Asset Creation involves ensuring that all the Specification, Design, Construction, Procurement, Commissioning and Handover activities needed to turn a business requirement result in a functional and safe asset being integrated into the organisation.

Jemena ensures asset integrity through the implementation of design, construction and commissioning practices in accordance with:

- Applicable codes and standards;
- Best industry practices;
- Jemena experience;
- Risk management principles.

These are implemented within new projects through the applicable of relevant Technical Specifications, as defined below:

- GDN-1999-DG-DN-001 JGN - Secondary Systems Design Manual
- GDN-1999-DG-DN-002 JGN - Low and Medium Pressure System Design Manual
- GAS-960-DG-PL-001 – AS2885 Pipelines Design Manual
- GAS 999 DG FA 001 – HP Facilities Design Guide Manual (under review)

5.3 INSPECTION AND MAINTENANCE

Ongoing asset integrity is continuously monitored through inspection and maintenance activities using an integrity management cyclic process inherent within the Asset Management System. This includes the following key elements:

- Inspections to identify and collect relevant integrity data;
- Asset condition assessments to identify anomalies;
- Facility risk assessments to assess anomalies;
- Planned maintenance to maintain integrity;

- Corrective maintenance to return equipment to a safe condition.

These integrity management activities are described in the following Specifications:

- GAS-960-SP-ME-019 AS2885 Field Operations and Maintenance Specification
- GAS 1999 SP ME 001 AS 4645 Field Operations and Maintenance Specification

Integrity Management Plans are developed for each asset based on the specific requirements for each asset resulting from the application of the above specifications and risk assessments described in Section 4.

5.4 OPERATIONS

All Jemena gas assets are operating in accordance with operating manuals which define the actions to be taken in the event of normal, abnormal, and emergency operating conditions to ensure the safe operation of the assets.

These operating manuals and procedures for each gas asset are developed and established on the basis of the following Technical Specification:

- GAS-960-SP-NC-001 Gas Pipelines - Operational Monitoring, Control and Response Specification
- GAS-960-SP-NC-002 Gas Networks - Operational Monitoring, Control and Response Specification

This Specification provides the outline instructions and procedures for performing operational monitoring, control and fault and emergency response requirements for all Jemena gas assets in accordance with relevant legislation and Jemena's operational, societal and environmental objectives.

5.5 MANAGEMENT OF CHANGE

All gas asset facility modifications are required to follow the requirements of Jemena change management procedures. The change management process includes the following activities.

In circumstances when a modification is necessary, the engineering change management procedure is followed. In this instance, the suitability of the modification shall be demonstrated through a documented assessment which will ensure all relevant inputs and implications on existing facilities are considered

To support the above, Safety Management Studies are carried out for all changes to A2885 pipelines and facilities in accordance with AS2885.1 to confirm all threats have been considered in the modification design and the design does not introduce additional uncontrolled threats to the existing infrastructure.

Formal safety assessments are carried out for Gas Networks in accordance with AS4655.

All modifications work is carried out in accordance with Jemena Safe Work practices, as defined in Section 5.6

Reference to Change Management procedures is provided in the Compliance Assurance Matrix.

5.6 SAFE WORK SYSTEMS

Jemena operates safe work systems to ensure high levels of health, safety and the environment are maintained when work is carried out on gas assets. The activities and processes that Jemena employ to ensure all field work is carried out safely is described below.

Risk assessment for field operations are carried out in advance of the operations to identify threats to the assets and confirm adequate controls have been included in the work procedures to mitigate any residual risk to acceptable levels. The most typical risk assessments include the following:

- Construction Work Safety Management Studies/Risk Assessments in accordance with AS2885.1;
- In-service welding risk assessments in accordance with AS2885.2 and WTIA Technical Note 20;
- Hot tapping risk assessment.

Hazard Identification and Risk Assessments (HIDRA) are performed prior to all operations to address threats to personnel and confirm adequate controls are established within the work procedures to reduce any residual risk to acceptable levels.

Jemena operates a Permit to Work (PTW) system for work carried out on all Jemena gas assets. The PTW System is an additional procedural control employed for site works involving high levels of risk when working with any pipeline or its facilities to ensure high levels of health, safety and the environment are maintained. Types of Permit to Work include:

- Cold Work Permit;
- Hot Work Permit;
- Excavation Permit;
- Confined Space Entry Permit
- Critical Work Permit

References to the Safe Work Systems is referenced in the Compliance Assurance Matrix

6. INCIDENT INVESTIGATION AND REPORTING

Within the Asset Management System, Jemena utilises an Incident Management System for logging incidents. The management of the incident investigation is completed through Jemena's Asset Incident Investigation process where appropriate persons are tasked with investigation of the incident.

Jemena has established procedures for identifying, notifying, recording, investigating and reporting accidents or incidents resulting from the operation and maintenance of the assets. This includes any event associated with the pipeline or facility that either causes or has the potential to cause:

- Injury or death to pipeline personnel or the public
- Significant damage to the environment
- Significant impact on the pipeline's operation or integrity

These procedures provide for feedback to ensure appropriate preventative actions are implemented in the Safety Management process.

Please refer [JEM HSE PR 0151 Jemena Incident Investigation Procedure](#) (and as mapped in the Compliance Assurance Matrix).

7. EMERGENCY MANAGEMENT SYSTEM

Jemena maintains an Emergency Management Plan (EMP) which provides a common emergency management structure surrounding an event which is impacting on the business and has been classified as being an emergency.

This Emergency Management Plan and its annexes support the actions of an established Emergency Management Team (EMT) and Area Management Team (AMT) including the following:

- Effective decision-making for significant incident and emergency events;
- Effective identification, assessment and escalation of events;
- Effective recording of EMT/ AMT actions and decisions:
- Supports the post-event review of EMT/AMT management to support recommendations for future improvement; and
- Provision of training.

This Emergency Management Plan provides guidance on Emergency Management Team (EMT) processes and the roles and responsibilities of team members during an event and describes the structure of the Emergency Management Team (EMT) and Area Management Team (AMT). This includes the process of escalation, activation and mobilisation to provide a state of readiness for effective deployment and response.

The Emergency Management Plan and other supporting documentation is referenced in the Compliance Assurance Matrix.

8. COMPETENCY AND TRAINING

Jemena has systems in place to ensure that its management, supervisors, employees and contractors are recruited appropriately, have the necessary skills and knowledge and are competent to operate and maintain the facilities in compliance with Jemena safety objectives.

Competency procedures address the following to ensure the safe operation of the gas assets:

- Appropriate employee selection;
- Engineering staff competency;
- Field staff technical and HSE competency;
- Contractor management;
- Employee performance review and development.

Reference to Competency and Training Procedures is provided in the Compliance Assurance Matrix.

9. SYSTEM AUDITS

Management review and auditing activities are part of Jemena continual improvement process as outlined in the Asset Management System. Along with asset assessments, AMS monitoring, compliance management and incident investigations, these audits assure that the asset management system is providing the necessary outcomes as required by Jemena's objectives.

Reference to system audit activities and procedures is provided in the Compliance Assurance Matrix.

The audits related to the gas safety management systems are described below.

9.1 EXTERNAL AUDITS

Jemena complies with external audit regimes as relevant, to monitor and evaluate the level of compliance. This may include:

- Auditing of the Safety and Operating Plans (SAOPs), Pipeline Management Plans (PMP), Safety Cases, Safety Management Plans, Safety Management Schemes and Environmental Management Plans (EMP) associated with the various assets under management;
- Auditing the accuracy of compliance obligation confirmations;
- Acting upon deficiencies identified in the audit in a timely manner;
- The inclusion of audit results in management reviews;
- Non-conformance, Corrective and Preventative Action Plans.

9.2 INTERNAL AUDITS

Jemena carries out internal audits to monitor and evaluate compliance to technical safety, requirements. This includes:

- Auditing of the Safety Management Plans, SAOPs, Safety Management Schemes and EMPs associated with the various assets under management;
- Scheduling of audits in order of the importance of the activities and associated risk and the results of previous audits taking into account scheduled external regulatory audits;
- Acting upon deficiencies identified in the audit in a timely manner;
- The inclusion of audit results in management reviews;

9.3 AUDIT FOLLOW UP AND CONTINUOUS IMPROVEMENT

All audit actions are monitored and tracked through the Jemena Compliance and Risk Systems (JCARS) with formal reports generated monthly to track their progress. The Internal Audit team reviews the outcomes of these actions following the closure of each action item.

10. SAFETY PERFORMANCE MANAGEMENT AND GOVERNANCE

Safety performance is managed and governed through the preparation of asset safety performance reports, the results of which are reported through a number of established safety committees. This safety performance management and government process is described below.

The Safety Council provides overall HSE leadership and assists Jemena to fulfil its overall responsibilities in relation to HSE matters as they affect workers (employees and contractors), customers and the community. Membership of the Council includes the Managing Director as the Chair, all Executive General Managers and the General Manager of HSEQ.

The HSE Council has established an Asset and Public Safety Committee (APSC), which monitors and reports on the effectiveness of strategies and practices to manage risks. The APSC includes all Asset Management and Delivery General Managers as well as HSE and Risk Management. On behalf of the APSC, the APSC chair reports to the HSE Council on the APSC's activities and on the safety performance of Jemena network and pipeline assets.

The APSC oversees a number of operational and review committees which have specific objectives, including the Gas Safety and Management Review Committee (GSMRC). Through the Gas Safety and Management Review Committee, the APSC reviews and monitors the operation of gas safety management processes and systems to ensure they deliver.

The GSMRC oversee the following areas insofar as that relate to asset and public safety as detailed in the committee charter:

- Technical policies, procedures and work instructions;
- Regulations, codes, standards and contractual compliance;
- Audit and incident investigations;
- Performance, integrity and condition monitoring;
- Good industry practice, research and innovation.

The GSMRC reports to the APSC, on a quarterly basis, the current status of the asset and public safety program and management system including:

- Performance against key performance indicators (KPIs);
- Trend analysis of significant events;
- Major incident logs and major incident review completed;
- Formal Safety Assessments and Safety Management Studies;
- Legislative and regulatory compliance;
- Status of relevant management system audit or corrective actions;
- Changes to the status of risks and controls.

The GSMRC is supported by the AS2885 Pipeline Code Committee and the AS4656 Code Committee.

These are operational level committees with the purpose of developing operational excellence across all gas infrastructure assets governed by the AS 2885 suite of standards for gas pipelines and facilities and AS4645 Suite of standards for gas networks.

Monthly performance reports are prepared at the operational level for the gas assets, which relate performance to a number of KPIs, including:

- Reportable incidents;
- Gas releases;
- Response time;
- Encroachments;
- Cathodic Protection performance;
- Third party hits;
- Pipeline defects;
- Pipeline patrols;
- Maintenance completion;
- Engineering assessment close outs;
- Asset integrity and condition assessments.

11. ASSET INFORMATION MANAGEMENT

Information management, which supports asset management process including decision making, reporting and activities, is fundamental to the assured safe performance of the assets.

Jemena has established record management plans for the identification, preparation, collection, storage, transfer and disposal of information pertinent to the safe operation of the assets. This information includes the following:

- Engineering records including pipeline design, construction records, change requests, engineering assessments, operating condition data, welding qualifications, communication systems data, drawings, risk assessments, HAZOPs, easement information, location class review, MAOP review, maps, coating inspections, pipeline inspections (both internal and external), cathodic protection, hydrotest and commissioning reports;
- Operations and maintenance records including inspection and test records, surveillance records, quality and integrity data from forms;
- Audit records of field operations, work practices, competency details, health, safety and environment performance data;
- Operational reports as required by the company and by regulators;
- Incident reports and corrective action reports;
- Work management system data including work orders and completion reports;
- Health and safety including meeting minutes, safety grams, SWMS, audits and environmental issues.

Jemena utilises a Geographic Information System (GIS) to manage pipeline information, landowner management, crossing notifications, field data capture, pipeline inspections and other asset information. The GIS allows users to view, query, analyse and map information related to the asset and surrounding land, and provides access to the following types of data:

- As-built pipeline data;
- Pipe & weld traceability recorded during construction;
- Above ground & below ground features near pipeline;
- ROW information / environmental / land management data / Inspection records;
- Safety Management (AS2885) information incl. Location Class;
- Aerial photography.

The overall principles of Asset Information management is addressed in the Asset Management System Manual. Reference to the Asset information Management procedures are provided in the Compliance Assurance Matrix.

Appendix C Compliance Assurance Matrix

Note : compliance assurance matrix embedded

Compliance Assurance Matrix

No	Standard	Requirement Title and Detail	How do we address the requirement – additional information	Supporting procedure / process
1	AS2885.3 CI.2.2.2.1	<p>Management - Policy and Commitment Policy and commitment The Licensee shall define its policy towards the various aspects of operating the pipeline. Policies shall address at least—</p> <ul style="list-style-type: none"> (a) pipeline integrity management; (b) environmental management; and (c) occupational health and safety management. <p>NOTE: A clear commitment by the Licensee towards specific outcomes forms the basis of the pipeline management system.</p>	<p>Jemena is committed to being the customer’s choice for world leading, reliable and sustainable energy solutions.</p> <p>Please note the various applicable Policies.</p>	<p>Jemena Compliance With The Law Policy</p> <p>Jemena Asset Management Policy</p> <p>Jemena Health & Safety Policy</p> <p>Jemena Environment Policy</p>
2	AS2885.3 CI.2.2.2.2 & CI.2.2.2.3	<p>Management - Structure A defined management structure for the pipeline shall be established to identify key positions and or personnel. A management structure appropriate to the size and complexity of the pipeline shall be maintained</p> <p>Management - Responsibilities, Accountabilities and Authorities The responsibilities, accountabilities and authority levels of personnel and or contractors with respect to the various aspects of the operation and maintenance of the pipeline shall be detailed in the pipeline management system. In particular, personnel shall be identified and documented with the responsibility and authority to—</p> <ul style="list-style-type: none"> (a) initiate action to prevent a loss of pipeline integrity, damage to the environment, impact to public, or to correct an occupational health and safety issue; (b) identify and report on any existing or potential deficiencies within the pipeline management system or the pipeline’s operation and maintenance; (c) initiate, recommend and approve corrective and preventive actions in relation to identified existing or potential deficiencies within the pipeline management system or the pipeline’s operation and maintenance; (d) evaluate and verify the effectiveness of any corrective or preventive action implemented; and (e) satisfy the mandatory approval requirements of this Standard. <p>NOTE: AS 2885.0 requires the development of an approval matrix to document the delegations of the Licensee.</p>	<p>The organization structure for the asset is broadly described in element 7 of the safety case . Details of the organizational arrangements in managing the assets is described through the Jemena’s Accountability Model .</p> <p>Note: Jemena’s Accountability Model. The Accountability Model is a tool that utilises the Enterprise Process Model (EPM) to provides a single source of truth for accountabilities across the business. It is expected that the tool will enable the business to clarify roles in planning and executing work, executing a process, and making day-to-day decisions.</p> <p>In addition to this, as required by the standard, Jemena has established AS 2885 Document Approvals Structure to meet necessary compliance (refer Document Approvals Matrix)</p>	<p>Asset Management Manual – Section 9</p> <p>Jemena Organisation Chart</p> <p>GAS-999-PA-DM-004 GAS AS 2885 Document Approvals Structure</p> <p>The Accountability Model (RASCI)</p>
3	AS2885.3 CI.2.2.2.4	<p>Management - Training and Competency Personnel shall be competent to perform the specific tasks and functions for which they are responsible.</p> <p>The Licensee shall establish and maintain procedures for identifying and providing the training needs of all personnel performing functions covered by the pipeline management system.</p> <p>As a minimum and as applicable to each position, personnel responsible for the operation and maintenance of the pipeline shall be—</p>	<p>Jemena has comprehensive Learning and Development Processes in place to meet ongoing training and competency needs. These are met through several processes. The details of which can be demonstrated by a member of the Jemena Learning and Development team.</p> <p>In addition, People leaders have responsibility to ongoing management of competency and support. Sever tools are available to support the training and competency requirements.</p> <p>Learning includes Success Factors, Competency Framework. Passport (Contractors).</p>	<p>Asset Management Manual – Section 9</p> <p>Jemena Learning & Development Website</p> <p>JEM PR 0101 WI 02 Gas Technical Training</p> <p>JEM PR 0101 WI 02 Gas Technical Training</p>

Note: Assets Operating above 1050kPa, refer to AS 2885 requirements. Assets Operating below 1050kPa , refer AS 4645 requirements.

Compliance Assurance Matrix

No	Standard	Requirement Title and Detail	How do we address the requirement – additional information	Supporting procedure / process
		<p>(a) adequately trained and experienced in all aspects of the equipment in their control;</p> <p>(b) adequately trained in the obligations of the pipeline management system and briefed in the requirements of the controls and actions identified during the safety management study;</p> <p>(c) aware of properties of the fluid, including its hazards (see Note 1); and</p> <p>(d) adequately knowledgeable in the design, construction, welding, hydrostatic testing, cathodic protection and coating of pipelines as required by AS 2885, the relevant pipeline coating and cathodic protection standard and other technical documents and Standards relevant to the pipeline's integrity (see Note 2 and Note 3).</p> <p>NOTES: 1 For more information on fluid properties see AS 4343. 2 Detail on the framework for National Competencies for Transmission Pipeline Operators can be found at www.ee-oz.com.au. 3 Detail on the engineering competencies can be found at the APIA website www.apia.net.au</p>		
4	AS2885.3 Cl.2.2.2.5	<p>Management – Resourcing The Licensee shall identify the resourcing, equipment and material requirements for the pipeline's operation and maintenance, including the resources required to ensure the appropriate development, implementation and review of the pipeline management system. NOTE: Where the pipeline is in continuous operation, sufficient personnel should be available for undertaking planned and unplanned operations and maintenance, taking into account the requirements for leave and training.</p>	<p>Resourcing is undertaken via specific processes within the AMS. The purpose of the plan is to assess and formulate the delivery strategy. It analyses of the ability of the business to deliver the program of work and including the delivery approach. This Delivery Plan provides the framework to deliver the projects specified in the Asset Management Plan (AMP) and an assessment of the deliverability of the Capital Programme of Works including the delivery approach.</p>	<p>Asset Management Manual – Section 6.4 Asset Management System (AMS) Intranet Site</p>
5	AS2885.3 Cl.2.2.2.6	<p>Management - Change Management The Licensee shall establish procedures for managing changes to the pipeline management system, procedures, pipeline design or operation so that they are conducted in a controlled manner, and reviewed and approved.</p> <p>Any change to the pipeline or its operating context shall be reviewed and approved. Change shall be considered to have taken place if the engineering design has been upgraded or modified (see Section 10), or if any event or newly identified threat initiates an operational, technical or procedural change in the measures in place to—</p> <p>(a) protect the pipeline and associated components; (b) promote public awareness of the pipeline; (c) operate and maintain the pipeline safely; (d) respond to emergencies; (e) prevent and minimize loss of containment; (f) carry out inspections in accordance with Clauses 6.4, 6.5, 6.6 and Clause 6.7; and (g) ensure that the plans and procedures continue to comply with the engineering design.</p> <p>The change management procedures shall address implementation of any resulting pipeline management system changes, including notification and</p>	<p>Jemena has established several change management procedures to address changes to asset (i.e. design, process, projects etc). Examples include Engineering Change Management, Field Technical Change and Acts & Regulations Change.</p>	<p>Asset Management Manual – Section 10.4 JEM PR 0026 Field Technical Change & Implementation Process Field Technical Change Intranet Site GTS-980-OM-CM-001 Change Management Manual Lessons Learned Projects Change JEM PR 0047 Acts & Regulation Change Procedure</p>

Note: Assets Operating above 1050kPa, refer to AS 2885 requirements. Assets Operating below 1050kPa , refer AS 4645 requirements.

Compliance Assurance Matrix

No	Standard	Requirement Title and Detail	How do we address the requirement – additional information	Supporting procedure / process
		training of staff impacted by the change, and the allocation of responsibilities for any identified actions. The change management procedures shall also include communication of changes to relevant stakeholders		
6	AS2885.3 CI.2.2.2.7	<p>Management - Management Review The Licensee shall establish procedures for regular management review of the effectiveness and appropriateness of the pipeline management system. NOTE: The management review should include review by the Licensee for those elements of the pipeline management system considered high risk, and take into account the outcomes from the various procedures covering the measurement and evaluation of elements of the pipeline management system (see Clause 2.2.5).</p> <p>The pipeline management system shall be reviewed and, if necessary, updated, at least every 2 years or in the event of any change to the pipeline management system elements (as detailed in Clause 2.2.2 to 2.2.6). NOTE: For example, updating of the pipeline management system may be necessary when there are changes to legislative requirements, Licensee, or organization structure.</p>	<p>Gas Safety Management Review Committee. The purpose of this committee is to monitor and report on the effectiveness of strategies and practices to manage risks associated with the safe operation of all gas network and pipeline assets in accordance with the charter. The meetings are held quarterly and are supported by an operating charter and minutes with retained within the process. Follow-up of decisions and actions are supported by several process within Jemena.</p>	<p>Asset Management Manual – Section 10.7</p> <p>GAS-999-GL-RM-001 GSMRC Operating Charter</p> <p>GSMRC Intranet Link</p>
7	AS2885.3 CI.2.2.6	<p>Consultation, Communication and Reporting 2.2.6 Consultation, communication and reporting</p> <p>The Licensee shall identify external people and organizations with a legitimate interest in the safety and environmental aspects of the pipeline's operation and maintenance. These may include landowners, contractors, utilities, local and emergency authorities, regulatory authorities and government agencies.</p> <p>The Licensee shall establish procedures for regular consultation with, and communication and reporting to, these identified stakeholders. These procedures should include statutory reporting requirements. NOTE: Clause 7.3.1 provides details of stakeholders and community awareness processes as they relate to external interference protection.</p>	<p>Jemena engages several methods to communicate consult and report including statutory reporting. The process is robust and uses latest IT tools, mobile solutions and Jemena Intranet. Other means include team meetings, dashboards, townhalls etc including management review process. external reporting normally is coordinated through the relevant approval processes and document approvals structure.</p>	<p>Asset Management Manual – Section 10.10 Safety, Emergency and Physical Security Website (external notification)</p> <p>Annual Reports (NSW Technical Regulator)</p> <p>Property Portfolio Landholder & Stakeholder Engagement Strategy</p>
8	AS2885.3 Appendix D D2 (c)	<p>Document Approvals - Approval Matrix</p>	<p>Please note the Document Approvals Structure</p>	<p>GAS-999-PA-DM-004 GAS AS 2885 Document Approvals Structure</p> <p>The Accountability Model (RASCI)</p>
9	AS2885.3 CI.2.2.3.2	<p>Planning - Planning for Normal Operation When developing the policies and procedures of the pipeline management system, the Licensee shall utilize the various safety management studies undertaken under the requirements of AS 2885.1 and this Standard.</p> <p>Control measures required to eliminate threats or reduce them to an acceptable level, including threats to the environment as a result of pipeline operation activities, shall be incorporated into the appropriate procedures.</p> <p>The Licensee shall also establish a process for the identification of occupational health and safety and environment hazards and mitigation of occupational health and safety and environment risks as described in Section 4, prior to the commencement of any activity.</p>	<p>Jemena Asset Strategy Gas with its asset classes define planning requirements from Design Basis Manuals, Operational and Maintenance Specifications, Risk Management Guidelines etc. These culminate in workplans which are managed in SAP.</p>	<p>Asset Management Manual – Section 5 HSE-Management-System</p> <p>Asset Management System Intranet</p> <p>JEM AM GU 0007 Asset Risk Management Guideline</p> <p>GAS PR 0003 Permit To Work Procedure</p> <p>ES.COM.PROC.002 Safety Management Study Procedure (under revision please refer GTS-999-PR-RM-001)</p>

Note: Assets Operating above 1050kPa, refer to AS 2885 requirements. Assets Operating below 1050kPa , refer AS 4645 requirements.

Compliance Assurance Matrix

No	Standard	Requirement Title and Detail	How do we address the requirement – additional information	Supporting procedure / process
10	AS2885.3 Cl.2.2.3.3	<p>Planning - Planning and preparation for Abnormal Operations</p> <p>The Licensee shall plan and prepare for operation of the pipeline in circumstances that are different from those initially considered during the design of the pipeline or during significant disruption to normal operations. These circumstances may include the following:</p> <p>(a) Operating under emergency power supplies. (b) Operating without key assets such as compressors. (c) Operating at low flow, pressure or linepack levels. (d) Operating under communication outages. (e) Operating under changed conditions to maintain safety of a damaged pipeline.</p>	Jemena Asset Strategy Gas with its asset classes define planning requirements from Design Basis Manuals, Operational and Maintenance Specifications.	Asset Management Manual – Section 5 Asset Management System Intranet section 7.6 Technical Specifications GAS-999-PR-IN-001 AS2885 Pipeline Anomaly Assessment Procedure AS2885 Pipeline Design Basis Manual AS2885 HP Facilities Design Basis Manual AS2885 Pipelines Field Operations & Maintenance
11	AS2885.3 Cl.2.2.3.4	<p>Planning - Emergency Planning and Preparation</p> <p>The Licensee shall plan and prepare for emergency events resulting from the pipeline's operation and maintenance and from external events that may affect the safe and reliable operation of the pipeline (see Section 11).</p> <p>In the event of an emergency, the Licensee shall ensure that any response is performed in a safe manner. NOTE: Liaison with emergency services and stakeholders may assist the Licensee to be adequately prepared for an emergency event.</p>	<p>Jemena Asset Strategy Gas with its asset classes define planning requirements from Design Basis Manuals, Operational and Maintenance Specifications.</p> <p>Also refer to implementation (Section 11) requirements within this matrix.</p>	Asset Management Manual – Section 5 Asset Management System Intranet Technical Specifications GAS-999-PR-IN-001 AS2885 Pipeline Anomaly Assessment Procedure AS2885 Pipelines Field Operations & Maintenance Crisis Emergency Management & Security Intranet site JEM PL 0013 Jemena Emergency Management Plan
12	AS2885.3 Cl.2.2.4	<p>Implementation - Preparation for Operation (Section 3)</p> <p>Please refer to section 3 of the 2885.3 Standard.</p>	<p>Jemena Project Management Methodology includes the construction and commissioning processes.</p> <p>Project Gating ensure necessary administrative and technical controls are obtained, implemented and made available before an asset is transitioned into normal operation/maintenance – including as-built records.</p> <p>Asset related risk management requirements (eg: SMS, HAZOP, ALARP etc.) are detailed in the Asset Risk Management Guideline.</p>	Asset Management Manual – Section 5 Asset Management System Intranet Technical Specifications AS2885 Pipeline Design Basis Manual AS2885 HP Facilities Design Basis Manual Project Delivery Centre Intranet PMM Gating Portal – Jemena 7 Step Gating online management portal JEM AM GU 0007 Asset Risk Management Guideline
13	AS2885.3 Section 4	<p>Implementation - Site Safety and Environmental Management (Section 4)</p> <p>Please Refer Section 4 of the 2885.3 Standard.</p>	<p>Jemena HSE Systems largely provides the basis for personnel working under safe systems of work. In addition several work instructions e.g. SWMS, etc provide a trigger for field operatives to perform a routine review of site HSE risks before any work activity is performed.</p>	Asset Management Manual – Section 5 HSE Management Website GAS PR 0003 Permit To Work Procedure a) GAS MA 0001 Gas Transmission Safe Work Method Statement Manual b) GAS MA 0003 Safe Work System Manual

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Compliance Assurance Matrix

No	Standard	Requirement Title and Detail	How do we address the requirement – additional information	Supporting procedure / process
14	AS2885.3 Section 5	Implementation - Pipeline Integrity Management (Section 5) Please Refer Sections 5, 6,7,9,10 of the 2885.3 Standard	Pipeline Integrity Management is addressed by several Jemena Artefacts and as relevant/applicable to the specific 2885 asset. Jemena Asset Strategy Gas with its asset classes define planning requirements from Design Basis Manuals, Operational and Maintenance Specifications. Service Delivery is required to meet these specifications and where required, provide necessary data re work accomplishment, asset condition and asset performance.	Asset Management Manual – Section 10.6 Asset Management System Intranet Technical Specifications GAS-999-PR-IN-001 AS2885 Pipeline Anomaly Assessment Procedure Asset specific Pipeline Integrity Management Plans
15	AS2885.3 Section 8	Implementation - Stations Operations and Maintenance (Section 8) Please Refer Section 8 of the 2885.3 Standard	The requirement is addressed by several Jemena Artefacts and as relevant/applicable to the specific 2885 asset. Jemena Asset Strategy Gas with its asset classes define planning requirements from Design Basis Manuals, Operational and Maintenance Specifications. Service Delivery is required to meet these specifications and where required, provide necessary data re work accomplishment, asset condition and asset performance.	Asset Management Manual – Section 7.2 Asset Management System Intranet Technical Specifications AS2885 HP Facilities Design Basis Manual GAS-999-PR-IN-001 AS2885 Pipeline Anomaly Assessment Procedure AS2885 Pipeline Design Basis Manual AS2885 HP Facilities Design Basis Manual AS2885 Pipelines Field Operations & Maintenance
16	AS2885.3 Section 11	Implementation - Emergency Response (Section 11) Please Refer Section 11 of the 2885.3 Standard	The purpose of emergency management is to manage an adverse event or series of events, which has the potential to impact on employee, public safety or loss of supply. Emergency procedures have been established and implemented to minimise any consequences resulting from incidents. The Emergency Management Plan provides guidance on emergency processes and the roles and responsibilities of team members during an event. This includes the process of escalation, activation and mobilisation to provide a state of readiness for effective deployment and response. The Crisis & Emergency Management Training & Exercise framework provides a standardised approach to crisis and emergency management training and exercising (simulations) and supports crisis and emergency preparedness. These processes are detailed in the specified procedures.	Asset Management Manual – Section 7.4 Jemena Crisis Emergency Management & Security Intranet site JEM PL 0013 Jemena Emergency Management Plan JEM PL 0014 Crisis and Emergency Management Training and Exercise Framework
17	AS2885.3 Section 12	Implementation - Records Management (Section 12) Please Refer Section 12 of the 2885.3 Standard	Jemena applies various tools and systems towards management of asset records. These include , ECMS, SharePoint, SAP, ASPIRE, JCARS, Leaning and Development, etc.	Asset Management Manual – Section 8 Asset Data Management Aspire Incident Investigation & Reporting System Jemena Intranet JCARS

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Compliance Assurance Matrix

No	Standard	Requirement Title and Detail	How do we address the requirement – additional information	Supporting procedure / process
18	AS2885.3 Cl.2.2.5.1 & 2	<p>Measurement and evaluation - Data Acquisition and Analysis 2.2.5.1 General</p> <p>The pipeline management system shall incorporate procedures for the appropriate measurement and evaluation of the performance of the pipeline management system elements. NOTE: The results of audit, review and monitoring processes should be utilized for the purpose of management review of the pipeline management system.</p> <p>2.2.5.2 Data acquisition and analysis The Licensee shall establish procedures for identifying, collecting and analysing the pipeline’s operational, maintenance and reliability data to identify trends in the pipeline’s operation and performance. NOTE: Analysis of this data should enable operation of the pipeline to continue as planned. It should also identify any negative trend that may result in an event adversely impacting the safe and reliable operation of the pipeline.</p>	<p>The requirement is addressed by several Jemena Artefacts and as relevant/applicable to the specific 2885 asset. Jemena Asset Strategy Gas with its asset classes define planning requirements from Design Basis Manuals, Operational and Maintenance Specifications. Asset Information corresponding to pipeline’s operation and performance is retained in relevant asset records. The links below provide the common areas and must be cross referenced to specific asset information on ECMS</p>	<p>Asset Management Manual – Section 10.7</p> <p>GAS-999-GL-RM-001 GSMRC Operating Charter</p> <p>GSMRC Intranet Link</p> <p>Operational Reports</p> <p>Asset Specific Annual Performance and Integrity Report (APAIR) Process.</p>
19	AS2885.3 Cl.2.2.5.3	<p>Measurement and evaluation - Accident/Incident Investigation and Reporting 2.2.5.3 Accident/incident investigation and reporting</p> <p>The Licensee shall establish procedures for identifying, notifying, recording, investigating and reporting accidents or incidents resulting from the operation and maintenance of the pipeline. This shall cover any event associated with the pipeline that either causes or has the potential to cause—</p> <p>(a) injury or death to pipeline personnel or the public; (b) significant damage to the environment; and/or (c) significant impact on the pipeline’s operation or integrity.</p> <p>Reporting shall include notification of relevant regulatory authorities as required by legislation. NOTE: Apart from incident reporting to the regulatory authority where required by legislation, the circumstances of any incident, as defined in the Australian Pipeline Industry Association (APIA) Pipeline Incident Database, should be reported to APIA to enable statistics of pipeline incidents to be gathered.</p>	<p>Jemena has several procedures, tools or systems to support this requirement, like ASPIRE, ICAMs, Crisis and Emergencies.</p>	<p>Asset Management Manual – Section 10.7</p> <p>JEM HSE PR 0032 Management of Health & Safety Risk & Legal Obligations Registers</p> <p>JEM PR 0110 W I1 OHSE External Incident Notification</p> <p>Aspire Incident Investigation & Reporting System</p> <p>JEM HSE PR 0151 Jemena Incident Investigation Procedure</p>
20	AS2885.3 Cl.2.2.5.4	<p>Measurement and evaluation - System Audits 2.2.5.4 System audits</p> <p>The Licensee shall establish procedures for planning and implementing audits of the pipeline management system to determine compliance with and effectiveness of the plans and procedures. System audits should also assess compliance with legal and regulatory requirements and ensure the pipeline management system adequately addresses these issues. The Licensee shall consider the threats identified and risks evaluated in the safety management study to ensure that audits evaluate—</p> <p>(a) the effectiveness of the pipeline management system in controlling the risks identified; and (b) the effectiveness of the monitoring procedures in place to identify new or changed threats and risks.</p> <p>Audits shall be performed by competent personnel who are independent of the section of the pipeline management system being audited. The audit</p>	<p>Jemena Asset Risk and Assurance has a process in place for internal and external audits for all Jemena managed gas assets. These audits have a primary intent to satisfy Jemena internal and external audits requirements as part of the pipeline management system.</p> <p>A copy of the audit plan and an extract of the most recent periodical SAOP audit is included in Appendix D of the SAOP.</p>	<p>Asset Management Manual – Section 10.8</p> <p>Asset Risk and Assurance Internal Audit Plan (Electricity, Gas and Water)</p>

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Compliance Assurance Matrix

No	Standard	Requirement Title and Detail	How do we address the requirement – additional information	Supporting procedure / process
		<p>procedures shall cover the timing of audits, including the conduct of external independent audits where chosen to be undertaken or where required by regulatory authorities.</p> <p>Audit procedures shall cover arrangements for verifying the implementation and effectiveness of corrective and preventive actions designed to address any non-conformances identified during the audit.</p> <p>The outcomes of audits shall be subject to management review.</p>		
21	AS2885.3 Cl.2.2.5.5	<p>Measurement and Evaluation - Corrective and Preventive Action 2.2.5.5 Corrective and preventive action</p> <p>The Licensee shall develop and implement procedures for determining, approving and implementing corrective and preventive actions. NOTE: Corrective actions are taken to deal with an existing issue while preventive actions address potential issues.</p> <p>The proposed actions shall, as far as reasonably practicable, eliminate or mitigate the issue and shall be appropriate and commensurate to the risk encountered. The proposed actions shall be recorded and their effectiveness determined by audit.</p> <p>The basis for any action shall be documented and the outcomes of actions taken, along with their effectiveness, shall be subject to management review.</p>	<p>Jemena Compliance and Risk System (JCARS) is the primarily system of corrective and preventive actions. The process is supported by additional artefacts such as procedures and other monitoring tools within JCARS to enable better management oversight. In addition there are other systems and processes within Jemena that support the corrective and preventive actions. e.g. ASPIRE.</p>	<p>Asset Management Manual – Sections 6 and 10.9 JCARS</p> <p>Asset Risk and Assurance Internal Audit Plan (Electricity, Gas and Water)</p> <p>Aspire Incident Investigation & Reporting System</p> <p>JEM HSE PR 0151 Jemena Incident Investigation Procedure</p>

Compliance Assurance Matrix

	Standard	Requirement Title and Detail	Jemena Processes/procedures/artefacts addressing the requirements	Procedure
22	AS4645 2.4.2 and Schedule 1 Safety and operating plans of <i>Gas Supply (Safety and Network Management) Regulation 2013</i>	<p>General Provisions of Safety and Operating Plan The general matters that must be included in a safety and operating plan are as follows:</p> <ul style="list-style-type: none"> (a) a statement that sets out the objectives of the plan, (b) a description of the management structure of the network operator and a schedule identifying each person designated by the network operator as being responsible for the development, approval and implementation of the plan, (c) identification of the distribution districts to which the plan applies and of those procedures set out or referred to in the plan that apply only in relation to a particular distribution district, (d) a description of the gas network, and its operation and maintenance, within each distribution district, (e) a statement to the effect that all procedures set out or referred to in the plan are in place and have been tested and proved. <p>The framework of the SAOP shall include or reference, but not be limited to, the following:</p> <ul style="list-style-type: none"> (a) Administrative requirements: <ul style="list-style-type: none"> (i) Scope and objectives of the SAOP. (ii) Review period for the SAOP. (iii) The process for auditing in accordance with Clause 10.3. (b) Description (by listing) of primary legislation, codes and standards of design and construction, maintenance and operation of the gas distribution network. (c) Description of the gas distribution network physical scale and dimensions, including: 	<p>General Provisions</p> <ul style="list-style-type: none"> a) Safety case purpose and objectives of the plan is set out in this safety case. b) Refer to the Intranet / Approvals Structure and Jemena Organisation Framework- JEM HR GU 0001, Position Descriptions, etc. c) Refer to Appendix A d) Refer to Appendix A e) All procedures referred to in this safety case have been tested and proved. <p>Framework of the SAOP</p> <ul style="list-style-type: none"> (a) Administrative requirements <ul style="list-style-type: none"> (i) Safety case purpose and objectives of the plan is set out in this safety case. (ii) Refer to section 7 of the SAOP. (iii) Jemena Asset Risk and Assurance has a process in place for internal audit for Jemena Assets. These audits have a primary intent to satisfy Jemena internal audits requirements as part of the pipeline management system. (b) Primary legislation, codes and standards of design and construction, maintenance and operation of the gas distribution network are specified within this safety case. <p>This section has already been detailed previously under General Provisions.</p>	<p>General Provisions</p> <ul style="list-style-type: none"> a) Refer to Section 1 Safety Case Purpose & Objectives b) JEM HR GU 0001 Jemena Organisation Framework c) Refer to Appendix A d) Refer to Appendix A e) Refer to statement in section 5.3 of this safety case <p>Framework of the SAOP</p> <ul style="list-style-type: none"> (a) Administrative requirements <ol style="list-style-type: none"> 1. Refer to section 1 of this document "Safety Case Purpose & Objectives" 2. Refer to section 7 of SAOP. 3. Asset Risk and Assurance Internal Audit Plan (Electricity, Gas and Water) (b) Primary legislation and standards are detailed in the Executive Statement to this safety case and section 2 of Jemena's Safety Management Manual as detailed in this safety case. <p>c) Refer to section above on General Provisions.</p>
23	AS4645 2.4.2	<p>Description of Gas Network (c) Description of the gas distribution network physical scale and dimensions, including:</p> <ul style="list-style-type: none"> (i) Geographical location and spread. (ii) Materials used for mains. (iii) Length and diameter of mains. (iv) Materials used for services. (v) Number of services. (vi) Operating pressures. (vii) Number and technical outline of city gates affecting the safety of the system and gas supply. (viii) Number and technical outline of network pressure control systems. <p>NOTE: This information should be in summary form, including use of, or reference to, suitable maps, drawings, diagrams, lists and registers.</p>	<p>A description of gas assets including geographical location, pipeline system specifications, facility components and operating pressures is provided in Appendix A of this safety case.</p> <p>The DBYD process is defined in procedure "GAS-1999-SP-ME-001" and the DBYD website.</p>	<p>Refer to Appendix A for description of gas network.</p> <p>Asset Class Strategies (Networks, Pipelines and Facilities)</p> <p>GAS-1999-SP-ME-001 Field Operations Maintenance Specification < 1050kPa</p> <p>Dial Before You Dig Website</p>

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Compliance Assurance Matrix

	Standard	Requirement Title and Detail	Jemena Processes/procedures/artefacts addressing the requirements	Procedure
24	AS 4645 2.4.2	<p>(e) Accountabilities and Resources:</p> <p>(i) A description of the organization structure and responsibilities of key positions including the positions with approval authorities as required by this Standard.</p> <p>(ii) Description of the responsibilities for participants in the gas supply chain with respect to consumer education and public awareness programs, including information on how to report gas leaks or other gas related occurrences on the gas distribution network, such as broken main or service, leaks in public areas.</p> <p>NOTE: Appendix E provides information on consumer safety and public awareness programs.</p> <p>(iii) Description of the resources to safely operate and maintain the system throughout its lifecycle. These resource details may include—</p> <p>(A) numbers, competence (in accordance with Clause 2.5) and span of control over the necessary workforce;</p> <p>(B) description of other necessary resources;</p> <p>(C) means to ensure that resources are monitored and maintained; and</p> <p>(D) system support availability and backup provisions.</p> <p>(iv) Description of the means utilized to ensure that all persons involved in critical activities within design, construction, operation, monitoring and maintenance of the gas distribution network are competent to carry out their duties.</p>	<p>Accountabilities & Responsibilities</p> <p>The organization structure is accessible via Jemena Intranet. Jemena's Accountability Model. The Accountability Model is a tool that utilises the Enterprise Process Model (EPM) to provides a single source of truth for accountabilities across the business. It is expected that the tool will enable the business to clarify roles in planning and executing work, executing a process, and making day-to-day decisions.</p>	<p>Asset Management Manual – Section 9</p> <p>The Accountability Model (RASCI)</p> <p>Jemena Organisation Chart</p>
25	AS 4645 2.4.2	<p>(f) Outcomes of FSA, including:</p> <p>(i) The threat identification, consequence and likelihood assessment and level of risk from each threat.</p> <p>(ii) The controls identified via FSA to ensure that all risks are eliminated or reduced to an acceptable level during the lifecycle of the gas distribution network.</p> <p>(iii) FSA outcomes and the controls in the SAOP framework shall be linked through utilizing a risk register or other appropriate means.</p>	<p>Risk Assessment</p> <p>The Asset Risk Management Guideline details the safety management processes implemented within Jemena to manage the asset in a safe manner including providing a line of sight from corporate level risk to asset based risks. The purpose of this document is to provide guidance on the application of appropriate asset risk management processes to ensure the safety, reliability and affordability of Jemena managed assets throughout their lifecycle.</p> <p>Formal Safety Assessment</p> <p>The FSA is a systematic review to identify and assess hazards inherent in the lifecycle of a gas distribution network. The FSA documents the controls that are in place to manage these hazards and demonstrates the safe systems of work for the management of all hazards and risks in its business and to the public and environment. It is generally conducted over a 5 year cycle or as required depending on activities at the time. Outcomes may result in works procedures, maintenance regimes and methodologies. However, specific ad-hoc FSAs may also be conducted for one off activities such as projects.</p>	<p>JEM AM GU 0007 Asset Risk Management Guideline</p> <p>Formal Safety Assessment Procedure</p> <p>Refer to Risk Register in Appendix D</p> <p>Refer to Formal Safety Assessment Table (5 Years) in Appendix D</p>
26	AS 4645 2.4.2	<p>(g) Functional requirements, specifications, plans, procedures, designs, including:</p> <p>I. Functional requirements in accordance with Clause 3.3.</p>	<p>Jemena has developed and implemented technical specifications to manage the design, construction, and operations and maintenance of network assets. These are summarised as follows:</p> <p>I. Refer to following information.</p>	<p>i. Functional Requirements have been incorporated in the following procedures.</p> <p>ii. Approved Materials & Equipment</p>

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Compliance Assurance Matrix

Standard	Requirement Title and Detail	Jemena Processes/procedures/artefacts addressing the requirements	Procedure
	<p>II. The methods for control, identification and traceability for materials and equipment in accordance with Clause 4.5.</p> <p>III. Effective processes for the control of construction and commissioning activities to ensure that they are implemented in accordance with the specifications.</p> <p>IV. Operational and maintenance plans, processes and/or procedures, including—</p> <ul style="list-style-type: none"> a. requirements for third party liaison; b. maintenance; c. work practices; d. permit to work; e. leakage management, including the classification of leaks; 	<p>II. Approved Materials and Equipment Lists have been developed to ensure that only appropriate equipment is used in the network. Traceability is via SAP and relevant material supply build standard. The process includes engineering approval for any new equipment.</p> <p>III. Appropriate construction and commissioning processes have been developed to ensure that the gas distribution network and network elements are installed in a safe controlled manner. The Project Management Methodology is used for large projects whilst routine construction are based on the Construction Field Manual.</p> <p>IV. Operational & Maintenance Plans, processes, procedures</p> <ul style="list-style-type: none"> a. Third Party Liaison processes have been implemented to manage engagement activities. b. Maintenance is based on SAP work orders being developed from the asset class strategies. Maintenance activities are defined in the Operations Field Manual. c. Work Practices d. Permit to Work process has been established for transmission assets whilst AS 4645 activities are based on risk control detailed in the Operations Field Manual and field risk management process. e. Leakage Management is a key control to the safe operation of the asset as provides an input into the condition monitoring process of the asset. f. Annual Condition Assessments are undertaken for all Jemena managed gas assets. It uses a combination of integrity data and operational reports to determine the 	<ul style="list-style-type: none"> - Approved Materials List ($\leq 1050\text{kPa}$) - Approved Equipment List ($\leq 1050\text{kPa}$) - Approved material list of low and medium pressure systems ($\leq 500\text{kPa}$) - Distribution System Approved Equipment List For networks with an MAOP less than 500kPa - Site specific Bill of Material (BOM) for district regulator sets and I&C meter sets - Approved materials list for corrosion mitigation <p>III. Construction & Commissioning</p> <ul style="list-style-type: none"> - GAS-999-OM-GD-002 Construction Field Manual - Project Delivery Centre Intranet - PMM Gating Portal <p>iv. Operational & Maintenance Plans, processes, procedures</p> <ul style="list-style-type: none"> a) Third Party Liaison <ul style="list-style-type: none"> - Property Portfolio Landholder & Stakeholder Engagement Strategy b) Refer to Appendix D for schedule <ul style="list-style-type: none"> - GAS-999-OM-GD-001 Operations Field Manual c) Work Practices d) GAS PR 0003 Permit To Work Procedure <ul style="list-style-type: none"> - GAS MA 0001 Safe Work Method Statement Manual - GAS MA 0003 Safe Work System Manual e) GAS-1999-SP-ME-001 Field Operations Maintenance Specification < 1050kPa

Note: Assets Operating above 1050kPa, refer to AS 2885 requirements. Assets Operating below 1050kPa, refer AS 4645 requirements.

Compliance Assurance Matrix

Standard	Requirement Title and Detail	Jemena Processes/procedures/artefacts addressing the requirements	Procedure
	<p>f. condition monitoring; and</p> <p>g. capacity management.</p> <p>h. Competency of personnel</p> <p>(v) Description of the quality specification for the gas to be delivered including the safe range and/or limits of relevant gas characteristics.</p> <p>(vi) Description of the odorant and detection levels of odorant.</p> <p>(vii) The emergency plan for implementation in the event of emergencies in accordance with section 9.</p> <p>(viii) The process for establishment and maintenance of a system of emergency load management to mitigate the consequences of a gas supply failure.</p> <p>(ix) The process for investigation of failures and the subsequent analysis for their implications on the management of risk.</p> <p>(x) Records Management in accordance with section 9</p> <p>(xi) For each system or process identified by FSA as critical control the risk, the network operator shall utilise a process of monitoring and review of system performance to ensure that the system continues to operate as designed.</p> <p>(xii) Description of change management processes. These processes shall address—</p> <ol style="list-style-type: none"> a. the technical basis for any proposed change b. impact of change on safety and health of personnel, plant and environment; c. modifications to operating or maintenance procedures; d. necessary time period for the change; and 	<p>condition of the asset. Monitoring is performed via monthly operational reports.</p> <p>g. Capacity Management involves the ongoing pro-active monitoring of network pressures across networks to ensure that gas pressures are capable of meeting forecast demand including load modelling.</p> <p>h. Competency of Personnel. Jemena has comprehensive Learning and Development Processes in place to meet ongoing training and competency needs. These are met through several processes including Success Factors, Competency Framework. Passport (Contractors)</p> <p>(v) Gas quality specification is detailed later in this matrix.</p> <p>(vi) As above.</p> <p>(vii) Refer to emergencies section detailed later in this matrix.</p> <p>(viii) Emergency load management is the process of contacting the asset owners customers during times of short supply. This process is tested periodically and implemented when required.</p> <p>(ix) The purpose of investigating failures is to ensure that all incidents of failures of piping and components in the distribution system are investigated, and documented in an appropriate manner, and any trends analysed.</p> <p>(x) Jemena applies various tools and systems towards management of asset records. These include , ECMS, SharePoint, SAP, ASPIRE, JCARS, Learning and Development, etc.</p> <p>(xi) There are a number of processes in place to monitor network performance. They include analysis of monthly operational reports, quarterly management reviews, yearly condition assessments and annual regulatory reporting etc.</p> <p>(xii) Jemena has established Change Management procedures to address changes to asset (i.e. design, process, projects etc). Engineering Change Management, Field Technical Change for A to E.</p>	<p>g) GDN 1999 SP DN 001 Capacity Design Specification Manual</p> <p>h) Jemena Learning & Development Website</p> <ul style="list-style-type: none"> - JEM PR 0101 WI 02 Gas Technical Training - JEM PR 0101 WI 02 Gas Technical Training - AM Competency Development <p>(ix) GAS-1999-SP-ME-001 Field Operations Maintenance Specification <1050kPa</p> <p>(x) Asset Data Management</p> <p>(xi) GAS-999-GL-RM-001 GSMRC Operating Charter</p> <p>(xii) JEM PR 0026 Field Technical Change & Implementation Process</p> <p>(xii) Field Technical Change Intranet Site</p>

Note: Assets Operating above 1050kPa, refer to AS 2885 requirements. Assets Operating below 1050kPa , refer AS 4645 requirements.

Compliance Assurance Matrix

	Standard	Requirement Title and Detail	Jemena Processes/procedures/artefacts addressing the requirements	Procedure
		e. authorization requirements for the proposed change, if applicable		
27	Schedule 1 Safety and operating plans of <i>Gas Supply (Safety and Network Management) Regulation 2013</i> (Also included are related requirement of AS 4645)	<p>Gas Quality</p> <p>The gas quality standards to be applied must include standards relating to the following:</p> <ul style="list-style-type: none"> (a) heating value, (b) relative density, (c) composition and purity. 	Jemena Sydney and Melbourne Control Centres monitor on a continuous basis, the quality of the gas entering the gas network. The analysis is performed by the gas chromatographs installed at each receipt point, and values are fed into the SCADA system.	Operational Monitoring, Control & Response
28	Schedule 1 Safety and operating plans of <i>Gas Supply (Safety and Network Management) Regulation 2013</i> (Also included are related requirement of AS 4645)	<p>Procedures for Testing Gas</p> <p>(1) A safety and operating plan must identify the procedures to be implemented by the network operator to ensure that gas conveyed or supplied:</p> <ul style="list-style-type: none"> (a) meets the relevant gas quality and pressure standards, and (b) complies with the relevant gas specification. <p>(2) A safety and operating plan must specify:</p> <ul style="list-style-type: none"> (a) the equipment to be provided and maintained by or on behalf of the network operator for the testing of gas (including the order of accuracy of results the equipment delivers), and (b) the place or places at which the equipment is to be kept, and (c) how often calibration tests are to be conducted on the equipment to ensure its accuracy, and (d) how often gas testing is to be carried out. <p>A safety and operating plan must:</p> <ul style="list-style-type: none"> (a) identify the procedures to be implemented by the network operator to ensure that gas conveyed or supplied has a distinctive and unpleasant odour, and (b) specify the odoriferous substances to be used, and (c) specify the odour intensities. 	<p>Gas Quality</p> <p>Before any shipper can require a transportation service, Jemena will require the prospective user to demonstrate that it has arrangements in place to ensure gas presented at a receipt point for transportation will conform to the gas quality specifications. Gas quality is monitored and measured via the SCADA system. Reporting of out of specification gas is provided to the appropriate regulator and based on the Emergency Management Response Plan.</p> <p>Continuous monitoring of gas quality is carried out by gas chromatographs (GC). These GCs are auto calibrated daily and manually calibrated monthly. Calibration results and equipment are maintained at the Meter Centre. Witness tests are performed at the Custody Transfer stations on a regular basis as per SAP.</p> <p>Odorant</p> <p>Monitoring and measuring the performance of the odorant dosing specification is done through alarms, Logs and gas sampling including monitoring from data acquisition via SCADA at Longford, Port Kembla , Rosalind Park, NGSF and Young. Monthly sampling are undertaken at extremities to validate the presence of odorant for JGN. Refer to procedures for more information on odorant management including responsibility matrix.</p>	<p>GAS-1999-SP-ME-001 Field Operations Maintenance Specification < 1050kPa</p> <p>Select Technical Solutions Procedure for Monitoring Odourisation of Natural Gas LABS-WI-4.11.27"</p>
29	Schedule 1 Safety and operating plans of <i>Gas Supply (Safety and Network Management) Regulation 2013</i> (Also included are related requirement of AS 4645)	<p>Emergencies</p> <p>(1) A safety and operating plan must identify the emergency procedures to be implemented by the network operator to ensure an effective response to emergencies.</p> <p>(2) The types of emergencies in respect of which procedures must be implemented include (as a minimum):</p> <ul style="list-style-type: none"> (a) fires, explosions, leaks and impacts (with particular reference to those caused by the activities of other parties), and (b) natural disasters, and (c) civil disturbances. <p>(3) A safety and operating plan must identify the procedures implemented by the network operator that ensure:</p>	<p>The purpose of emergency management is to manage an adverse event or series of events, which has the potential to impact on employee, public safety or loss of supply. Emergency procedures have been established and implemented to minimise any consequences resulting from incidents.</p> <p>The Emergency Management Plan provides guidance on emergency processes and the roles and responsibilities of team members during an event. This includes the process of escalation, activation and mobilisation to provide a state of readiness for effective deployment and response. The Crisis & Emergency Management Training & Exercise framework provides a standardised approach to crisis and emergency management training</p>	<p>Jemena Crisis Emergency Management & Security Intranet site</p> <p>JEM PL 0013 Jemena Emergency Management Plan</p> <p>JEM PL 0014 Crisis and Emergency Management Training and Exercise Framework</p>

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Compliance Assurance Matrix

	Standard	Requirement Title and Detail	Jemena Processes/procedures/artefacts addressing the requirements	Procedure
		(a) all emergency procedures have been tested and proved, and (b) all emergency procedures are reviewed and tested on a regular basis.	and exercising (simulations) and supports crisis and emergency preparedness. These processes are detailed in the specified procedures.	
30	Schedule 1 Safety and operating plans of <i>Gas Supply (Safety and Network Management) Regulation 2013</i> (Also included are related requirement of AS 4645)	<p>Analysis of Hazardous Events</p> <p>(1) An analysis of hazardous events must be prepared in relation to each distribution district of the network operator unless subclause (2) applies. (2) A common analysis of hazardous events may be prepared in relation to those distribution districts of the network operator that possess the same characteristics from which the risk of hazardous events may be identified. (3) If a new gas network is to be constructed or an existing gas network extended, an analysis of hazardous events must be prepared in relation to the construction or extension before its construction is commenced. (4) An analysis of hazardous events must, consistent with the size and complexity of each distribution district or proposed distribution district, concerned: (a) identify the range of supply pressures applied within each distribution district (or to be applied within each proposed distribution district, as the case may be), and (b) systematically identify hazardous events that might be expected to occur, and (c) identify the potential causes of those events, and (d) identify the possible consequences of those events, and (e) specify operational, maintenance and organisational measures intended to prevent those events from occurring or, should they occur, intended to protect operating personnel, plant, equipment, the community and the environment. (5) The operational and maintenance measures must include a maintenance schedule indicating, among other things, the type and frequency of inspections, coating surveys and checks on cathodic protection devices (if such coatings or devices are used). (6) In the case of new gas networks or extensions to existing networks, an analysis of hazardous events should also take into account hazardous events that may occur during construction. (7) A safety and operating plan must include a description of the methodology to be used to conduct an analysis of hazardous events.</p>	<p>The FSA is a systematic review to identify and assess hazards inherent in the lifecycle of a gas distribution network. The FSA documents the controls that are in place to manage these hazards and demonstrates the safe systems of work for the management of all hazards and risks in its business and to the public and environment. It is conducted over a 5 year cycle or as required depending on activities at the time. Outcomes may result in works procedures, maintenance regimes and methodologies.</p> <p>Risk Assessment The Asset Risk Management Guideline details the safety management processes implemented within Jemena to manage the asset in a safe manner including providing a line of sight from corporate level risk to asset based risks. The purpose of this document is to provide guidance on the application of appropriate asset risk management processes to ensure the safety, reliability and affordability of Jemena managed assets throughout their lifecycle.</p> <p>5) SAP specifies the maintenance regime for all assets.</p>	<p>Formal Safety Assessment Procedure</p> <p>Refer to Risk Register in Appendix D</p> <p>Also include technical management guideline??</p> <p>JEM AM GU 0007 Asset Risk Management Guideline</p> <p>A copy of the Maintenance schedule is included in Appendix 4</p> <p>Include ops specs</p>
31	Schedule 1 Safety and operating plans of <i>Gas Supply (Safety and Network Management) Regulation 2013</i> (Also included are related requirement of AS 4645)	<p>Plan must incorporate any Relevant Management System Standards</p> <p>A safety and operating plan must incorporate any management system standards that are relevant to the management of a gas network (for example, standards relating to document control, record management, and procedures for conducting audits and management reviews).</p>	Jemena has developed an Asset Management System based on ISO 55001 . It is currently in the process of obtaining certification to this standard.	Asset Management System Intranet
32	Schedule 1 Safety and operating plans of	<p>Codes and Standards</p> <p>If a network operator has departed from any standards that it was required to take into account under clause 6 (2) of this Regulation when</p>	Not Applicable for EVO or JGN Assets in this instance.	

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Compliance Assurance Matrix

	Standard	Requirement Title and Detail	Jemena Processes/procedures/artefacts addressing the requirements	Procedure
	<i>Gas Supply (Safety and Network Management) Regulation 2013</i> (Also included are related requirement of AS 4645)	designing, constructing, operating or extending its gas network, or any part of its gas network, the safety and operating plan must contain an explanation of: (a) the extent of the departure, and (b) the arrangements in place to ensure that an equivalent or safer outcome has been achieved despite that departure.	Where required, the process will follow AS 4645 and AS 2885. Requirements and sufficient basis for such deviations/departure will be maintained with appropriate consultation with the relevant jurisdictional Technical Regulatory organisation.	
33	Schedule 1 Safety and operating plans of <i>Gas Supply (Safety and Network Management) Regulation 2013</i> (Also included are related requirement of AS 4645)	Meters, regulators and other basic metering equipment (1) A safety and operating plan must require any device or equipment used in the gas network (including any basic metering equipment): (a) to be suitable for the design working pressure of the part or parts of the network in which it is used, and (b) if installed, to be installed so as not to interfere with metering accuracy. (2) A safety and operating plan must require pressure regulators operating with an outlet pressure of more than 35 kilopascals and any compensating devices to be sealed.	Jemena has developed a series of design basis manuals covering the design of gas distribution networks . It has implemented a proactive process to monitor network pressures across networks and sub-networks to ensure gas pressures in each are capable of meeting current and future forecasts in demand. Accordingly metering equipment have been designed and selected based on recommended pressures in accordance with a minimum inlet guaranteed network pressure. The process is defined in the referenced procedures. The requirement for pressure regulators operating with an outlet pressure exceeding 35kPa is also defined in the operational manual.	GAS-1799-DG-EQ-001 Metering Equipment Design Basis Manual GDN 1999 SP DN 001 Capacity Design Specification Manual GDN 1999 DG DN 001 JGN - Secondary Systems Design Manual GAS-1999-GD-DN-003 Network Pressure Control Design Basis Manual Part 1 - District Regulator Sets GAS-999-OM-GD-001 Operations Field Manual
34	Schedule 1 Safety and operating plans of Gas Supply (Safety and Network Management) Regulation 2013 (Also included are related requirement of AS 4645)	Procedures for connection of gas supply to a gas installation Network operator rules (NSW) (1) A safety and operating plan must establish rules regarding the manner in which any work to which clause 8 of this Regulation applies is to be carried out. (2) The rules established in accordance with subclause (1) must be no less stringent than any code of practice or standard that is applied to any such work by any regulations under the Act. (3) A safety and operating plan must identify: (a) procedures that provide for the authorising of persons to carry out work to which clause 8 of this Regulation applies, and (b) steps that are to be taken to ensure those persons comply with the rules established in accordance with subclause (1) in carrying out the work.	The Jemena Network Operator Rules have been established to ensure the safe installation, operation and repair of the consumer service for assets in NSW. The prime objective of the Network Operator Rules is to provide for the safe connection of natural gas to a property from Jemena's natural gas reticulation network in NSW. The steps undertaken to ensure that those persons are adhering to the relevant standards, codes, specifications and the requirements of the Jemena Network Operator Rules include the following: a. Work to be done only by certified and licensed Gas Fitters. This is verified by an on line check via the NSW Government Licensing Service that the Gas Fitter is licensed to do the work prior to the issue of any meters. b. Certificate of compliance provided on completion of work. c. Leak test certificate provided on completion of work. 4. Ensuring that relevant certificate of compliance and leak test certificates are received by Jemena.	Jemena Network Operator Rules
35	AS4645	Additional Requirements The following requirements (may already have been included elsewhere in this matrix) are provided to simplify understanding that the requirements have been addressed by specific procedures. 1. Purging 2. Isolated Mains	Purging procedures are developed to ensure that any purging operation carried out during commissioning/degassing of a distribution system meets the requirements of AS4645. The process is detailed in the following procedure. Isolated mains are assets which are not utilised for gas transportation and are still owned by the asset owner and remain in the Asset Register.	GAS-1999-SP-ME-001 Field Operations Maintenance Specification < 1050kPa

Note: Assets Operating above 1050kPa, refer to AS 2885 requirements. Assets Operating below 1050kPa , refer AS 4645 requirements.

Compliance Assurance Matrix

	Standard	Requirement Title and Detail	Jemena Processes/procedures/artefacts addressing the requirements	Procedure
		<p>3. Means of Conformance</p> <p>4. High Risk Area Identification</p>	<p>Isolated mains are valuable assets because of their potential for reuse at some time in the future and shall be preserved for that purpose.</p> <p>Means of conformance is managed via risk management processes.</p> <p>A high risk area is an area that requires a higher level of safety management. High risk areas are locations where there is a higher density of public usage over what is considered normal usage. High risk areas require an isolation plan to enable safely stopping gas escape during any incident or emergency. These high risk areas are leakage surveyed on a yearly basis.</p>	<p>JEM AM GU 0007 Asset Risk Management Guideline</p>

Appendix D Specific Jurisdiction Requirements

Note : As applicable.

References to Schedule 1 Safety and operating plans of *Gas Supply (Safety and Network Management) Regulation 2013* has been included within the compliance assurance matrix.
