



Our ref: SF20/22895

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Dear Mr Jones

**Western Sydney Green Gas Project (SSD10313)**  
**Safety and Operating Plan**

Thank you for providing the additional information requested of Jemena in relation to the Safety and Operating Plan under the development consent conditions for the Western Sydney Green Gas Project.

The Gas Regulatory team has reviewed the additional information provided and is satisfied that Jemena now meets the requirements of the development consent condition B2 for the preparation of a revised Safety and Operating Plan for the assets and equipment located within the development footprint.

The Gas Regulatory team will continue to work with Jemena through the development of the project to ensure all requirements of the *Gas Supply Act 1996* can be met.

Should you have any questions in relation to this matter, please contact Mr Warren Woodhouse, Senior Technical Advisor (Gas Networks and Pipelines), at the Department on 02 8275 1932.

Yours sincerely

A handwritten signature in black ink that reads 'K. Staggs'.

Kathy Staggs  
Manager, Energy Networks  
Energy, Climate Change & Sustainability

11 November 2020

# Jemena Asset Management Pty Ltd

## **Safety Case Pipeline Management Plan**

Jemena Gas Pipelines 1,2,3,7,8  
Jemena Colongra Lateral Pipeline 33

Protected

4 August 2020



**An appropriate citation for this paper is:**

Safety Case  
Pipeline Management Plan

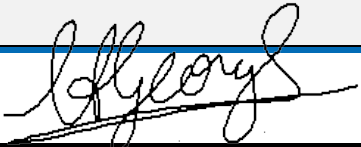
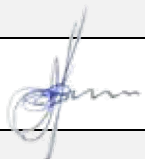

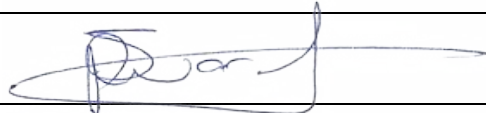
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**History**

Rev No	Date	Description of changes	Author
1	01/05/2018	First issue of the document	George Castline
2	04.07.2019	Re-issue following the new organisation structure as of 01.07.2019	George Castline
3	04/08/2020	Inclusion of technical specifications references collection	George Castline
4	01.09.2020	Minor update to satisfy development consent - Section 4.38 of the Environmental Planning & Assessment Act 1979 – Schedule 3 Part B, B2	George Castline
5	25.09.2020	Inclusion of Formal Safety Assessment outcome summary and CSMP in appendix D	George Castline

**Owning Functional Area**

Business Function Owner:	Asset Risk & Assurance
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## ABBREVIATIONS

ACT	Australian Capital Territory
ALARP	As Low as Reasonably Practicable
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
D&C	Design & Construction
DAMS	Distribution Management Services
ECMS	Enterprise Content Management System
EMP	Emergency Management Plan
EMT	Emergency Management Team
EVO	Evoenergy
FSA	Formal Safety Assessment
GIS	Geographic Information System
GSMRC	Gas Safety Management Review Committee
HAZOP	Hazards and Operability Study (HAZOP)
ISO	International Organization for Standardization
NSW	New South Wales
O&M	Operation & Maintenance
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
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. It 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:

Table 1-1: Safety Case Elements

<ul style="list-style-type: none"> <li>• <b>Asset Description</b>, 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.</li> </ul>	Element 2
<ul style="list-style-type: none"> <li>• <b>Operating Environment</b> providing context related to:               <ul style="list-style-type: none"> <li>○ the stakeholders</li> <li>○ community expectations</li> <li>○ historical performances &amp; trends and</li> <li>○ asset condition and integrity.</li> </ul> </li> </ul>	Element 3
<ul style="list-style-type: none"> <li>• <b>Safety Risk Assessment and Management</b> providing an overall framework understanding of Jemena's               <ul style="list-style-type: none"> <li>○ Risk Identification – process used to identify</li> <li>○ Risk Management – application of resources and controls to risk processes</li> <li>○ Significant Risks –risk registers.</li> </ul> </li> </ul>	Element 4
<ul style="list-style-type: none"> <li>• <b>Safety Management System</b> 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.</li> </ul>	Element 5
<ul style="list-style-type: none"> <li>• <b>Emergency Management System</b> providing the system for managing events which are impacting on the business and have been classified as being and emergency.</li> </ul>	Element 6
<ul style="list-style-type: none"> <li>• <b>Governance (Management Review and Assurance)</b> 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 applicable statutory and regulatory requirements and maintains and improves Jemena reputation and stakeholder expectations.</li> </ul>	Element 7



## 1.3 OBJECTIVES

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### 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

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The scope of the Safety Case is for Jemena gas assets. It will take into account the details as per element 2 of this document and the gas assets.

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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

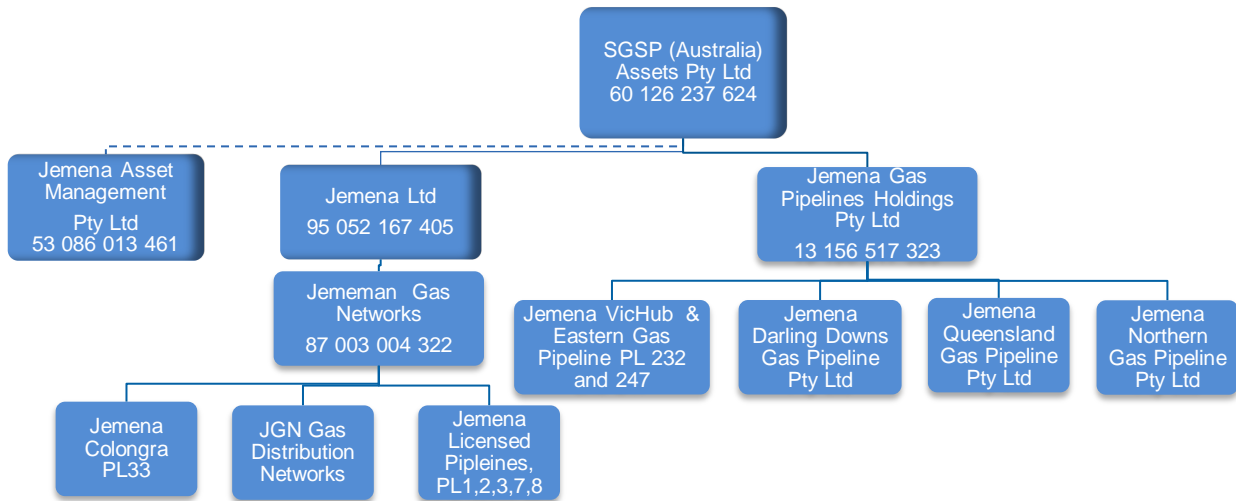
Jemena Limited owns and operates a diverse portfolio of energy and water infrastructure assets across the east coast of Australia. With more than \$9 billion worth of major utility infrastructure, we supply millions of households and businesses with essential everyday services.

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

Table 1-2: Jemena Assets

Asset	Description
<b>Northern Gas Pipeline</b>	The Northern Gas Pipeline (NGP) is a new, underground, natural gas pipeline, 622 kilometres (km) in length commissioned in 2019. The pipeline connects the Amadeus Gas Pipeline (AGP) at the Warrego Compressor Station in the Northern Territory (NT) to the Carpentaria Gas Pipeline (CGP) at Mount Isa in Queensland (QLD). The pipeline is a 12 inch diameter pipe, with 457 km traversing land in the Northern Territory and 165 km in Queensland.
<b>Jemena Gas Network</b>	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.
<b>Queensland Gas Pipeline</b>	627 km pipeline delivers gas from the Surat/Cooper Basin to the Gladstone and Rockhampton markets
<b>Eastern Gas Pipeline</b>	797 km pipeline delivers gas from Victoria's Gippsland Basin to Sydney, the ACT and regional New South Wales
<b>VicHub</b>	Our pipeline interconnect enables gas to flow between the Eastern and Tasmanian Gas Pipelines as well as the Victorian gas transmission network
<b>Darling Downs Pipeline</b>	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
<b>Colongra Gas Transmission and Storage Facility</b>	pipeline and compressor station transports and stores gas for Delta Electricity's 667 MW gas fired peaking generator
<b>Jemena Electricity Network</b>	The 6,301 km system delivers electricity to more than 327,000 homes and business in north-west Melbourne
<b>Atlas Gas Pipeline</b>	Pipeline Licence PPL2040 is a 60.48km long DN200 high pressure pipeline transporting Coal Seam Gas from Senex's Atlas gas fields in the Surat Basin into the Darling Downs Pipeline

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 IAM's 'Asset Management – An Anatomy'.

Jemena is certified to the international standard ISO 55001:2014 - *Asset Management-Management Systems* (by around 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

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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: Risk acceptability, prioritisation and escalation 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
<b>EXTREME</b>	<b>Generally Intolerable.</b> Cannot be accepted except under extraordinary circumstances with approval at Board-level.	Requires immediate action. Highest priority to treat risk. Senior level monitoring.	Action plans prepared and normally implemented within 1 month. Status of risk should be monitored monthly.
<b>HIGH</b>	<b>ALARP or Tolerable Region.</b> 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.
<b>SIGNIFICANT</b>	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.
<b>MODERATE</b>	<b>Broadly Acceptable Region</b> Risk reduction may be disproportionate to benefits gained	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.
<b>LOW</b>		"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

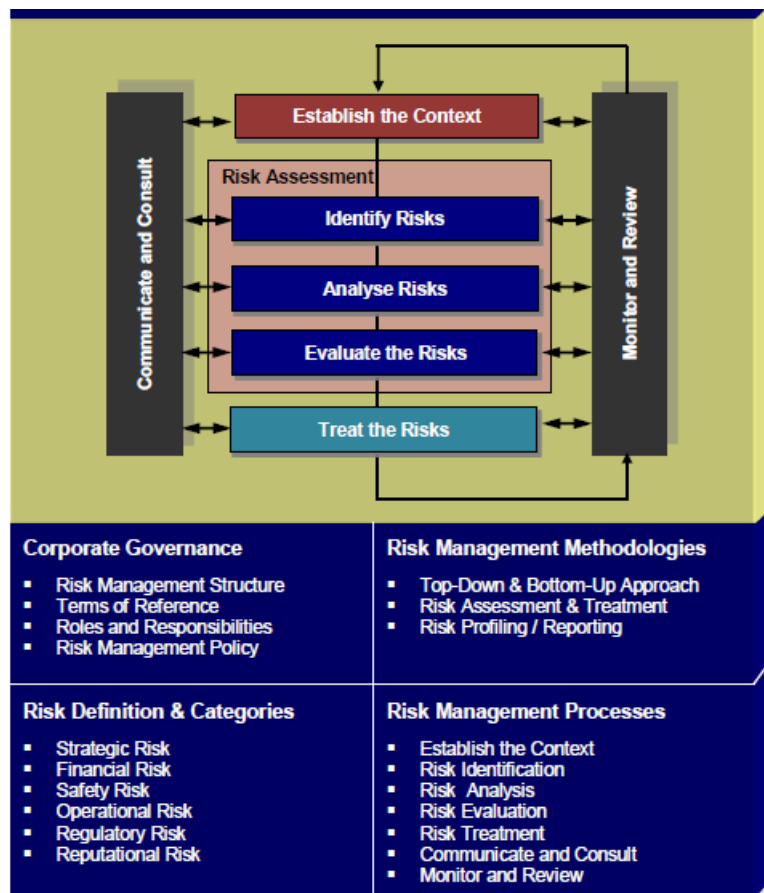
Jemena's Risk Management process applies the principle and requirements of AS/NZS ISO 31000:2009 to its Risk Management.

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 & 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:

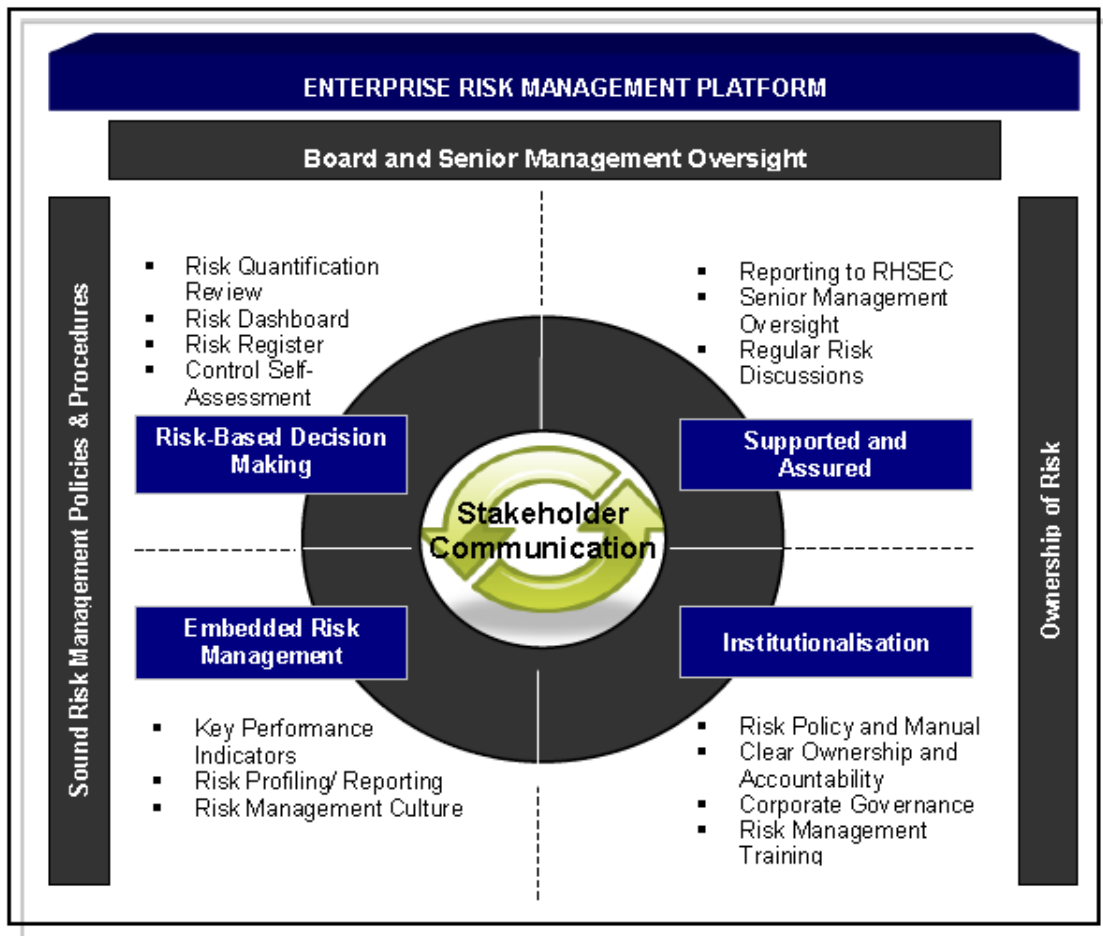
- Implementing a Risk Management Framework.
- Sharing information that has broad applicability across all areas of the business
- Reporting on the progress of implementing the Risk Management Framework
- Chairing the Executive Risk Management Committee.
- Integrating risk management as part of business-as-usual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

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**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

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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

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 & 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 ( <https://energy.nsw.gov.au/government-and-regulation/Reports> ) 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

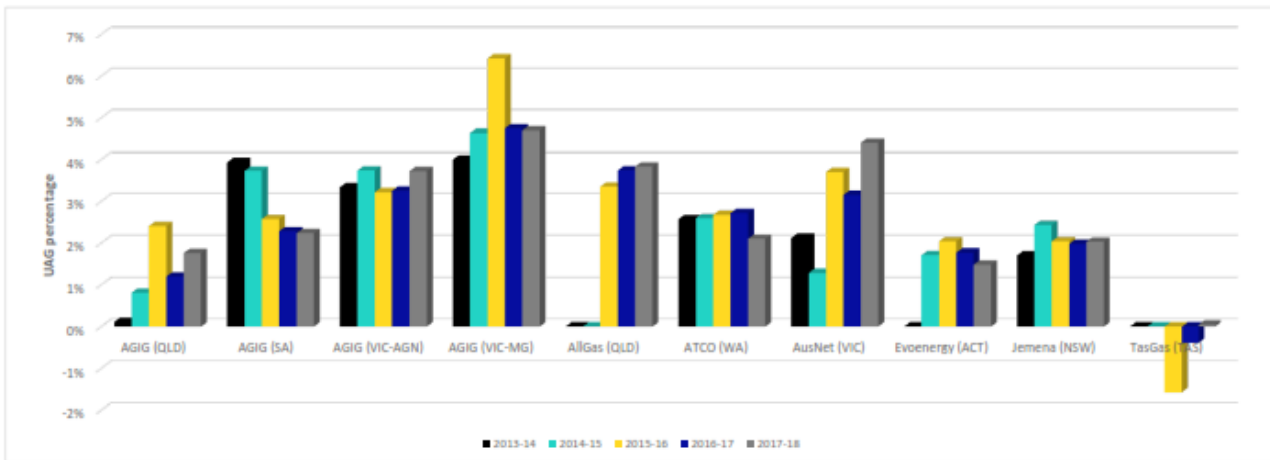


Figure 3-1 Unaccounted for Gas

### 3. Reliability and safety

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

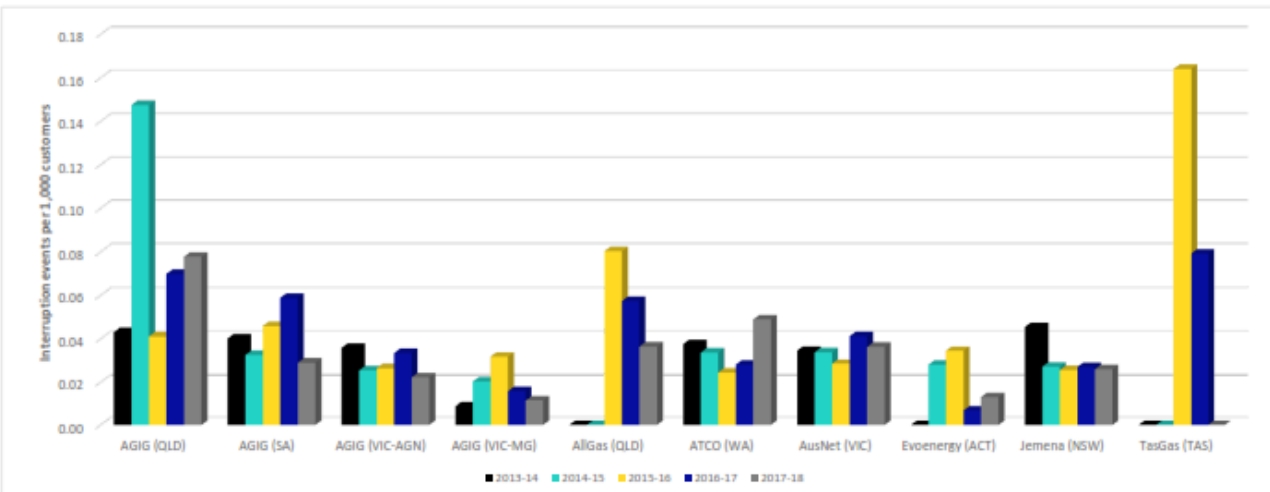


Figure 3-2 Unplanned Outages

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

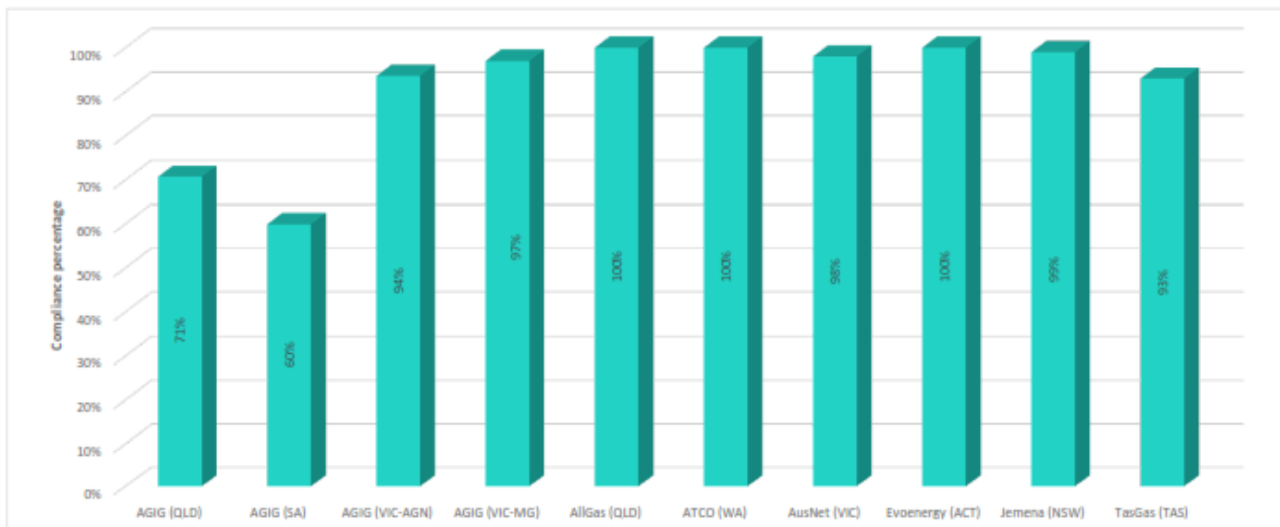


Figure 3-3 Compliance with Priority A Incidents

Chart 3.8: Repaired publicly reported leaks

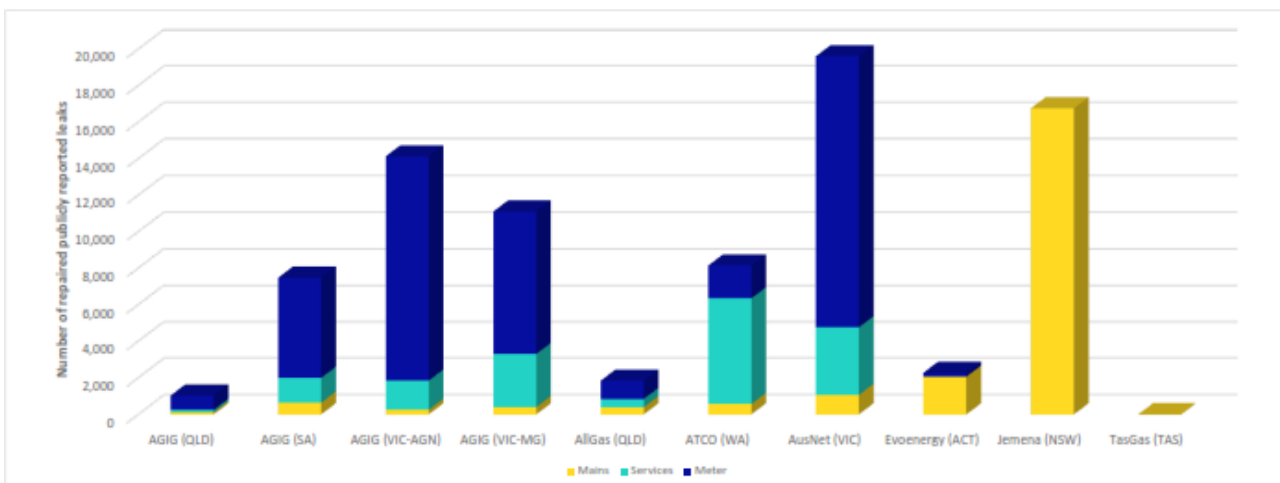


Figure 3-4 Repaired Public Reported Gas Leaks

Chart 3.11: Third party damages - services and mains

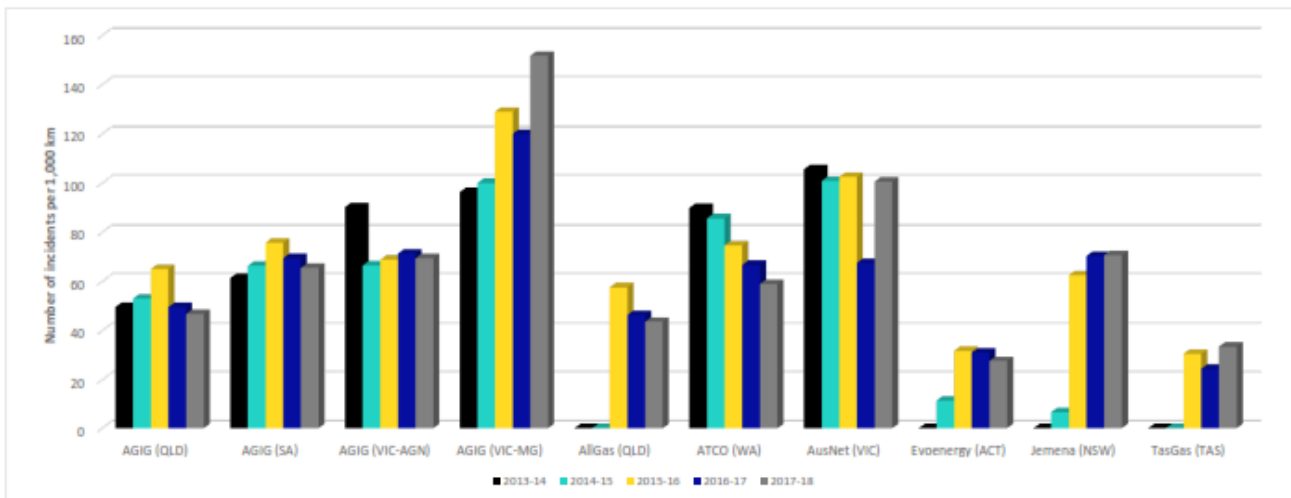


Figure 3-5 Third Party Damages

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.

To establish the 'line-of-sight' from the perspective of 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).

These assessments occur through a combination of self-evaluation and/or facilitated workshops (via Asset Risk & Assurance, an independent function within Jemena Asset Management). These risk assessments are maintained by relevant functional groups to ensure the safe operation of the gas assets and are subjected to periodical audits by the regulator.

Jemena undertakes risk assessments for all new projects and periodic risk assessment for all existing assets in alignment with Jemena Corporate Risk Manual and the applicable codes and standards.

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

These asset risk assessments includes the following structured methodologies.

- Safety Management Study
- Formal Safety Assessments
- Hazard and Operability Study (HAZOP)
- Gas Processing Safety

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.



## 4 — SAFETY RISK ASSESSMENT AND MANAGEMENT

The risk management methodology examples provided on pages (Section 4 Example Pages from 1-14) are for illustrative and reference purposes only and are not to be used for the purposes of verification of records under audit. Evidence of risk assessment, controls assessment records and completion of action plans raised to mitigate risks should be sourced from Jemena's ECMS and JCARS Systems.

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	GAS-999-PR-RM-002

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 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

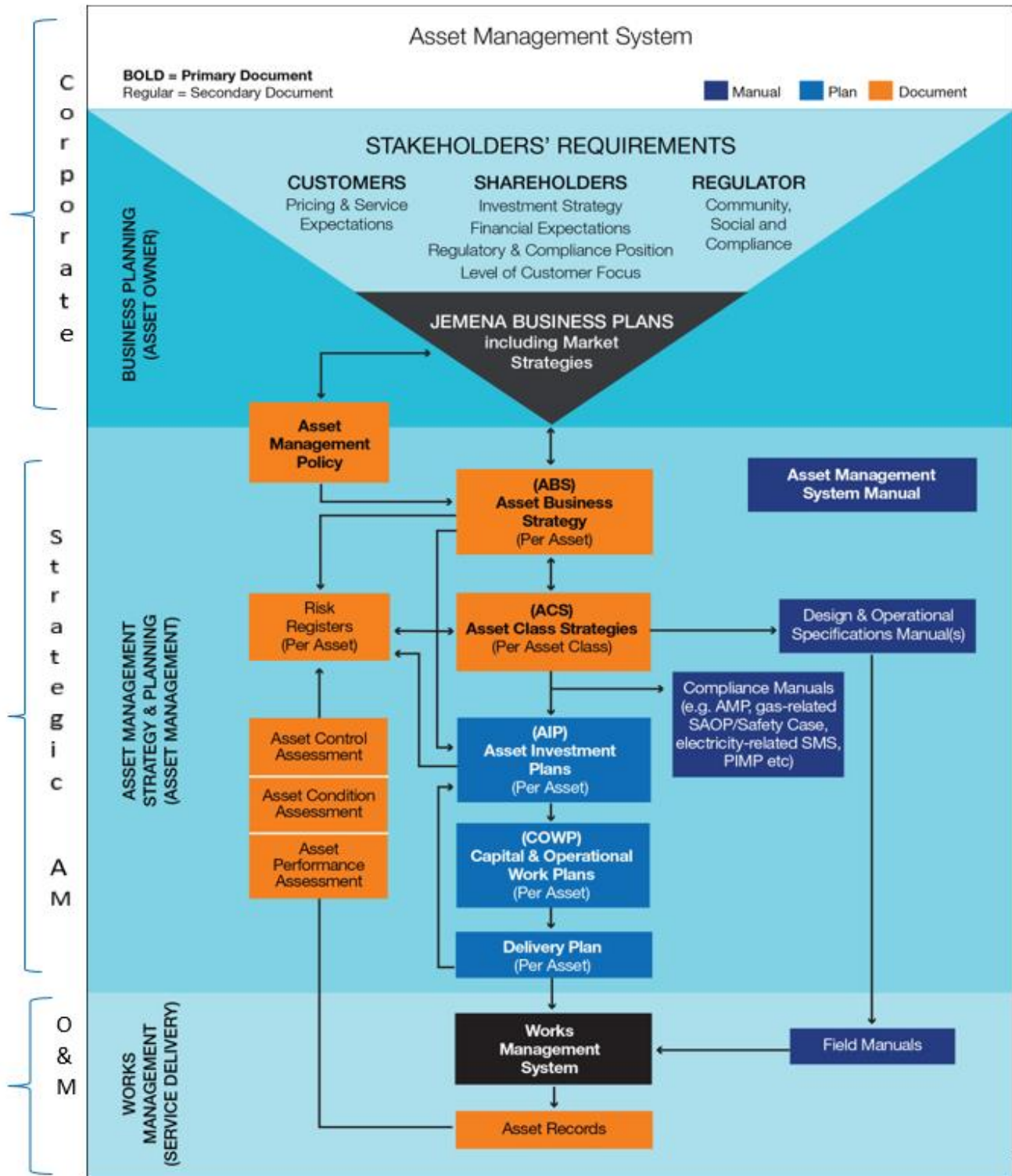
### 5.1 ASSET MANAGEMENT SYSTEM OVERVIEW

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.

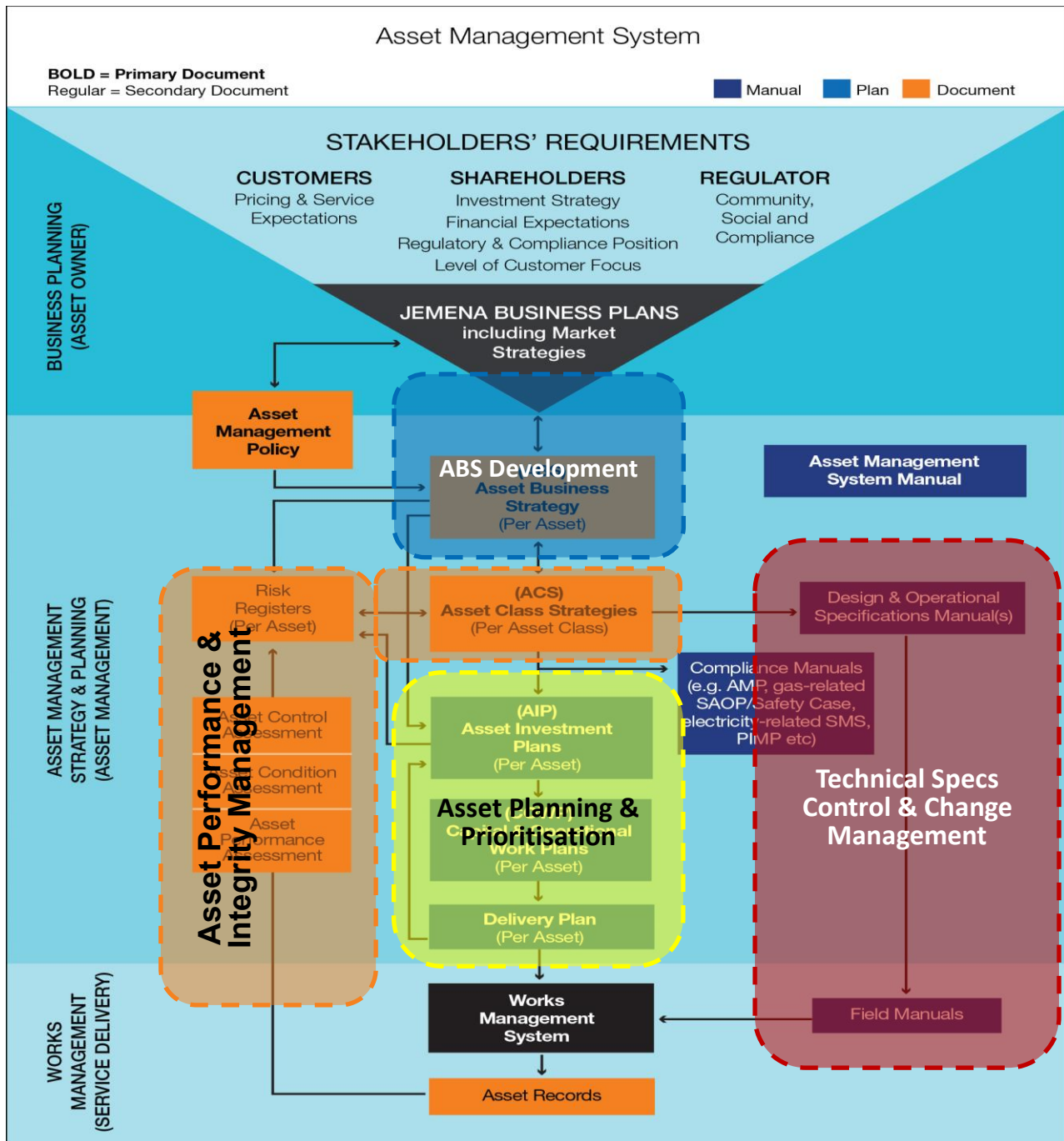
Figure 5:1: Jemena Asset Management System Document Hierarchy



## 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 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).

#### 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 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 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;
- Legislative and regulatory compliance;

## 7 — GOVERNANCE (MANAGEMENT REVIEW AND ASSURANCE)

- 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, 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 / resubmission 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 the organisation structure. For quick references please visit [One Group Organisation Structure](#)

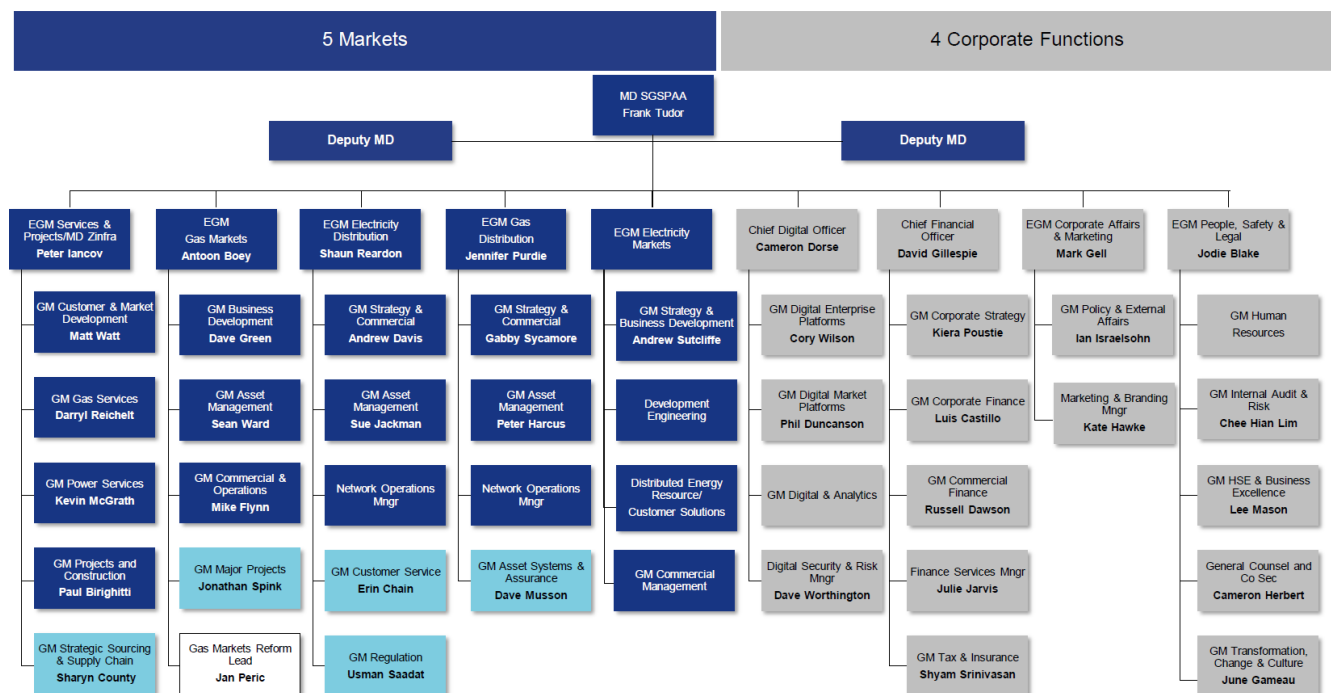


Figure 7-1: Organisation Structure

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) (Frank Tudor)	<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>
2	GM Asset Management Gas Distribution (level 3) (Peter Harcus)	<p>Person-In-Charge (NSW)</p> <p>Approve the Safety Case for all Jemena owned or managed Gas Distribution Assets including the NSW licensed Pipelines that support the distribution assets.</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>Approve the Safety Cases for JGN NSW Distribution Assets, Evoenergy Distribution and Pipelines Licenses 1,2,3,7,8,29.</p> <p>99 Walker St, North Sydney, NSW 2060</p>
3	GM Asset Management Gas Markets (level 3) (Sean Ward)	<p>Executive Safety Manager (QLD) and Registered Holder (NT)</p> <p>Approve the Jemena Safety Case for all Jemena Gas Markets Assets (Licensed Pipelines) except for those within Victoria and NSW.</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 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>Approve the Safety Cases for Pipelines Licenses 30, 33, 34, 90,133,134 and 2015</p> <p>567 Collins Street, Melbourne VIC 3000</p>
4	Gas Distribution Asset Manager	<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>

## 7 — GOVERNANCE (MANAGEMENT REVIEW AND ASSURANCE)

No	Key Position	Accountabilities/ Responsibilities
	Gas Transmission Asset Manager Gas Engineering Manager	Monitor Works Delivery performance Monitor Asset Performance to ensure it meets regulatory, code and business requirements 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;
5	Asset Risk & Assurance Manager (level4) (Ian Russom)	Person responsible for the preparation, revision and submission of the Safety Case in Victoria and NSW Report to the GM Asset Risk and Management Systems with regards to the monitoring and auditing programme for the Safety Case compliance Develop and implement the auditing program for Safety Case compliance Provide reports to the Jemena Executive and the Jemena Board on the performance of the Safety Case Liaise with safety regulators about matters relating to the Safety Case and the Compliance Management System Liaise with relevant positions within Jemena to ensure operational input into the Management Systems and specifications including this Safety Case. Communicate and manage compliance with regulatory, industry and code obligations and requirements. 567 Collins Street, Melbourne, 3000, VIC.
6	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
7	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
8	GM HSEQ (Level3)	responsible for the provision of Health, Safety, Environment & Quality strategy, policies and programs throughout Jemena

# Appendix A      Asset Description

Note : Inclusions and exclusions during external regulatory audits are as follows.

# ASSET DESCRIPTION

## JEMENA NSW GAS ASSETS

INTERNAL

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# 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).

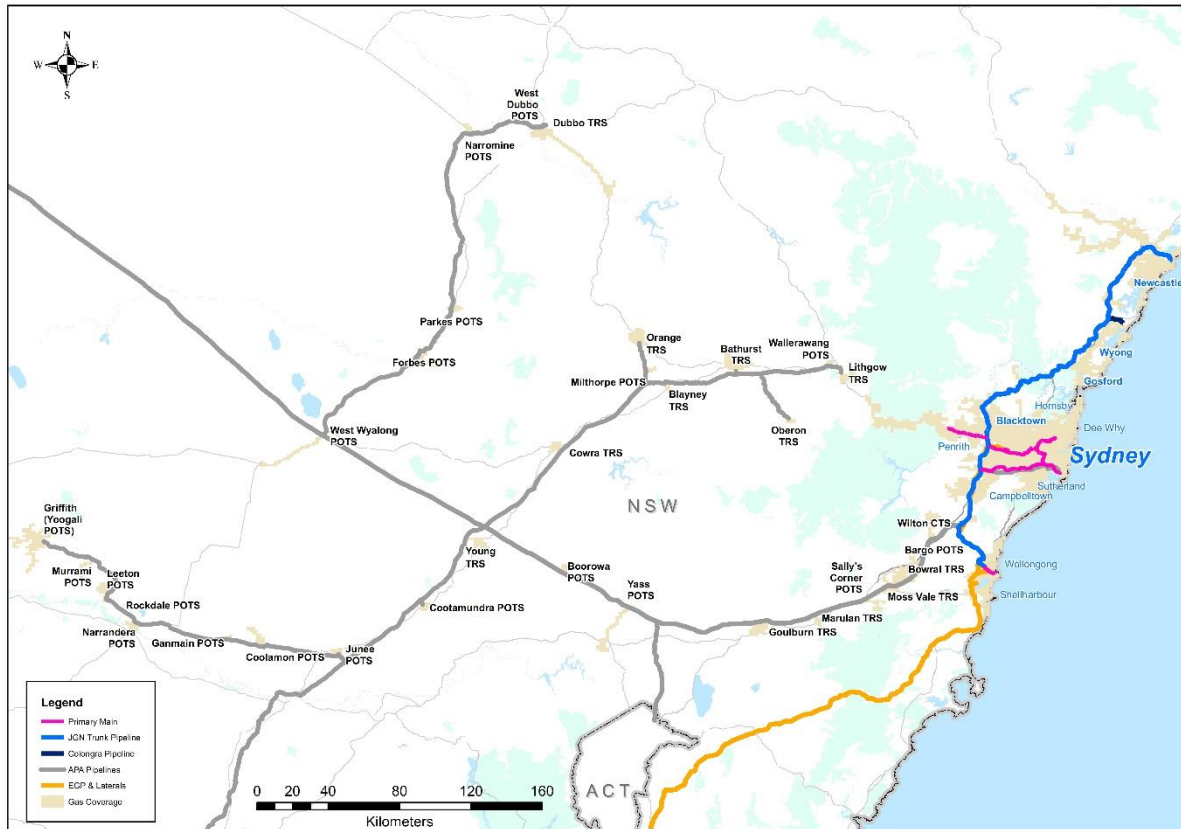


Figure 1 : Overview of the Jemena NSW Gas Distribution Network.

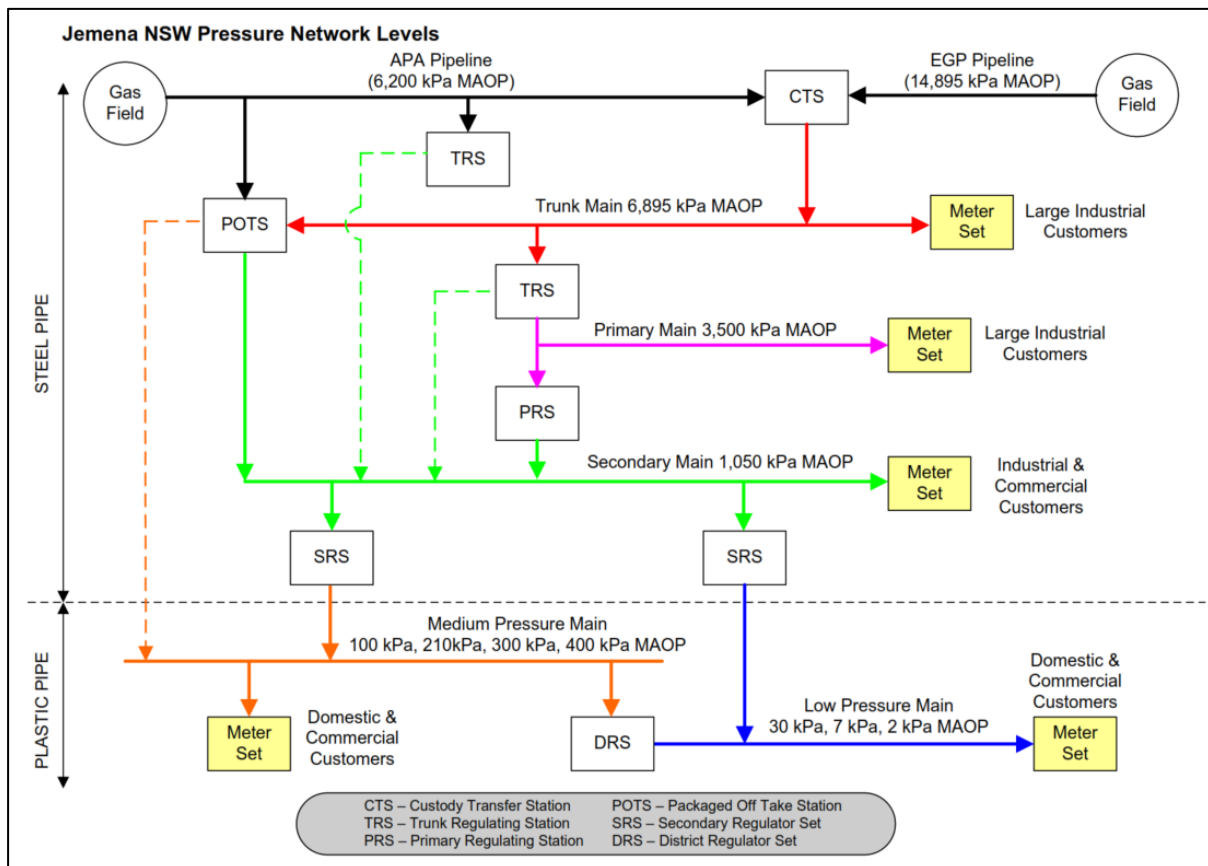


Figure 2 : Jemena NSW Pressure Levels Schematic

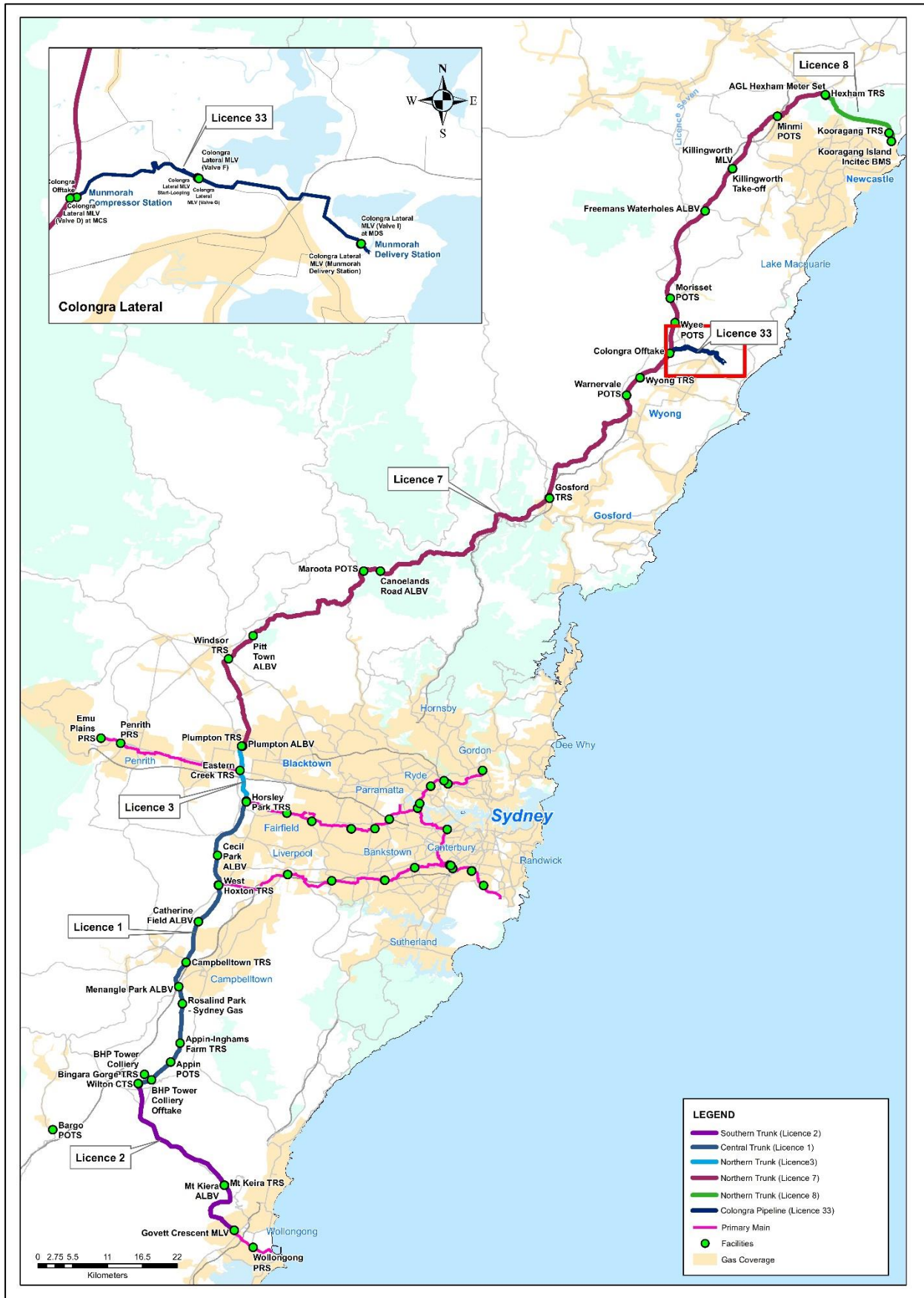


Figure 3 : Overview of the Jemena NSW Licenced Pipeline Sections.

## 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
<b>Total Length</b>			<b>283.6 km</b>

#### 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 Process.

The integrity management process 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 <sup>1</sup>	1969 - 1987	DN150 / 250 / 500 / 550	75.1
Sydney Primary Loop <sup>2</sup>	1987 & 2007	DN500 / 550	42.6
Penrith Primary Main <sup>3</sup>	2003 & 2012	DN200	22.1
Wollongong Primary Main	1982	DN150 / 250	7.3
<b>Total Length</b>			<b>147.1 km</b>

(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	Murrumbidgee	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	Wyee	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

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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.

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### 3.5 SECONDARY REGULATOR SETS (SRS)

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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.

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### 3.6 DISTRICT REGULATOR SETS (DRS)

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District Regulator Sets (DRS) 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.

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### 3.7 WESTERN SYDNEY GREEN GAS (WSGG)

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The Western Sydney Green Gas (WSGG) project is a high pressure facility located within property boundary of the Horsley Park TRS site, developed with the purpose of onsite generation of high pressure hydrogen gas for injection into the secondary network, immediately downstream of the PRS at the same location.

Commencing operations in Q1 2021, running for 5 years the assets are deployed to evaluate and demonstrate the viability of the technology as a long term replacement for natural gas, as well as identify technical, commercial and regulatory impediments to large scale adoption of Power to Gas (PtG) technology. The initial trial will inject no more than 2% hydrogen by molar volume into the local secondary network. WSGG is currently in its pre-construction phase (awaiting consent from DPIE NSW to commence construction) and refer to the new annex of the Construction Safety Management Plan in Appendix D.

## 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.

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## 4.2 FLOW

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### 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/Sm<sup>3</sup>
- Higher Heating Value      Maximum 42.2 MJ/Sm<sup>3</sup>
- Oxygen                              Maximum 0.2 mol%
- Hydrogen Sulphide          Maximum 5.7 mg/Sm<sup>3</sup>
- Total Sulphur                   Maximum 50 mg/Sm<sup>3</sup>
- Water Content                  Maximum Dewpoint 0oC at MAOP (Max 112.0 mg/Sm<sup>3</sup>)
- 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.

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## 4.4 SCADA SYSTEM

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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 : Inclusions of document

# Jemena Asset Management Pty Ltd

## Safety Management Manual

### Gas Assets

Protected

10 May 2019



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1	10.05.2019	Inserted section on gas process safety and minor amendments	George Castline
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**Owning Functional Area**

Business Function Owner:	Asset Risk & Assurance
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# 1. INTRODUCTION

## 1.1 PURPOSE

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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

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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 GAS SAFETY RISKS

---

For the purpose of identifying, assessing and controlling gas safety risk, the following risk categories are considered significant on the basis of Jemena's risk framework 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
- Gas Processing operational risks – cryogenic liquids, amine, hot oils etc.

## 1.4 APPLICABLE ASSETS

---

This manual applies for the following Jemena owned or managed 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 and PL 29
- Evoenergy ACT Distribution Network
- Jemena Colongra Pipeline L33 (NSW)
- Eastern Gas Pipeline PL 26 (NSW).
- Darling Downs Pipeline PL90, 133, 134 (QLD)
- Queensland Gas Pipeline PL30 (QLD)
- Northern Gas Pipeline PL 34 (NT) and 2015 (QLD)
- Atlas PL 2048 (QLD)
- Roma North PL 2028 (QLD)

## 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 2018 (Queensland)
- Energy Pipelines Act 1981 (NT)
- Energy Pipelines Regulations 2001 (NT)
- 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

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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

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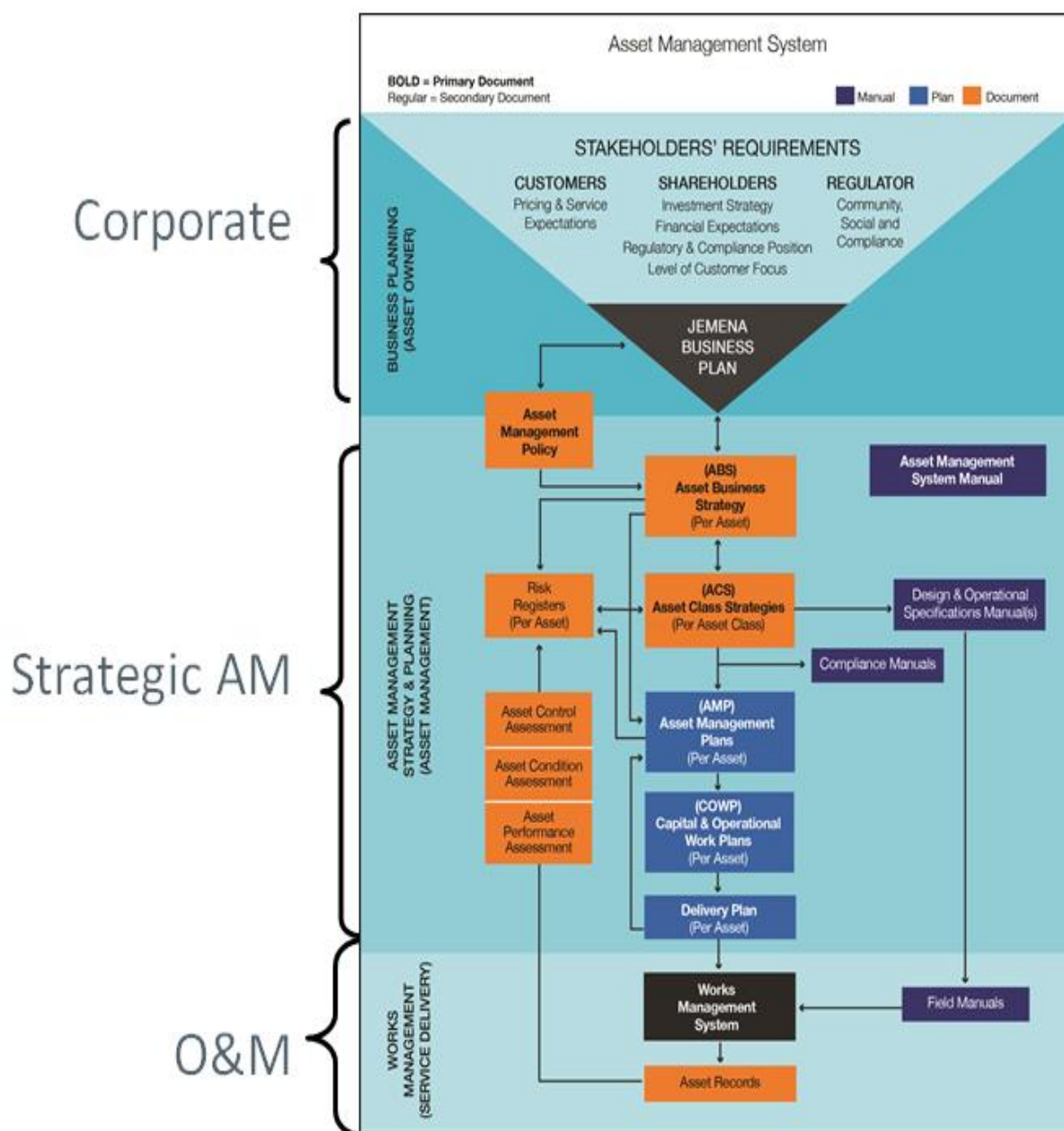
Jemena has an overall Asset Management System (AMS) within which Safety Management is a key element. The Asset Management System provides the principle framework for the organization to direct, coordinate and control asset management activities and provides assurance that Jemena's operational, societal 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 2.1 details the document hierarchy that transforms Jemena's strategic objectives into the required actions that underpin the asset management function. Figure 3.1 also shows secondary documents that support the strategy and planning documents.

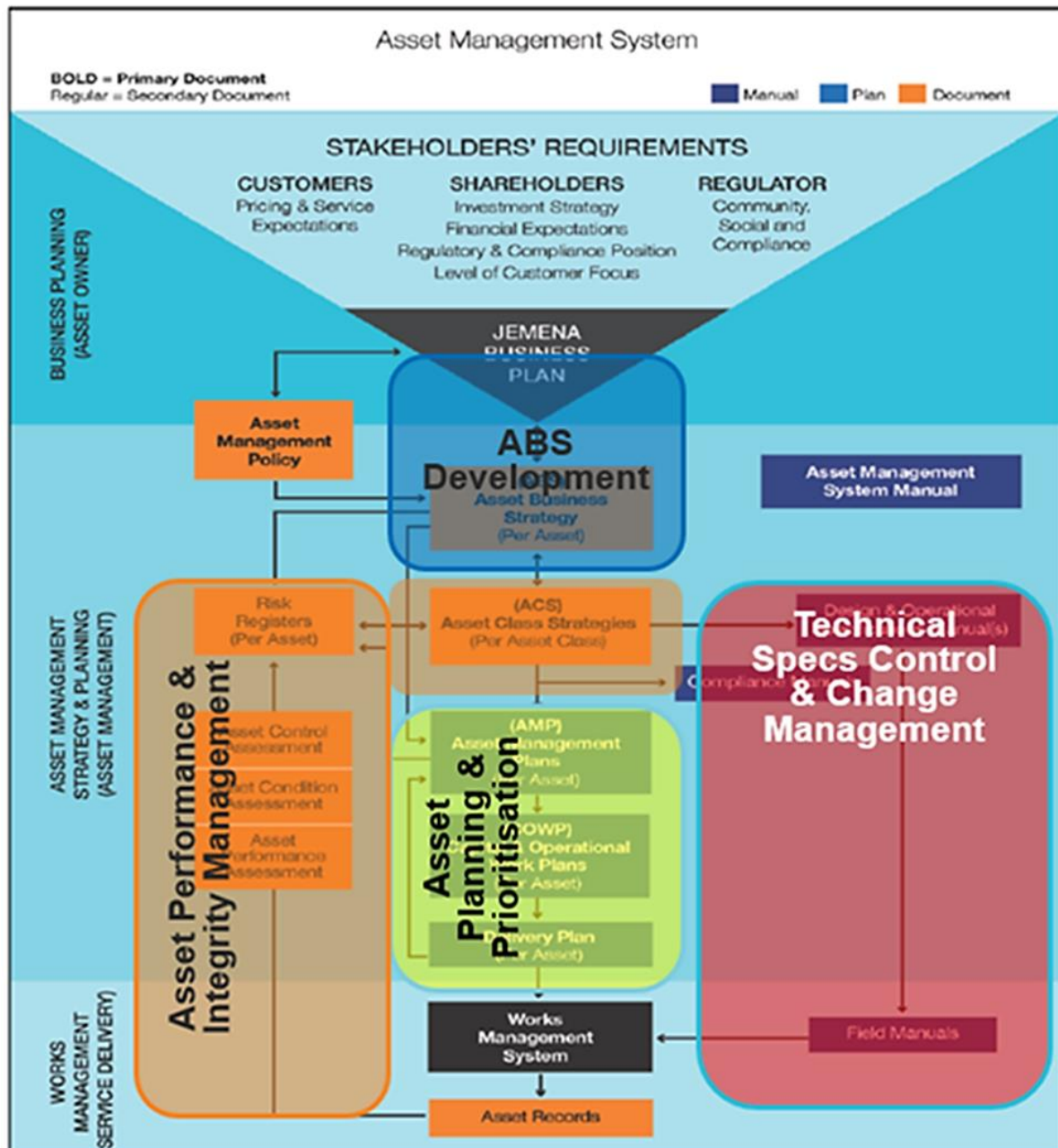
Figure 3:1: Jemena Asset Management System Document Hierarchy



### 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 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.

### 3.3.3.2 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

### 3.3.3.3 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.

#### 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 as per the approvals processes.

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

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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.

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 identity 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 ASSET RISK ASSESSMENTS

Jemena undertakes risk assessments for all new projects and periodic risk assessment for all existing assets 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 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 GAS PROCESSING SAFETY

Jemena has a comprehensive review of process safety, which mirrors the SMS process. The details of which is reflected in the asset risk and management guideline JEM AM GU 0007.

Jemena has conducted HAZOP and SIL studies for its gas processing facility (NGP facilities) to ensure that process hazards are identified and their control mechanisms are reliable and functional. These studies have identified key process and instrumentation risks and testing and maintenance requirements. These risks will form the starting point for process hazard management which will use risk assessment and procedural control effectiveness principles. The process hazard management system analyses the following aspects of facility operation, as a minimum:

- Incident identification
- Review of maintenance

- Alarm Management
- Technical review of Change Management System requests

#### 4.2.5 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

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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

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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 relevant applicable Technical Specifications, as defined below:

- GDN-1999-DG-DN-001 - Secondary Systems Design Manual
- GDN-1999-DG-DN-002 - Low and Medium Pressure System Design Manual
- Asset Specific AS2885 Pipelines Design Manual
- GAS-999-DG-FA-001 HP – Facilities Design Guide Manual

#### 5.3 INSPECTION AND MAINTENANCE

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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:

- AS2885 Pipelines Field Operations and Maintenance Specification
  - GAS-960-SP-ME-019 GAS Distribution - AS2885 Field Operations and Maintenance Specification
  - GAS-960-SP-ME-037 GAS Markets - AS2885 Facilities Field Operations and Maintenance Specification
- Networks Maintenance Specification

All "Technical Specifications Controlled Documented Information" can be accessed via the following link:  
<http://ecms/otcs/cs.exe/properties/317696873>

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

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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:

- 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

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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 AS4645.

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

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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 Register 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.

Reference to Jemena Incident Investigation and Reporting procedures is provided 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 and considering the principles of 3 lines of defence. 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

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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

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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

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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.

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 : Inclusions of compliance matrix pdf

## Compliance Assurance Matrix

No	Standard	Requirement Title and Detail	How do we address the requirement – additional information	Supporting artefacts /procedures / processes
1	AS2885.3 CI.2.2.2.1	<b>Management - Policy and Commitment</b> Policy and commitment The Licensee shall define its policy towards the various aspects of operating the pipeline. Policies shall address at least— (a) pipeline integrity management; (b) environmental management; and (c) occupational health and safety management. NOTE: A clear commitment by the Licensee towards specific outcomes forms the basis of the pipeline management system.	Jemena has in place a comprehensive set of policies approved by its board to be implemented by management including Asset Management Policy and HSE Policies.	<a href="#">Jemena Compliance with the Law Policy</a>  <a href="#">Jemena Asset Management Policy</a>  <a href="#">Jemena Health &amp; Safety Policy</a>  <a href="#">Jemena Environment Policy</a>
2	AS2885.3 CI.2.2.2.2 & CI.2.2.2.3	<b>Management - Structure</b> 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  <b>Management - Responsibilities, Accountabilities and Authorities</b> 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—  (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. NOTE: AS 2885.0 requires the development of an approval matrix to document the delegations of the Licensee.	The asset management structure is broadly described in section 9 of the AMS manual. Further details in element 7 of the safety case and safety management manual. Details of the organizational arrangements in managing the assets is described through the <b>Jemena Operating Model - Accountability Model</b> .  <b>Note: Jemena's Accountability Model.</b> The Accountability Model is a tool that utilises the Enterprise Process Model (EPM) to provide clarity of the accountabilities within the business.  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)	Note : <a href="#">Asset Management System Manual</a> provides an approach to the activities undertaken by AM to manage the lifecycle of its assets, to ensure optimum outcomes.  <a href="#">Asset Management System Manual</a> – Section 9  <a href="#">Jemena Organisation Chart</a>  <a href="#">GAS-999-PA-DM-004 GAS AS 2885 Document Approvals Structure</a>  The <a href="#">Accountability Model</a>
3	AS2885.3 CI.2.2.2.4	<b>Management - Training and Competency</b> Personnel shall be competent to perform the specific tasks and functions for which they are responsible.  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.  As a minimum and as applicable to each position, personnel responsible for the operation and maintenance of the pipeline shall be—	Jemena has <b>comprehensive Learning and Development Processes in place to meet ongoing training and competency needs</b> . These are met through several processes. The details of which can be demonstrated by a member of the Jemena Learning and Development team. In addition, People leaders have responsibility to ongoing management of competency and support. Sever tools are available to support the training and competency requirements. Learning includes Success Factors, Competency Framework. Passport (Contractors).	<a href="#">Asset Management System Manual</a> – Section 9 <a href="#">Jemena Learning &amp; Development Website</a>  <a href="#">AM Competency Framework</a>

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 artefacts /procedures / processes
		<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:</p> <p>1 For more information on fluid properties see AS 4343.</p> <p>2 Detail on the framework for National Competencies for Transmission Pipeline Operators can be found at <a href="http://www.ee-oz.com.au">www.ee-oz.com.au</a>.</p> <p>3 Detail on the engineering competencies can be found at the APIA website <a href="http://www.apia.net.au">www.apia.net.au</a></p>		
4	AS2885.3 Cl.2.2.2.5	<p><b>Management – Resourcing</b></p> <p>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.</p> <p>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><b>Resourcing</b> 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 Investment Plan (AIP) and an assessment of the deliverability of the Capital Programme of Works including the delivery approach.</p>	<p><a href="#">Asset Management System Manual</a> – Section 6.4</p> <p><a href="#">Asset Investment Plan</a></p> <p><a href="#">Asset Management System (AMS) Intranet Site</a></p>
5	AS2885.3 Cl.2.2.2.6	<p><b>Management - Change Management</b></p> <p>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;</p> <p>(b) promote public awareness of the pipeline;</p> <p>(c) operate and maintain the pipeline safely;</p> <p>(d) respond to emergencies;</p> <p>(e) prevent and minimize loss of containment;</p> <p>(f) carry out inspections in accordance with Clauses 6.4, 6.5, 6.6 and Clause 6.7; and</p> <p>(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>The AMS documents Jemena's <b>change management</b> procedures to address changes to asset (i.e. design, process, projects etc). Examples include Engineering Change Management, Field Technical Change and Acts &amp; Regulations Change.</p>	<p><a href="#">Asset Management System Manual</a> – Section 10.4</p> <p><a href="#">JEM PR 0026 Field Technical Change &amp; Implementation Process</a></p> <p><a href="#">Field Technical Change Intranet Site</a></p> <p><a href="#">GTS-980-OM-CM-001 Change Management Manual</a></p> <p><a href="#">JEM RCM PR 0001 Managing Compliance Tasks in JCARS Procedure</a></p>

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## Compliance Assurance Matrix

No	Standard	Requirement Title and Detail	How do we address the requirement – additional information	Supporting artefacts /procedures / processes
		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><b>Management - Management Review</b></p> <p>The Licensee shall establish procedures for regular management review of the effectiveness and appropriateness of the pipeline management system.</p> <p>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).</p> <p>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>Asset Performance Monitoring and Assessment Process provides Jemena management a comprehensive review of the effectiveness and appropriateness of the pipeline management system. These include</p> <p>HSE Executive Committee, Asset Public Safety Committee, Gas Safety Management Review Committee, Technical safety committees (AS 2885 and AS 4645) operating within defined charters to allow a comprehensive review of the system</p>	<p><a href="#">Asset Management System Manual</a> – Section 10.7</p> <p><a href="#">APSC, GSMRC Intranet Link</a></p>
7	AS2885.3 CI.2.2.6	<p><b>Consultation, Communication and Reporting</b></p> <p>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.</p> <p>NOTE: Clause 7.3.1 provides details of stakeholders and community awareness processes as they relate to external interference protection.</p>	<p>Stakeholder Engagement process within the AMS provides a broad framework of stakeholder engagement and consultation. This includes external forums , surveys etc</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><a href="#">Asset Management System Manual</a> – Section 10.10</p> <p><a href="#">Communication Strategy (AMS)</a></p> <p><a href="#">Safety, Emergency and Physical Security Website (external notification)</a></p> <p>Annual Reports (NSW Technical Regulator)</p> <p><a href="#">Landowner - stakeholder engagements</a></p>
8	AS2885.3 Appendix D D2 (c)	<b>Document Approvals - Approval Matrix</b>	Please note the Document Approvals Structure	<p><a href="#">GAS-999-PA-DM-004 GAS AS 2885 Document Approvals Structure</a></p> <p>The <a href="#">Accountability Model</a></p>
9	AS2885.3 CI.2.2.3.2	<p><b>Planning - Planning for Normal Operation</b></p> <p>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>Asset management system – Group 1 strategy and planning and Group 3 lifecycle delivery define broadly the framework within the AMS. In addition the section 3 of the safety management manual defines the process in more detail from the perspective of planning requirements.</p>	<p><a href="#">Asset Management System Manual</a> – Section 5</p> <p><a href="#">AMS Library</a></p> <p><a href="#">JEM AM GU 0007 Asset Risk Management Guideline</a></p> <p><a href="#">GAS-999-PR-HSE-006 Permit to Work Procedure</a></p> <p>Safety Management Study Procedure <a href="#">(under revision please refer GTS-999-PR-RM-001)</a></p> <p><a href="#">HSE-Management-System</a></p>

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## Compliance Assurance Matrix

No	Standard	Requirement Title and Detail	How do we address the requirement – additional information	Supporting artefacts /procedures / processes
10	AS2885.3 Cl.2.2.3.3	<b>Planning - Planning and preparation for Abnormal Operations</b> 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: (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.	Asset management system – Group 1 strategy and planning and Group 3 lifecycle delivery define broadly the framework within the AMS. In addition the section 5 of the safety management manual defines the process in more detail from the perspective of planning requirements.	<a href="#">Asset Management System Manual</a> – Section 5  AS2885 Pipeline Anomaly Assessment Procedure AS2885 Pipeline Design Basis Manual AS2885 HP Facilities Design Basis Manual AS2885 Pipelines Field Operations & Maintenance specification Operational Monitoring, Control and response Specification <a href="#">Technical Specifications Control Documented Information</a>
11	AS2885.3 Cl.2.2.3.4	<b>Planning - Emergency Planning and Preparation</b> 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).  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.	Jemena Asset Strategy Gas with its asset classes define planning requirements from Design Basis Manuals, Operational and Maintenance Specifications.  Also refer to implementation (Section 11) requirements within this matrix.	<a href="#">Asset Management System Manual</a> – Section 5 <a href="#">Asset Management System Intranet</a> <a href="#">Technical Specifications Control Documented Information</a>  GAS-999-PR-IN-001 AS2885 Pipeline Anomaly Assessment Procedure AS2885 Pipelines Field Operations & Maintenance <a href="#">Crisis Emergency Management &amp; Security Intranet site</a> <a href="#">JEM PL 0013 Jemena Emergency Management Plan</a>
12	AS2885.3 Cl.2.2.4	<b>Implementation - Preparation for Operation (Section 3)</b>  Please refer to section 3 of the 2885.3 and AS 2885.6	Jemena Project Management Methodology includes the construction and commissioning processes.  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.  Asset related risk management requirements (eg: SMS, HAZOP, ALARP etc.) are detailed in the Asset Risk Management Guideline.	<a href="#">Asset Management System Manual</a> – Section 5 <a href="#">Asset Management System Intranet</a> <a href="#">Technical Specifications Control Documented Information</a>  AS2885 Pipeline Design Basis Manual  AS2885 HP Facilities Design Basis Manual  <a href="#">Project Delivery Centre Intranet</a>  PMM Gating Portal – Jemena 7 Step Gating online management portal  <a href="#">JEM AM GU 0007 Asset Risk Management Guideline</a>
13	AS2885.3 Section 4	<b>Implementation - Site Safety and Environmental Management (Section 4)</b>  Please Refer Section 4 of the 2885.3 Standard.	Jemena <b>HSE management Systems</b> 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.	<a href="#">Asset Management System Manual</a> – Section 5 <a href="#">HSE Management Website</a>  <a href="#">Works Practices and Standards (safe work systems)</a>

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## Compliance Assurance Matrix

No	Standard	Requirement Title and Detail	How do we address the requirement – additional information	Supporting artefacts /procedures / processes
14	AS2885.3 Section 5	<b>Implementation - Pipeline Integrity Management (Section 5)</b> Please Refer Sections 5, 6,7,9,10 of the 2885.3 Standard	<b>Pipeline Integrity Management</b>  The requirements for a PIMP are covered through the application of Jemena's AMS. The integrity management approach and actions are defined in the Asset Class Strategies (ACS), operationalised through the OMCRS & FOMS, and assessed annually through the APAIR. Management review and assurance over the integrity management approach is provided through the GSMRC and APSC. In addition the 5 yearly SMS a detailed strategic review of the adequacy of the integrity management approach and actions. A summary table of key integrity management items and frequencies in each of the ACSs in the lifecycle management section.	<a href="#">Asset Management System Manual</a> – Section 10.6  AS2885 Pipeline Anomaly Assessment Procedure AS2885 Pipeline Design Basis Manual AS2885 HP Facilities Design Basis Manual AS2885 Pipelines Field Operations & Maintenance specification Operational Monitoring, Control and response Specification <a href="#">Technical Specifications Control Documented Information</a>
15	AS2885.3 Section 8	<b>Implementation - Stations Operations and Maintenance (Section 8)</b>  Please Refer Section 8 of the 2885.3 Standard	Jemena delivers safe and reliable station Operations and Maintenance through the development of O&M specifications and manuals as outlined in the AMS. The artefacts include field operation and maintenance specifications, Operational Monitoring, Control and response Specifications, field operation manuals.	<a href="#">Asset Management System Manual</a> – Section 7.2  GAS-999-PR-IN-001 AS2885 Pipeline Anomaly Assessment Procedure GAS-960-DG-PL-001 AS2885 Pipeline Design Basis Manual GAS-999-DG-FA-001 AS2885 HP Facilities Design Basis Manual GAS-960-SP-ME-019 - AS2885 Pipelines Field Operations & Maintenance
16	AS2885.3 Section 11	<b>Implementation - Emergency Response (Section 11)</b> Please Refer Section 11 of the 2885.3 Standard	The purpose of <b>emergency management</b> 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.  Jemena Emergency Management Plan defines 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.	<a href="#">Asset Management System Manual</a> – Section 7.4 <a href="#">Jemena Crisis Emergency Management &amp; Security Intranet site</a>  <a href="#">JEM PL 0013 Jemena Emergency Management Plan</a>  <a href="#">JEM PL 0014 Crisis and Emergency Management Training and Exercise Framework</a>
17	AS2885.3 Section 12	<b>Implementation - Records Management (Section 12)</b> Please Refer Section 12 of the 2885.3 Standard	Jemena applies various tools and systems towards management of asset records in accordance with the AMS asset data governance manual and asset data management plan.	<a href="#">Asset Management System Manual</a> – Section 8 - <a href="#">Asset Data Governance Manual</a> - <a href="#">Asset Data Management Plan</a>

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## Compliance Assurance Matrix

No	Standard	Requirement Title and Detail	How do we address the requirement – additional information	Supporting artefacts /procedures / processes
18	AS2885.3 Cl.2.2.5.1 & 2	<p><b>Measurement and evaluation - Data Acquisition and Analysis</b></p> <p>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.</p> <p>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</p> <p>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.</p> <p>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>Jemena's approach to defining, acquiring and evaluating data is outlined section 5 of the AMS. Key Performance metrics and data requirements are defined in the ACS. Monitoring requirements is defined within performance and integrity process</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.</p>	<p><a href="#">Asset Management System Manual</a> – Section 5 and 10.5</p> <p>Asset Class Strategies</p> <p><a href="#">GAS-999-GL-RM-001 GSMRC Operating Charter</a></p> <p><a href="#">GSMRC Intranet Link</a></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><b>Measurement and evaluation - Accident/Incident Investigation and Reporting</b></p> <p>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</p> <p>(c) significant impact on the pipeline's operation or integrity.</p> <p>Reporting shall include notification of relevant regulatory authorities as required by legislation.</p> <p>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 addresses this requirement through its asset management system, incident and emergency management system</p>	<p><a href="#">Asset Management System Manual</a> – Section 10.7</p> <p><a href="#">JEM HSE PR 0032 Management of Health &amp; Safety Risk &amp; Legal Obligations Registers</a></p> <p><a href="#">JEM PR 0110 W I1 OHSE External Incident Notification</a></p> <p><a href="#">Aspire Incident Investigation &amp; Reporting System</a></p> <p><a href="#">JEM HSE PR 0151 Incident Investigation Procedure</a></p>
20	AS2885.3 Cl.2.2.5.4	<p><b>Measurement and evaluation - System Audits</b></p> <p>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.</p> <p>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</p> <p>(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>AMS system audits, Asset Risk and Assurance audits augmented by external regulatory audits and several audit actions tools including JCARS provides a review for effectiveness of the system.</p>	<p><a href="#">Asset Management System Manual</a> – Section 10.8</p> <p><a href="#">Asset Risk and Assurance Internal Audit Plan (Electricity, Gas and Water)</a></p>

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## Compliance Assurance Matrix

No	Standard	Requirement Title and Detail	How do we address the requirement – additional information	Supporting artefacts /procedures / processes
		<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 CI.2.2.5.5	<p><b>Measurement and Evaluation - Corrective and Preventive Action</b></p> <p>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 AMS and Gas Safety Management Manual(GSMM)</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><a href="#">Asset Management System Manual</a> – Sections 6 and 10.9 <a href="#">JCARS</a></p> <p><a href="#">Asset Risk and Assurance Internal Audit Plan (Electricity, Gas and Water)</a></p> <p><a href="#">Aspire Incident Investigation &amp; Reporting System</a></p> <p><a href="#">Jemena Incident Investigation Procedure</a></p>

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## 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><b>General Provisions of Safety and Operating Plan</b> The general matters that must be included in a safety and operating plan are as follows:</p> <ul style="list-style-type: none"> <li>(a) a statement that sets out the objectives of the plan,</li> <li>(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,</li> <li>(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,</li> <li>(d) a description of the gas network, and its operation and maintenance, within each distribution district,</li> <li>(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.</li> </ul> <p><b>The framework of the SAOP shall include or reference, but not be limited to, the following:</b></p> <ul style="list-style-type: none"> <li>(a) Administrative requirements:</li> <li>(i) Scope and objectives of the SAOP.</li> <li>(ii) Review period for the SAOP.</li> <li>(iii) The process for auditing in accordance with Clause 10.3.</li> </ul> <p>(b) Description (by listing) of primary legislation, codes and standards of design and construction, maintenance and operation of the gas distribution network.</p> <p>(c) Description of the gas distribution network physical scale and dimensions, including:</p>	<p>AMS and GSMM defines how Jemena addresses the management of safety requirements of its gas assets</p> <p><b>General Provisions</b></p> <ul style="list-style-type: none"> <li>a) Safety case purpose and objectives of the plan is set out in this safety case.</li> <li>b) Refer to the Intranet / Approvals Structure and Jemena Organisation Framework- JEM HR GU 0001, Position Descriptions, etc.</li> <li>c) Refer to Appendix A</li> <li>d) Refer to Appendix A</li> <li>e) All procedures referred to in this safety case have been tested and proved.</li> </ul> <p><b>Framework of the SAOP</b></p> <ul style="list-style-type: none"> <li>(a) Administrative requirements</li> <li>(i) Safety case purpose and objectives of the plan is set out in this safety case.</li> <li>(ii) Refer to section 7 of the SAOP.</li> <li>(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.</li> <li>(b) Primary legislation, codes and standards of design and construction, maintenance and operation of the gas distribution network are specified within this safety case.</li> </ul> <p>This section has already been detailed previously under General Provisions.</p>	<p><b>General Provisions</b></p> <ul style="list-style-type: none"> <li>a) Refer to Section 1 Safety Case Purpose &amp; Objectives</li> <li>b) <a href="#">JEM HR GU 0001 Jemena Organisation Framework</a></li> <li>c) Refer to Appendix A</li> <li>d) Refer to Appendix A</li> <li>e) Refer to statement in section 5.3 of this safety case</li> </ul> <p><b>Framework of the SAOP</b></p> <ul style="list-style-type: none"> <li>(a) Administrative requirements <ul style="list-style-type: none"> <li>1. Refer to section 1 of this document "Safety Case Purpose &amp; Objectives"</li> <li>2. Refer to section 7 of SAOP.</li> <li>3. <a href="#">Asset Risk and Assurance Internal Audit Plan (Electricity, Gas and Water)</a></li> </ul> </li> <li>(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.</li> </ul> <p>c) Refer to section above on General Provisions.</p>
23	AS4645 2.4.2	<p><b>Description of Gas Network</b> (c) Description of the gas distribution network physical scale and dimensions, including:</p> <ul style="list-style-type: none"> <li>(i) Geographical location and spread.</li> <li>(ii) Materials used for mains.</li> <li>(iii) Length and diameter of mains.</li> <li>(iv) Materials used for services.</li> <li>(v) Number of services.</li> <li>(vi) Operating pressures.</li> <li>(vii) Number and technical outline of city gates affecting the safety of the system and gas supply.</li> <li>(viii) Number and technical outline of network pressure control systems.</li> </ul> <p>NOTE: This information should be in summary form, including use of, or reference to, suitable maps, drawings, diagrams, lists and registers.</p>	<p>Jemena prepares a description of each gas asset (according to jurisdiction in which the asset operates) and is included in appendix A of the safety case</p> <p>A <b>description of gas assets</b> 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><a href="#">GAS-1999-SP-ME-001 Field Operations Maintenance Specification &lt;1050kPa</a></p> <p><a href="#">Dial Before You Dig Website</a></p>

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



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	Standard	Requirement Title and Detail	Jemena Processes/procedures/artefacts addressing the requirements	Procedure
24	AS 4645 2.4.2	<p><b>(e) Accountabilities and Resources:</b></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>The asset management structure is broadly described in section 9 of the AMS manual. Further details in element 7 of the safety case and safety management manual.</p> <p>Details of the organizational arrangements in managing the assets is described through the <b>Jemena Operating Model - Accountability Model</b>.</p> <p><b>Note: Jemena's Accountability Model.</b> The Accountability Model is a tool that utilises the Enterprise Process Model (EPM) to provide clarity of the accountabilities within the business.</p>	<p><a href="#">Asset Management System Manual</a> – Section 9</p> <p><a href="#">Jemena Organisation Chart</a></p> <p>The <a href="#">Accountability Model</a></p>
25	AS 4645 2.4.2	<p><b>(f) Outcomes of FSA, including:</b></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><b>Risk Register (asset specific)</b></p> <p><b>Risk Assessment</b></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><b>Formal Safety Assessment (asset specific)</b></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><a href="#">JEM AM GU 0007 Asset Risk Management Guideline</a></p> <p><a href="#">GAS-999-PR-RM-001 Formal Safety Assessment (FSA) Procedure</a></p>
26	AS 4645 2.4.2	<p><b>(g) Functional requirements, specifications, plans, procedures, designs, including:</b></p> <p>I. Functional requirements in accordance with Clause 3.3.</p>	<p>The AMS with relevant ACS, design basis manuals, FOMS and OMCR provides the framework to address this requirement</p>	<p>i. Functional Requirements have been incorporated in the following procedures.</p>

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	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> <p style="margin-left: 40px;">a. requirements for third party liaison;</p> <p style="margin-left: 40px;">b. maintenance;</p> <p style="margin-left: 40px;">c. work practices;</p> <p style="margin-left: 40px;">d. permit to work;</p> <p style="margin-left: 40px;">e. leakage management, including the classification of leaks;</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>II. <b>Approved Materials and Equipment</b> 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 <b>construction and commissioning processes</b> 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 &amp; Maintenance Plans, processes, procedures</p> <p style="margin-left: 40px;">a. <b>Third Party Liaison</b> processes have been implemented to manage engagement activities.</p> <p style="margin-left: 40px;">b. <b>Maintenance</b> is based on SAP work orders being developed from the asset class strategies. Maintenance activities are defined in the Operations Field Manual.</p> <p style="margin-left: 40px;">c. Work Practices</p> <p style="margin-left: 40px;">d. <b>Permit to Work</b> 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.</p>	<p>ii. Approved Materials &amp; Equipment</p> <ul style="list-style-type: none"> <li>- Approved Materials List (≤1050kPa)</li> <li>- Approved Equipment List (≤1050kPa)</li> <li>- Approved material list of low and medium pressure systems (≤500kPa )</li> <li>- Distribution System Approved Equipment List For networks with an MAOP less than 500kPa</li> <li>- Site specific Bill of Material (BOM) for district regulator sets and I&amp;C meter sets</li> <li>- Approved materials list for corrosion mitigation</li> </ul> <p>III. Construction &amp; Commissioning</p> <ul style="list-style-type: none"> <li>- <a href="#">GAS-999-OM-GD-002 Construction Field Manual</a></li> <li>- <a href="#">Project Delivery Centre Intranet</a></li> <li>- PMM Gating Portal</li> </ul> <p>iv. Operational &amp; Maintenance Plans, processes, procedures</p> <p>a) <b>Third Party Liaison</b></p> <ul style="list-style-type: none"> <li>- Property Portfolio Landholder &amp; Stakeholder Engagement Strategy</li> </ul> <p>b) Refer to Appendix D for schedule</p> <ul style="list-style-type: none"> <li>- <a href="#">GAS-999-OM-GD-001 Operations Field Manual</a></li> <li>-</li> </ul> <p>c) Work Practices</p> <p>d) <a href="#">GAS-999-PR-HSE-006 Permit to Work Procedure</a></p> <ul style="list-style-type: none"> <li>- GAS MA 0001 Safe Work Method Statement Manual</li> <li>- GAS MA 0003 Safe Work System Manual</li> </ul> <p>e) <a href="#">GAS-1999-SP-ME-001 Field Operations Maintenance Specification &lt; 1050kPa</a></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
		<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"> <li>the technical basis for any proposed change</li> <li>impact of change on safety and health of personnel, plant and environment;</li> <li>modifications to operating or maintenance procedures;</li> </ol>	<p>e. <b>Leakage Management</b> is a key control to the safe operation of the asset as provides an input into the condition monitoring process of the asset.</p> <p>f. <b>Annual Condition Assessments</b> are undertaken for all Jemena managed gas assets. It uses a combination of integrity data and operational reports to determine the condition of the asset. Monitoring is performed via monthly operational reports.</p> <p>g. <b>Capacity Management</b> 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. <b>Competency of Personnel.</b> 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 <b>investigating failures</b> 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 <b>asset records</b>. 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. These performance measures meet the compliance requirements of the performance monitoring plan of the standard.</p>	<p>g) <a href="#">GDN 1999 SP DN 001 Capacity Design Specification Manual</a></p> <p>h) <a href="#">Jemena Learning &amp; Development Website</a></p> <ul style="list-style-type: none"> <li>- <a href="#">JEM PR 0101 WI 02 Gas Technical Training</a></li> <li>- <a href="#">JEM PR 0101 WI 02 Gas Technical Training</a></li> <li>- AM Competency Development</li> </ul> <p>(ix) <a href="#">GAS-1999-SP-ME-001 Field Operations Maintenance Specification &lt;1050kPa</a></p> <p>(x) <a href="#">- Asset Data Governance Manual</a> <a href="#">- Asset Data Management Plan</a></p> <p>(xi) <a href="#">GAS-999-GL-RM-001 GSMRC Operating Charter</a></p> <p>(xii) <a href="#">JEM PR 0026 Field Technical Change &amp; Implementation Process</a></p>

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	Standard	Requirement Title and Detail	Jemena Processes/procedures/artefacts addressing the requirements	Procedure
		d. necessary time period for the change; and e. authorization requirements for the proposed change, if applicable	(xii) Jemena has established <b>Change Management</b> procedures to address changes to asset (i.e. design, process, projects etc). Engineering Change Management, Field Technical Change for A to E.	(xii) <a href="#">Field Technical Change Intranet Site</a>
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)	<b>Gas Quality</b> The gas quality standards to be applied must include standards relating to the following: (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.	<a href="#">Operational Monitoring, Control &amp; Response</a>
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)	<b>Procedures for Testing Gas</b> (1) A safety and operating plan must identify the procedures to be implemented by the network operator to ensure that gas conveyed or supplied: (a) meets the relevant gas quality and pressure standards, and (b) complies with the relevant gas specification.  (2) A safety and operating plan must specify: (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.  A safety and operating plan must: (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.	<b>Gas Quality</b> 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.  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.  <b>Odorant</b> 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.	<a href="#">GAS-1999-SP-ME-001 Field Operations Maintenance Specification &lt;1050kPa</a>
29	Schedule 1 Safety and operating plans of <i>Gas Supply (Safety and Network Management) Regulation 2013</i>	<b>Emergencies</b> (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. (2) The types of emergencies in respect of which procedures must be implemented include (as a minimum): (a) fires, explosions, leaks and impacts (with particular reference to those caused by the activities of other parties), and (b) natural disasters, and	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	<a href="#">Jemena Crisis Emergency Management &amp; Security Intranet site</a>  <a href="#">JEM PL 0013 Jemena Emergency Management Plan</a>  <a href="#">JEM PL 0014 Crisis and Emergency Management Training and Exercise Framework</a>

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	Standard	Requirement Title and Detail	Jemena Processes/procedures/artefacts addressing the requirements	Procedure
	(Also included are related requirement of AS 4645)	(c) civil disturbances. (3) A safety and operating plan must identify the procedures implemented by the network operator that ensure: (a) all emergency procedures have been tested and proved, and (b) all emergency procedures are reviewed and tested on a regular basis.	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.	
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)	<b>Analysis of Hazardous Events</b> (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.	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.  <b>Risk Assessment</b> 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.  5) SAP specifies the maintenance regime for all assets.	<a href="#">Formal Safety Assessment Procedure</a>  Refer to Risk Register in Appendix D  Also include technical management guideline??  <a href="#">JEM AM GU 0007 Asset Risk Management Guideline</a>        A copy of the Maintenance schedule is included in Appendix 4  Include ops specs
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)	<b>Plan must incorporate any Relevant Management System Standards</b> 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).	Jemena has an Asset Management System in place (in alignment with ISO 55001).	Jemena certification to ISO 55001 system  <a href="#">Asset Management System Manual</a>

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32	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)	<b>Codes and Standards</b> 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 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.	Not Applicable for EVO or JGN Assets in this instance.  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)	<b>Meters, regulators and other basic metering equipment</b> (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 <b>design basis manuals covering the design of gas distribution networks</b> . 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.	<a href="#">GAS-1799-DG-EQ-001 Metering Equipment Design Basis Manual</a>  <a href="#">GDN 1999 SP DN 001 Capacity Design Specification Manual</a>  <a href="#">GDN 1999 DG DN 001 JGN - Secondary Systems Design Manual</a> <a href="#">GAS-1999-GD-DN-003 Network Pressure Control Design Basis Manual Part 1 - District Regulator Sets</a>  <a href="#">GAS-999-OM-GD-001 Operations Field Manual</a>
34	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)	<b>Procedures for connection of gas supply to a gas installation</b>  <b>Network operator rules (NSW)</b> (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 <b>Jemena Network Operator Rules</b> 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.	<a href="#">Jemena Network Operator Rules</a>
35	AS4645	<b>Additional Requirements</b> 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.  <b>1. Purging</b>  <b>2. Isolated Mains</b>	<b>Purging</b> 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.	<a href="#">GAS-1999-SP-ME-001 Field Operations Maintenance Specification &lt; 1050kPa</a>

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Compliance Assurance Matrix

	Standard	Requirement Title and Detail	Jemena Processes/procedures/artefacts addressing the requirements	Procedure
		<div>3. Means of Conformance</div> <div>4. High Risk Area Identification</div>	<p><b>Isolated mains</b> are assets which are not utilised for gas transportation and are still owned by the asset owner and remain in the Asset Register. 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><b>Means of conformance</b> is managed via risk management processes.</p> <p>A <b>high risk</b> 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><a href="#">GDN 1999 DG DN 002 JGN - ActewAGL - Low And Medium Pressure System Design Manual</a></p> <p><a href="#">JEM AM GU 0007 Asset Risk Management Guideline</a></p>

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

## Appendix D Specific Jurisdiction Requirements

Note : Inclusions and exclusions as necessary

Appendix D contains information relating to FSA and CSMP.

A Formal Safety Assessment (FSA) workshop as required by AS 4645 was undertaken on 26th August 2020 in Jemena's North Sydney office, to assess the risk of injecting hydrogen into the existing natural gas network as a part of the Western Sydney Green Gas Project (WSGG).

The aim of the FSA was to identify the incremental risks associated with the injection of hydrogen and provide assurance to stakeholders that these risks are manageable and can be mitigated accordingly without adversely impacting on the safety of the asset, public, employees or the environment.

The methodology used during the FSA was favourably acknowledged by the workshop participants including representatives from Jemena and the following external stakeholders.

- NSW Department of Planning Industry and Investment.
- NSW Department of Customer Service.
- The Australian Gas Infrastructure Group (AGIG).
- GPA Engineering

The below is the summary of the outcome of the Formal Safety Assessment (FSA) undertaken, to identify, assess and control the risks that may arise from the blending of hydrogen into the gas distribution network fed by the Horsley Park Primary Regulating Station (PRS). For more information on the outcome of the FSA including associated actions, please refer to the actual Western Sydney Green Gas Trial Project FSA Report FSA P2G-2099-RP-RM-005.

### 1 BACKGROUND

Jemena Gas Networks is the asset owner of the Horsley Park High Pressure Gas Facility, comprising of a number of pressure let down and pipeline pigging facilities, including the Eastern Gas Pipeline (EGP) pipeline, Jemena Gas Network (JGN) Trunk, Sydney Primary Loop and local secondary network, located on Chandos Road in Horsley Park, NSW.

Jemena has proposed construction of a demonstration hydrogen production plant within and adjacent to their existing high pressure gas facilities at Horsley Park in New South Wales. The project, called the Western Sydney Green Gas Trial (WSGGT), will initially produce 100 Nm<sup>3</sup>/h of hydrogen gas with a 500 kW Hydrogenic PEM electrolyser using electricity from an on-site solar array or the local power grid.

It is proposed to blend up to 2 percent of hydrogen gas by volume by directly injecting hydrogen into the outlet natural gas stream of the PRS, at such hydrogen concentrations the blended gas stream will not exceed the gas combustion characteristic limits specified in AS 4564.

The *Gas Supply (Safety and Network Management) Regulation 2013* does not permit injection of gases not conforming with AS4564 into the network. Given that pure hydrogen does not conform to requirements of AS4564, Jemena will be seeking the following exemptions:

---



- Seek an exemption under Part 4, Cl 31 from conveying compliant natural gas from within the WSGG hydrogen pipeline.
- Invoke Part 4 Cl 24.2 (b) to seek permission to convey non-compliant natural gas at the point of injection on the basis that the blended hydrogen/natural gas stream conveyed to the end user will be compliant with AS4564.

Jemena conducted this Formal Safety Assessment in accordance with AS4645.1 to assess the risks that may arise from direct injection of hydrogen at Horsley Park to the continue safe operations of the gas distribution system, gas distribution employees and contractors, members of the public and gas consumers. The assessment included a review of the adequacy of Jemena's asset and safety management systems and key risk controls, and identified required changes to be documented in JGN's SAOP including changes to the description of the asset and risk registers.

## 2 RISKS AND RISKS MITIGATION

There were no "high" or "intermediate" risks reported during the risk assessment validation workshop for carrying hydrogen containing natural gas. Majority of the risks are rated as "low" or negligible" indicating no significant increase in risk as result of the gas quality change.

## 3 FSA VALIDATION WORKSHOP PARTICIPANTS

The validation workshop was carried out on 26 August, 2020 at Jemena North Sydney office with many participants joining in remotely via teams. The workshop team was consisted of participants with wider range of expertise related to the gas distribution network representing operational and managerial roles. As the WSGGT will have a direct impact on the composition of gas downstream of the facility, this FSA also included both technical and consumer regulatory representatives, and an external gas combustion specialist. This multi-disciplinary team based approach was used to increase the understanding about the nature of hazards and risks within the workplace and especially to consumers and the general public. The team assembled for the FSA validation workshop is listed below.

The methodology used during the FSA was favourably acknowledged by the workshop participants including representatives from Jemena and the following external stakeholders.

- NSW Department of Planning Industry and Investment.
- NSW Department of Customer Service.
- The Australian Gas Infrastructure Group (AGIG).
- GPA Engineering

## 4 SUMMARY OF IDENTIFIED THREATS

A total of 24 threats were identified across the category of People and Supply associated with conveying of hydrogen blended natural gas in the downstream distribution network to the boundary limit of end user appliances. Where a threat was deemed credible, existing controls implemented were identified to mitigate or manage the risks during asset life cycle. Further if identified risk is different from natural gas, the risk of the threat was assessed for downstream assets in the distribution network. A breakdown summary of these threats is shown below.

Threat Category	Threats Identified (People & Supply Category)	Threats Deemed Credible
Gas Composition (quality)	3	2
Material/Component Defects	9	4 (Out of 4, 3 to be re-assessed )
Operational Non-Conformance	7	2
Overpressure	1	0
Maintenance	3	0
Corrosion/Third party Damage	1	0
<b>Total</b>	<b>24</b>	<b>8</b>

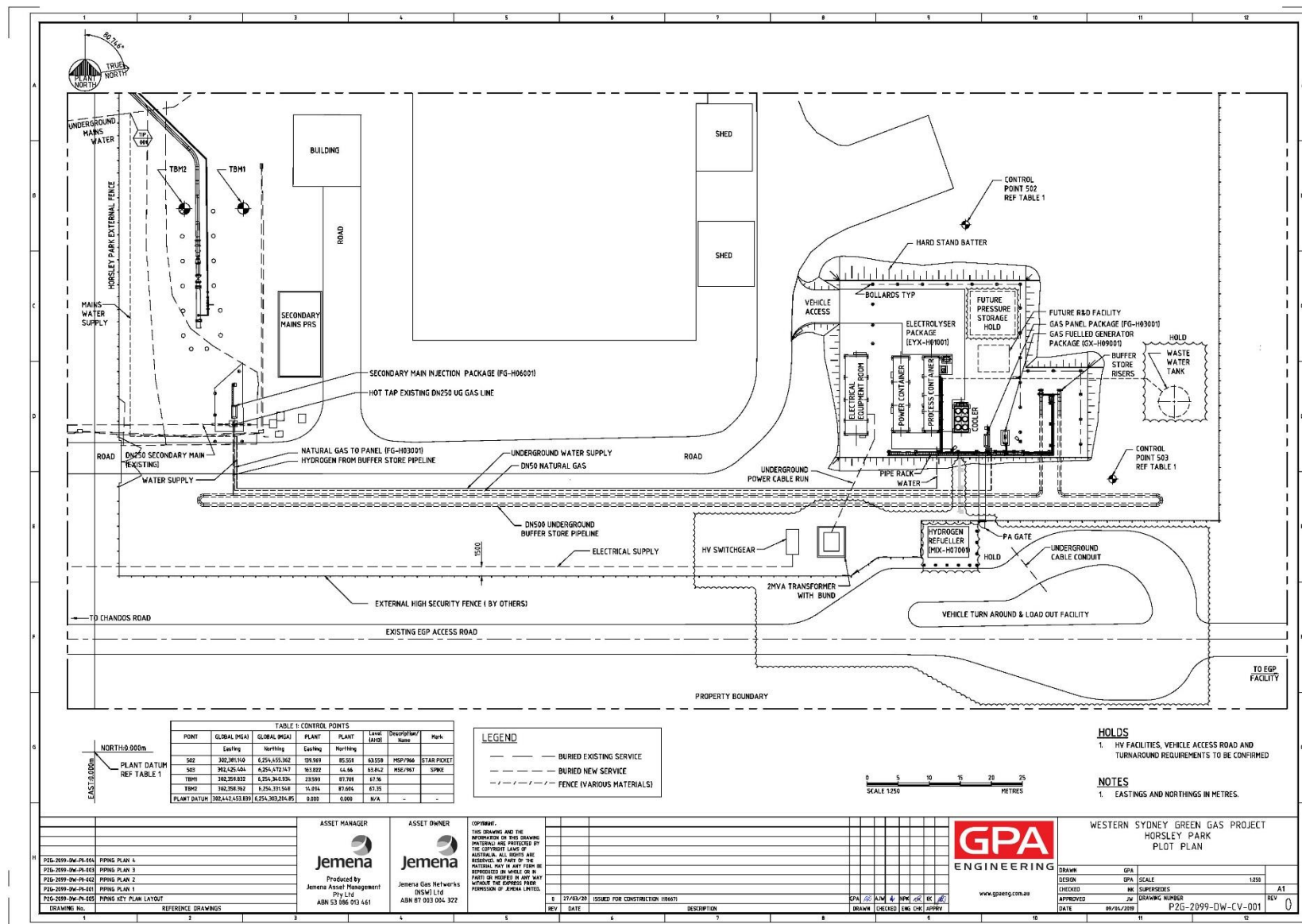
The summary table shows a reduction in the number of threats identified against credible threats that are assessed as specific to 2 molar percent of hydrogen blended in natural gas conveyed on the gas distribution network.

## 5 CONCLUSION

Based on the findings from the Formal Safety assessment there are no "high" or "intermediate" risks assessed for transporting 2 percent of hydrogen blended natural gas in the distribution network. Completion of the actions recommended by this FSA will assure that the transport of hydrogen blended natural gas is not expected to introduce unacceptable risk to the operation of the Jemena gas distribution network. Recommended actions include developing of sampling program and sampling tests to be performed after commissioning to confirm the homogeneous blend and no stratification of gas occurring due to low flow. Also Jemena to consult manufacturers of fittings on suitability of sleeves, diaphragms etc with Town Gas.

This Formal Safety Assessment will be reviewed upon completion of the actions to ensure the validity of the findings. When the actions are completed, risks which could not be assessed during the workshop or required more information will be reviewed to determine the appropriate risk rank considering the implementation of additional controls.

The assets and equipment located within the development footprint is reflected in the general layout as per below image.







## WESTERN SYDNEY GREEN GAS PROJECT

# CONSTRUCTION SAFETY MANAGEMENT PLAN

Document Number			2018-HSS-PLN-006		
Revision	Issue	Date	By	Check	Approve
A	For Client Review	08/10/2020	DP	AMH	AF

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## 1. PURPOSE

The purpose of this Construction Safety Management Plan (CSMP) is to plan and describe the control mechanisms to be implemented during the Scope of Work detailed for the Jemena Western Sydney Green Gas Project (Wasco 2018 Project) and to comply with the requirements of the Jemena Scope of Work and the Contract between Jemena Gas Networks (NSW) Ltd (Jemena | Client) and Wasco (Australia) Pty Ltd (Wasco).

Should there be any significant changes, or should amendments be made to the Contract or any significant risks be identified during the life of the project, this CSMP will be revised and changes to the plan will be made accordingly. All changes to the plan will be communicated to the appropriate parties prior to implementation. This Plan operates under the Wasco Integrated Management System (IMS) which is accredited to AS/NZS4801, AS/NZS ISO 14001, and AS/NZS ISO 9001. This plan should be read in conjunction with the Integrated Management System Manual WAPL-SYS-MAN-001 and the Jemena Safety Management Systems and Manuals. The following documents are integral to the Safety Management System that is established and delivered on the project. This CSMP combines the undertakings described in these documents into a single Inspection and Test regime that will be implemented to ensure that all items contained within these core documents are delivered.

- 2018-PRM-PLN-001 PROJECT EXECUTION PLAN
- 2018-HSS-PLN-001 HSE MANAGEMENT PLAN
- 2018-HSS-REG-001 PROJECT RISK REGISTER

These documents are considered within this document.

All work will be performed in accordance with all Client requirements and relevant Regulations – Codes of Practice and Australian, International and industry standards. Copies of all relevant Safety Legislation – Australian Standards – Codes of Practice will be maintained at the site office. The primary purpose of this document is to minimise health and safety impact by providing a Management Plan for general construction activities with potential health and safety risks, and to reduce the risks to as low as reasonably practical (ALARP).

## 2. SCOPE

The Western Sydney Green Gas (WSGG) Project involves the construction of a power to gas (P2G) hydrogen facility at the existing Jemena Horsley Park Trunk Receiving Station, located in Western Sydney. The facility will use renewable electricity to generate hydrogen, which can be injected into the natural gas network or used to generate electricity back to the grid by means of a hydrogen-powered micro-turbine or similar technology.

The Jemena Horsley Park Facility is located at 194 – 202 Chandos Road, Horsley Park (Lot 1 DP 499001 and Lot 3 DP 1002746)

Jemena has engaged Wasco to perform the role of the Principal Contractor for the duration of the Construction Project. As such, Wasco has been authorised to have management and control of the Construction Project, as required to discharge the duties of a Principal Contractor. This document will be the governing HSE Plan for the works while Wasco remains the Principal Contractor.

The scope of work defined under this Safety Management Plan is detailed in 2018-PRM-PLN-001 – Project Execution Plan and includes:

Preliminaries:

- Construction planning

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- Construction documentation and approvals
- Workshop fabrication, as applicable
- Weld and welder qualifications
- Procurement of contractor-supplied items

#### Mobilisation and Site Establishment

- Mobilisation to site
- Establishment of lay-down area, fencing and facilities
- Site Security
- Housekeeping and disposal/removal of waste
- Relocate communications link between TRS and EGP

#### Site Civil Construction

- Hardstand, access road and truck turnaround
- Foundations
- Pipe and cable installation and trenching
- Spoil and waste management

#### Installation of Major Package Equipment

- Electrolyser Package (process and electrical containers and separate cooler system)
- Microturbine Package
- Gas Panel Packages
- Gas Injection Panel Package
- Electrical Equipment Room
- High Voltage Switchgear and Kiosk Transformer (HV substation)
- Wastewater tank & irrigation system [HOLD 5]
- Cylinder Filling Package [HOLD 5]

#### Electrical Works

- The electrical scope of works as per separate SOW

#### Carbon Steel Pipelines (Hydrogen Buffer Store and Natural Gas Connection)

- Excavation of pipeline trench and tie-in bell-holes
- Transport, stockpiling and backfilling with controls on-site
- Welding of pipeline strings
- NDT and field-joint coating of welds
- Lowering in of pipeline
- Backfill of pipeline trench
- Cleaning, hydro-testing and drying of pipeline
- Hot tap coordination with the Principal

#### Mechanical and Structural Works

- Facility tubing and valves
- Water piping system
- Nitrogen cylinders and network
- Facility signage, labelling

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## Demobilisation and Commissioning

- Demobilisation and site restoration
- Pre-commissioning and commissioning

There are several existing site-specific procedures in the Jemena Work Health and Safety Management System that are required to be adopted by Wasco into the health and safety arrangements for the Construction Project. The elements which are required to be incorporated into Wasco's safety management system for the delivery of the Construction Project are:

DOCUMENT NUMBER	OWNER	DOCUMENT TITLE
JEM HSE PR 0027	Jemena/Zinfra	Fitness for Work Drug and Alcohol Procedure
GAS-999-PR-HSE-006	Jemena/Zinfra	Permit to Work Procedure;
GAS-999-PR-HSE-007	Jemena/Zinfra	Isolating and Tagging Procedure
GAS-310-PA-HSE-004	Jemena/Zinfra	COVID-19 (Corona Virus) Management Plan
GAS-399-PA-EV-003	Jemena/Zinfra	Operational Environmental Management Plan
GAS-310-PR-EM-001	Jemena/Zinfra	Station Evacuation Procedure
2018-HSS-PLN-002	Wasco	Travel Management Plan
2018-HSS-PLN-003	Wasco	Emergency Response Plan
2018-HSS-PLN-004	Wasco	CARE Plan
2018-HSS-PLN-005	Wasco	COVID-19 Management Plan
WAPL-SYS-REG-004	Wasco	COVID-19 Risk Register
WAPL-HSS-PRC-003	Wasco	Fitness for Work Procedure
WAPL-HSS-PLN-003	Wasco	Fatigue Management Plan
WAPL-HRE-PRC-014	Wasco	Training & Competency Procedure
WAPL-SYS-PLN-001	Wasco	Risk Management Plan
WAPL-SYS-PRC-002	Wasco	Incident Reporting Procedure

## 3. DEFINITIONS AND ABBREVIATIONS

Abbreviation	Definition
ALARP	As Low as Reasonably Practicable
AS/NZS	Australian Standard/New Zealand Standard
CAR	Corrective Action Report
CEMP	Construction Environmental Management Plan
Contract	The agreement between Jemena to carry out the work
Client	Jemena Gas Networks (NSW) Ltd
ELCB	Earth Leakage Circuit Breaker
ERP	Emergency Response Plan
FSA	Formal Safety Assessment
HAZID	Hazard Identification
HAZOB	Hazard Observation System
HSE	Health, Safety and Environment
IMS	Integrated Management System
ISO	International Organisation for Standardisation
ITP	Inspection and Test Plan

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Abbreviation	Definition
KPI	Key Performance Indicator
LTIFR	Lost Time Injury Frequency Rate
MTIFR	Medical Treatment Injury Frequency Rate
NATA	National Association of Testing Authorities
OHS	Occupational Health and Safety
PPE	Personal Protective Equipment
PTW	Permit to Work
RCD	Residual Current Device
RTW	Return to Work
RTWC	Return to Work Coordinator
SDS	Safety Data Sheet (also MSDS)
CSMP	Construction Safety Management Plan
SWL	Safe Working Load
SWMS	Safe Work Method Statement – Procedure for detailing specific requirements for high risk construction activities or designated
Take 5	Personal Task pre-start risk review
VRD	Voltage Reduction Device
Wasco	Wasco (Australia) Pty Ltd

## 4. RELEVANT LEGISLATION

The scope of work defined under this Safety Management Plan is detailed in 2018-PRM-PLN-001 – Project Execution Plan.

### 4.1 LEGISLATION

Legislative updates may occur during the life of the project, which may affect aspects of the project relating to safety requirements or regulations. Wasco subscribes to a Legislation Update and Alert service which provides information of changes as they are implemented, it is the responsibility of the Project Manager to provide updates to the Project and to ensure procedures and policies are appropriately updated and current. The Wasco Integrated Management System requires regular review and updating of legislation, codes of practice and standards.

Particular attention is drawn to the following:

Legislation Title
Work Health and Safety NSW Act 2011
Work Health and Safety NSW Regulations 2017
NSW Gas Supply Act 1996.



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## 5. RESPONSIBILITIES

The scope of work defined under this Safety Management Plan is detailed in 2018-PRM-PLN-001 – Project Execution Plan.

### 5.1 LEADERSHIP AND COMMITMENT

Wasco is committed to the safety, health, and welfare of all stakeholders on the project, and will demonstrate leadership in achieving the highest attainable standards in both the occupational and natural environments. Wasco shall consult with Client, subcontractors, and all personnel engaged on the project, to ensure that all personnel understand and commit to the same health and safety goals and initiatives.

The values supporting this commitment are:

- All injuries are preventable
- All levels of management will encourage involvement and ownership by leading through example
- Adopting safe work practices is a condition of employment
- Employee involvement and consultation is essential
- All levels of management are accountable for managing health and safety issues
- All hazards can be identified, assessed, and controlled; and
- Training employees to work safely is essential.

#### 5.1.1 PRINCIPLE CONTRACTOR RESPONSIBILITIES

Wasco is responsible for the implementation of this CSMP in accordance with the Wasco and J specified objectives on health, safety. We are committed to ensuring we comply with the NSW Work Health and Safety Act 2011 and NSW Work Health and Safety Regs 2017. We will also comply with any other relevant legislation, applicable Codes of Practice and Australian Standards as far as possible.

Wasco shall actively promote and ensure that all Project personnel under their control are fully conversant with this Plan and any incumbent responsibilities.

Wasco shall:

- Ensure the health and safety of its workers and others in our workplace
- Ensure the health and safety of other persons is not put at risk from work carried out as part of its operations
- Provide and maintain a work environment that is without risks to health and safety
- Provide and maintain safe plant and structures
- Provide and maintain safe systems of work
- Ensure the safe use, handling and storage of plant, structures and substances
- Provide adequate facilities for the welfare of workers
- Provide information, training, instruction and supervision
- Monitor the health of workers and the conditions of our workplaces
- Consult so far as reasonably practicable with workers, their representatives and Health and Safety Representatives on work health and safety matters.
- Provide leadership in the implementation of all health and safety initiatives
- Determine the resources necessary to conduct specific activities and achieve project objectives
- Ensure that all operations have been assessed to evaluate the potential presence of risks and hazards that any specified mitigation measures have been implemented
- Develop a construction methodology with due regard for the health and safety
- Ensure mitigation actions agreed as part of the risk assessment process are included in the CSMP, supporting plans and procedures
- Establish sufficient resources for emergency response systems
- Be actively involved in the HSE meetings, audits and reviews; and
- Produce Health and Safety objectives, tasks and targets for the contract.

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### 5.1.2 PROJECT MANAGEMENT TEAM

The Project Management Team consists of the Project Manager, Construction Manager, Project Engineer, HSE Advisor and Brisbane Support Staff. The Project Manager is accountable for the success or failure of health and safety performance for the project.

The Project Management Team has assigned discipline authority and responsibility for establishing the Project Health and Safety objectives, and for ensuring that adequate resources are made available to the Construction supervision to enable these objectives to be achieved.

The Project Management Team is responsible for the implementation of this CSMP in accordance with the Wasco and Jemena specified objectives on health, safety.

The Project Management Team shall actively promote and ensure that all Project personnel under their control are fully conversant with this Plan and any incumbent responsibilities.

The Project Management Team shall:

- Provide leadership in the implementation of all health and safety initiatives
- Determine the resources necessary to conduct specific activities and achieve project objectives
- Ensure that all operations have been assessed to evaluate the potential presence of risks and hazards that any specified mitigation measures have been implemented
- Develop a construction methodology with due regard for the health and safety
- Ensure mitigation actions agreed as part of the risk assessment process are included in the CSMP, supporting plans and procedures
- Establish sufficient resources for emergency response systems
- Provide training to ensure that each member of the project team within their discipline is competent to implement the CSMP
- Be actively involved in the HSE meetings, audits and reviews
- Produce Health and Safety objectives, tasks and targets for the contract.
- each member of the project team within their discipline is competent to implement the CSMP
- Ensure the government approved COVID 19 plan is fully implemented for the project and all project team members are meeting its requirements
- Ensure client-imposed policy, procedure or systems are implemented as instructed

### 5.1.3 PROJECT MANAGER

The Project Manager is accountable to the Client and Wasco Senior Management for the success or failure of health and safety performance.

The Project Manager has ultimate authority and responsibility for establishing compliance with the Health and Safety Policy and Objectives, and for ensuring that adequate resources are made available to the Project Construction Manager to enable these objectives to be achieved.

The Project Manager shall:

- Provide leadership in the implementation of health and safety initiatives
- Determine the resources necessary to conduct specific activities and achieve project objectives
- Ensure that all operations have been assessed to evaluate the potential presence of risk and hazards that any specified mitigation measures have been implemented
- Develop a construction methodology with due regard for the health and safety; and
- Ensure mitigation actions agreed as part of the risk assessment process are included in the CSMP, supporting plans and procedures
- Establish sufficient resources for emergency response systems
- Provide for training to ensure that each member of the project team is competent to implement the CSMP

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- Be actively involved in HSE meetings, HSE audits, HSE inspections and reviews
- Produce HSE objectives, tasks and targets for the contract
- Provide a copy of weekly HSE stats (leading indicators and lagging indicators) to Jemena through the weekly construction report.
- Ensure that personnel assigned to project activities are competent and, via pre-placement medical assessment, are physically fit when engaged to carry out specific work when required and for the duration that is required
- Notify the Wasco Corporate of all near misses and all incident events which involve significant personal injury, which compromise, or which impact the local community. All incidents are to be reported to the Client immediately or as soon as the situation has been stabilised as per Project incident reporting procedures
- Be the primary avenue of communication between Wasco and the Client on HSE matters.
- Develop, in consultation with the Wasco Corporate, terms of reference and decide the composition of the investigating team as appropriate with the designated Regulatory Authority; and
- Review the quality, thoroughness, and adequacy of corrective actions for each investigation.

#### 5.1.4 CONSTRUCTION MANAGER

The Construction Manager is accountable and reports to the Wasco Project Manager for compliance with both company and project health and safety requirements. The Construction Manager has the overriding authority to make decisions with respect to field safety and pollution prevention.

The Construction Manager shall:

- Be responsible for the health and safety issues relating to the construction
- Be responsible for ensuring that sufficient resources are available for the implementation of both this CSMP
- Establish and allocate resources to manage emergencies. This shall include training and regular drills to ensure the preparedness to act on all identified potential emergency scenarios
- Identify and implement any specialised training for the construction crew required in relation to health and safety
- Be responsible for the movement of personnel and all plant and equipment and liaise with the Client Site Representative and Local Authorities in exercising this responsibility (i.e. Police, Local Shire Authorities);
- Be responsible for the implementation of health and safety related procedures during all construction activities
- ensuring that personnel assigned to project activities are competent and, via pre-placement medical assessment, are physically fit when engaged to carry out specific work when required and for the duration that is required
- Select Supervisors from experienced and competent persons
- Encourage hazard identification and reporting by all site personnel to ensure that information gained is used to best effect in ensuring preventative actions are implemented
- Ensure smooth interaction with neighbouring Jemena Operational Team members through coordinated Simultaneous Operations (SIMOPS) meeting as required.
- Cooperate with audits and inspections carried out by Jemena representatives.
- Reports all HSE incidents and near misses to Jemena representative within 24 hours of occurring.
- Ensure all employees and including subcontractors engaged by WASCO are site inducted prior to commencing works on site.
- Maintain copies of licenses, VOC's, and all relevant training records and qualifications on site of all site employees including subcontractors engaged by WASCO.
- Ensure supervision backup during leave rotations and/or absences due to the work cycle rotation stand-by supervisors where required with all appropriate and compulsory training as identified in the Training

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Matrix including requirements by the Client

- Implement disciplinary actions for the breach of Project safety requirements
- Report all incidents to the Project Manager
- Encourage incident reporting by all site personnel to ensure that information gained from the incident is used to best effect in ensuring preventative actions are implemented
- Notify the Project Manager and the Client of all near misses and all incident events which involve significant personal injury, which compromise, or which impact the local community; and
- Ensure that a documented preliminary incident report is completed and provided to the Project Manager within 24 hours of a significant incident
- Inform the Project Manager of the injury or ill health
- Manage all medical emergencies at the construction site in accordance with the approved Emergency Response Plan
- Ensure that each employer (including subcontractors) will only allow employees to return to work strictly in accordance with the directions to resume work of the medical practitioner
- Nominate, in consultation with the Project Manager, a suitably qualified investigation team for any incident requiring submission to a statutory authority
- ensure investigation forms are accurately completed and closed out and involved employees have been informed
- Review the quality, thoroughness and adequacy of corrective actions for each investigation

#### 5.1.5 PROJECT ENGINEER

The Project Engineer is accountable to the Project Manager. The Project Engineer shall be responsible for all factors relating to health and safety on the project, including facilitating the implementation of safety management planning and co-ordination of site safety activities.

The Project Engineer shall ensure that:

- The project CSMP is developed and implemented
- Health and safety requirements are in compliance with all current statutory obligations
- Health and safety requirements are in compliance with Jemena requirements
- Copies of relevant legislation, codes of practice, codes and standards are readily accessible
- Hazards are identified, and risk assessment procedures are instigated
- Subcontractors have suitable experience and knowledge to conduct any potential work scope in compliance with project health and safety requirements
- Plant and Equipment used on the site have completed and passed an appropriate Plant Risk Assessment
- Schedule and audit on project activities and subcontractors
- Performance is monitored, documented and reported to Project Manager
- The CSMP is regularly reviewed and system improvements initiated
- Procedures are established for distribution, reporting and reviewing HSE issues
- Adequate and effective training programs are developed and implemented
- Adequate resources are available for elected health and safety representatives.
- Maintain copies of licenses, VOC's, and all relevant training records and qualifications on site of all site employees including subcontractors engaged by Wasco.

#### 5.1.6 PROJECT ENGINEER

Supervisors are accountable to the Construction Manager. Supervisors shall be responsible for determining the course of actions to be taken, to ensure minimal impact to health and safety.

Supervisors shall:

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- Provide leadership which encourages a consultative interaction with all team members;
- Provide training to team members within the scope of their ability (ie Trade Training and experience);
- Ensure that personnel assigned to project activity are competent and via pre-placement medical assessment are physically fit when engaged to carry out specific work when required and for the duration that is required;
- Assist team members to identify risks and instigate mitigation measures (SWMSs) and record and passed on to the HSE Advisors; ensure that SWMSs are reviewed and signed onto by the assigned workforce;
- Comply with the requirements of this SMP and any applicable legislation or company specific safety requirements;
- Ensure that the personnel under their supervision have an understanding of the specified health and safety requirements and are provided with the necessary instructions and support to perform their tasks in a manner which minimises impact on health and safety;
- Ensure that workers operating machinery are competent and machinery unless inspected for suitability does not unless authorised by Client enter project areas;
- Ensure pre-starts are carried out daily;
- Ensure plant is subject to risk assessment by the operator before use in a new or changed work environment;
- Encourage hazard identification and reporting by all site personnel to ensure that information gained is used to best effect in ensuring preventative actions are implemented
- Data from Hazard Alerts/Observations will be subject to trend analysis and the Client Construction Manager and Client Field HSE Advisors will be advised by the Construction Manager at daily progress meetings as appropriate of trending information;
- Ensure that pre-start checks are documented daily and are carried out on all plant and equipment;
- Ensure the availability and wearing of PPE;
- Encourage incident reporting by all site personnel to ensure that information gained from the incident is used to best effect in ensuring preventative actions are implemented;
- Ensure that the injured employee receives appropriate first aid or medical treatment in the first instance and where required make arrangements for transport to community emergency medical facilities or hospital, when advised of an injury or incident;
- Notify the location HSE Advisor and commence preparation of an Incident Report; and
- Initiate disciplinary actions for the breach of project safety requirements.

#### 5.1.7 PROJECT HSE ADVISOR

- Coordinate the activities of site medical and safety personnel
- Distribute health and safety information
- Coordinate/facilitate field-based inspections and audits on project activities and subcontractors
- Participate in the development of hazard identification and control mechanisms
- Review training records and qualifications to ensure each person is competent to perform tasks associated with their position
- Prepare and implement emergency response training drills and exercises
- Review performance monitoring reports;
- Prepare promotional material for HSE issues
- Provide leadership which encourages a consultative interaction with all team members
- Ensure that personnel assigned to the project activity are competent and via pre-placement medical assessment are physically fit when engaged to carry out specific work when required and for the duration that is required
- Comply with the requirements of this CSMP and any applicable legislation or Wasco / Jemena specific safety requirements
- Ensure that the personnel have an understanding of the specified health and safety requirements and are

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provided with the necessary instructions and support to perform their tasks in a manner which minimises impact on health and safety

- Ensure that workers operating machinery are ticketed and competent
- Ensure pre-start meetings are carried out daily onsite
- Ensure plant is subject to risk assessment prior to being used at the site and is completed by the operator before use in a new or changed work environment
- Encourage hazard identification and reporting by all site personnel to ensure that information gained is used to best effect in ensuring preventative actions are implemented
- Data from Hazard Alerts/Observations will be subject to trend analysis and Jemena will be advised by the Construction Manager at daily progress meetings as appropriate of trending information
- Ensure that pre-start checks are documented daily and are carried out on all plant and equipment
- Ensure the availability and wearing of PPE
- Encourage incident reporting by all site personnel to ensure that information gained from the incident is used to best effect in ensuring preventative actions are implemented
- Ensure that the injured employee receives appropriate first aid or medical treatment in the first instance and where required make arrangements for transport to community emergency medical facilities or hospital, when advised of an injury or incident
- Notify the Project Manager and commence preparation of an Incident Report; and
- Initiate disciplinary actions for the breach of project safety requirements.
- Ensure the government approved COVID 19 plan is fully implemented for the project and all project team members are meeting its requirements
- Ensure client-imposed policy, procedure or systems are implemented as instructed
- Facilitate daily and for cause D&A testing

#### 5.1.8 WORKERS AND SUBCONTRACTORS

All personnel, including subcontractors, are responsible as individuals for their health and safety and the wellbeing of others, in so far as they have some control, either direct or indirect.

Each person shall:

- Be responsible for keeping the workplace in a clean and tidy condition
- Immediately report all incidents/accidents, or other health and safety concerns in the workplace
- Only perform work for which they have been trained
- Comply with the requirements of statutory safety legislation
- Participate in health and safety awareness training
- Comply with, and adhere to health and safety management plans, instruction and procedures
- Take steps to fix, on their own initiative, and report any hazards that are identified at work
- Observe and practice safe work methods
- Correctly use tools, material, personal protective equipment, and pollution controls; and
- Immediately report to their manager or supervisor all injuries, illnesses, safety incidents and near misses, no matter how minor; and
- Ensure that all incidents are reported to Jemena immediately or as soon as the situation has been stabilised.

## 6. ORGANISATION CHART

Refer to 2018-PCO-OGC-001 Organisation Chart.

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## 7. PROJECT SCHEDULE

Work under the contract will commence in accordance with the Project Schedule 2018-PCO-SCH-001.

## 8. PROJECT ACTIVITIES

The Scope of Work includes:

- Mobilisation to Site
- Survey and Set Out
- Clearing, Grubbing and Right of Way preparation
- Earthworks including excavation, preparation of compacted hardstand and pavement, formwork, preparation, steel fixing, pouring of concrete
- Installation of Steel Driven Piles
- Installation of temporary and permanent erosion controls per approved ESC Plan
- Haulage and delivery of pipe to site
- Stringing and Welding
- Trench preparation, Lowering In and Backfill
- As built survey
- Hydrotesting & NDT
- Reinstatement
- Punch Listing
- Installation of Equipment Modules
- Installation of Pile Caps, Supports, Piping
- Electrical works includes all supports, cable pulling, glanding, terminations, Installation bedding, conduit
- Qualified HA inspections and documentation
- Instrumentation works includes all supports, tubing, fitting, leak testing, inspections, and documentation
- Commissioning Assistance



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## 9. NON-COMPROMISING RULES

Wasco 12 Non-Compromising Rules are an important part of our Safety Commitment and it is up to everyone in Wasco and its Sub Contractors to know them, understand them and above all, follow them. Any incident that involves the violation of any of these rules will be thoroughly investigated. Based on the findings of the investigation, any individuals found in breach of the rules will be subject to Wasco's disciplinary policy, up to and including termination.

### 9.1 12 NON-COMPROMISING RULES

1. Protect yourself from a fall when Working at Height
2. Comply with State Laws and Company Policies When Driving
3. Work with a Valid Permit to Work (PTW) When Required
4. Secure Load Prior to Lifting and Transportation
5. Ensure you are not working in the Line of Fire
6. Ensure Positive Identification of All Services prior to Excavation
7. Obtain Authorisation before entering a confined space
8. Ensure you are Fit for Work
9. Always use the Correct PPE for the Task
10. Verify Gas Tests Are Conducted as Per Permit
11. Do Not Use Mobile Phone when operating Vehicles, Plant or Equipment
12. Do Not Enter any Exclusion Zones

Wasco 12 Non-Compromising Rules are key actions to prevent incidents during high risk activities:

- Draw attention to the activities most likely to lead to a serious incident.
- Not intended to address all risks and hazards
- Focused on those things an individual has control over
- Rely on existing company systems being in place

## HOW SHOULD WE USE NON-COMPROMISING RULES?



### Toolbox talks & Safety meetings

Can we learn from incidents that involved a Non-Compromising Rule not being followed?



### Pre-job planning

- Are we doing any work today involving a Non-Compromising Rule?
- How can we follow the Rule from start to finish?
- What needs to be in place?
- Is everything in place, and in good working condition?



### Last minute risk assessment

- Have I done all the Non-Compromising Rules actions?
- Is everything as we discussed in the pre-job planning?
- Are there any Line of Fire hazards or ignition sources we didn't identify?



### Post-job reviews

- Did we take all the actions associated with the Non-Compromising Rules?
- What went well? What didn't go well?
- Anything to note for the next time we have to this perform task or work in this area?



### Observations & walkabouts

- Do you see anyone performing work where a Non-Compromising Rule is relevant?
- Are they following the Rule?
- Yes? Great, recognise it!
- No? Intervene!



### Intervention

- Intervene or stop the work if a Non-Compromising Rule is not being followed



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## 10. OBJECTIVES

The overriding Project objective is ***“zero harm to personnel, the community and the environment”***

The objective of this Construction Safety Management Plan (CSMP) is to establish, maintain and monitor measurable and achievable health and safety objectives and project performance targets consistent with the Wasco Corporate Health and Safety and Policies and those of Jemena.

This CSMP establishes procedures to ensure that the appropriate health and safety standards are maintained during the construction and commissioning phase of the project as determined by law, industry practice and specifically prepared guidelines and risk assessment for the project.

Wasco will provide an environment that is safe and promotes good health for all personnel. The success of this CSMP depends on **all personnel** engaged in company activities establishing and maintaining a positive attitude towards health and safety.

Wasco strives for the highest standard and promotes best practice in occupational health, safety and welfare. Wasco is aware of its responsibility to provide an occupational environment that fosters the well-being of its employees. Accident prevention is an integral part of Wasco management philosophy.

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## 10.1 LAGGING INDICATORS

Measure	Target
Lost Time Injuries	0
Lost Time Injury Frequency Rate	0
Restricted Work Injuries	0
Reportable Injury Frequency Rate	0
Near Misses	0
Vehicle Incidents	0
Notifiable Injuries, Government Notices	0

## 10.2 LEADING INDICATORS

Measure	Target
Take 5	1/person/crew each day
Hazard Eliminations ( Hazob cards)	Where required
Corrective Actions closeout	End of swing
Pre-start Meetings	daily
Audit compliance	90%
Site Inspections	Weekly
Environmental Inspections	Weekly and after each Rain event

## 11. WASCO POLICY STATEMENTS

The Wasco President has prepared and signed Wasco Policy Statements which is the recognition that each member of the Project Team is committed to the content and statements within these policies. Copies of the Wasco policy statements will be displayed at prominent locations at work sites.

Refer to:

- WAPL-HSS-POL-001\_HEALTH AND SAFETY POLICY
- WAPL-HRE-POL-002\_OCCUPATIONAL REHABILITATION POLICY
- WAPL-HSS-POL-004\_CHAIN OF RESPONSIBILITY POLICY
- WAPL-ENV-POL-001\_ENVIRONMENTAL POLICY

## 12. RISK ASSESSMENT AND HAZARD MANAGEMENT

The Project shall establish a multi-layer systems approach that enables the identification of hazards and assessment of risk and hazards associated with construction operations on the Project up to the time the facility is assigned for hand over to the Client, and implement control measures based on a hierarchy of risk control that ensures risk is reduced to as low as reasonable practicable (ALARP).

### 12.1 RISK ACCEPTANCE CRITERIA

The Wasco safety management implementation strategy for the Project is to identify the risks, hazards, consequences and likelihood of occurrence by an analysis of the scope of work prior to mobilisation where practicable.

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The Project Management Team has adopted a risk acceptance criterion based on a rigorous risk identification and assessment process and through implementation of effective mitigation measures to reduce the level of risk associated with the business's activities to ALARP. Project risk acceptance criteria encompass operational, technical, financial, legal, social, humanitarian aspects of the businesses. These risk acceptance criteria are based on the corporate values of Wasco in particular those of personal accountability of all project personnel to ensure that of being recognized as responsible corporate citizens, fulfilling their moral and legal duties. This personal accountability is based on the knowledge and experience of competent and experienced colleagues in assigning sufficient resources to ensure that the identified risks are reduced to ALARP and appropriate control measures are implemented to justify acceptance of the risk.

The term ALARP means that the degree of risk in a particular activity or environment can be balanced against the time, loss, cost and physical difficulty of taking measures to avoid the risk. If these are so disproportionate to the risk that it would be unreasonable for the persons concerned to have to incur them to prevent it, they are not obliged to do so. The greater the risk, the more likely it is that it is reasonable to go to very substantial expense, trouble and invention to reduce it. But if the consequences and the extent of a risk are small, insistence on great expense would not be considered reasonable. It is important to remember that the judgement is an objective one and the size or financial position of the employer is immaterial.

In considering the relationship of probability and consequence to qualitatively define the level of risk associated with a particular hazard and the effectiveness of control measures to mitigate the level of risk associated with a hazard, reasonably practicable measures will have regard to:

- The severity of the hazard or risk in question
- The state of knowledge about the hazard or risk and any ways of removing or mitigating that hazard or risk
- ways to remove or mitigate that hazard or risk; and
- The cost of removing or mitigating that hazard or risk

In assessing the level of risk associated with a Construction hazard the risk ranking process is based on requirements under AS/NZS ISO 31000 Risk Management - Principles and guidelines. In assessing the level of risk associated with a particular construction hazard identified as being associated with a construction process a risk ranking process based on the Wasco Risk Model is to be used consistent with the requirements of the Wasco Risk Management Procedure.

## 12.2 ASSESSMENT OF RISK/HAZARD

Wasco will facilitate a HAZID work shop with relevant Sub contractor and Jemena participation, hazards associated with specific tasks of the project are to be assessed in consultation with involved personnel to utilise their skill, knowledge and experience. Each identified hazard is to be assessed against the agreed Wasco's Risk Model for application of Risk Ranking. The identified hazards are to be tabulated against the qualitative Risk Ranking with the agreed control strategies listed. The Risk Model forms part the Project Construction Risk Assessment Register.

Where a hazard is identified, the risk of injury or harm to a person, damage, loss or activity interruption at the project site is to be assessed as a matter of priority.

In assessing the level of risk, the following processes are to be carried out:

- Identification of Injury/Illness, Environmental Impact, Societal or other loss potential and consequence.
- Assessment of the level of risk by considering the frequency of potential occurrence, duration of the event and loss severity or consequence.
- Prioritise control measures necessary to manage the identified hazard and assessed level of risk.
- Matters to be considered include:
  - Type of hazard
  - Size and layout of project work site

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- Frequency of potential hazard
- The situation or events in combination of circumstances that may give rise to the hazard
- Consequences of injury or loss likely to occur as a result of being exposed to the hazard
- Number of employees potentially exposed to the hazard and location (i.e. remote area)
- Distance to available emergency services
- Systems of emergency communication for personnel in remote locations; and
- Health and Safety information available on site (i.e. Material Safety Data Sheets).

### Construction processes and their hazards

Process	Hazards and Issues	Typical Management and Control Strategies
Survey	<ul style="list-style-type: none"> <li>• Working alone</li> <li>• Driving</li> <li>• Weather exposure</li> <li>• Unsupervised remote work</li> <li>• Poor communications</li> <li>• Natural hazards</li> <li>• Fauna, stock, snakes</li> <li>• Poor communications</li> <li>• Long work cycles</li> </ul>	<ul style="list-style-type: none"> <li>• Remote Work Procedures</li> <li>• SWMS</li> <li>• Appropriate communications equipment</li> <li>• Check-in processes</li> <li>• Well-equipped vehicles</li> <li>• Maps, GPS</li> <li>• PPE</li> </ul>
Protection of the Public	<ul style="list-style-type: none"> <li>• Excavations</li> <li>• Plant and machinery</li> <li>• Access to construction sites</li> <li>• Vehicle access</li> <li>• Hazards associated with welding activities</li> <li>• Crossing roads, railways etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Security of plant and equipment</li> <li>• Signage</li> <li>• Barricading and barriers</li> <li>• Traffic management Plan</li> <li>• Notifications and planning</li> <li>• Training of personnel</li> <li>• Qualifications of personnel</li> <li>• Security personnel (Where required)</li> <li>• Identification of high-risk areas/locations</li> <li>• Barriers</li> </ul>
Fencing	<ul style="list-style-type: none"> <li>• Working alone</li> <li>• Natural hazards</li> <li>• Poor communications</li> <li>• Electric fences, barb wire</li> <li>• Fauna and stock, snakes</li> <li>• Use of chainsaws</li> <li>• Walking on uneven ground</li> <li>• Dehydration</li> <li>• Overhead and underground hazards</li> </ul>	<ul style="list-style-type: none"> <li>• SWMS</li> <li>• Radio contact</li> <li>• First aid kits and qualifications</li> <li>• Adequate water</li> <li>• PPE including gloves</li> <li>• Manual Handling training</li> <li>• DBYD</li> <li>• Trained drivers</li> <li>• Vehicle equipment/ setup and spares</li> <li>• Call-in procedures</li> </ul>

Process	Hazards and Issues	Typical Management and Control Strategies
Site Communication	<ul style="list-style-type: none"> <li>• Lack of understanding of procedures</li> <li>• Errors and incidents</li> <li>• Poor emergency response</li> </ul>	<ul style="list-style-type: none"> <li>• Inductions</li> <li>• Prestart Meetings</li> <li>• Records</li> <li>• Newsletters</li> <li>• Toolbox meetings</li> <li>• Committee Meetings and distribution of minutes</li> <li>• Supervisor Meetings</li> <li>• Hazard reports/alerts</li> </ul>
Use of Plant and loading and unloading	<ul style="list-style-type: none"> <li>• Plant defects</li> <li>• Pinch points</li> <li>• Crush points</li> <li>• Noise exposure</li> <li>• Dust exposure</li> <li>• Rollover</li> <li>• injury</li> </ul>	<ul style="list-style-type: none"> <li>• Shut down plant for maintenance</li> <li>• Plant risk assessments conducted</li> <li>• Plant noise surveys</li> <li>• Wheeled plant to be fitted with ROPS</li> <li>• Sealed cabins</li> <li>• PPE and hearing protection</li> <li>• Guarding</li> <li>• Emergency stops</li> <li>• LUEZ Exclusion zones</li> <li>• SWMS</li> <li>• Powerlines marked; vehicle heights and crane reach known</li> <li>• Qualified and experienced dogmen and operators</li> <li>• Areas kept clear where lifting activities take place</li> <li>• Test loads</li> <li>• Lifting equipment inspections and registers</li> <li>• Stable areas nominated for Laydown</li> <li>• No one in the line of fire /Personnel clear of the fall zone</li> <li>• PPE includes good footwear, gloves and hardhats</li> <li>• Transport Management Plan</li> <li>• First aid kits and qualified personnel in crew</li> <li>• Observe maximum working at heights limits</li> </ul>
Clear and Grade/Civils	<ul style="list-style-type: none"> <li>• Overhead and underground hazards</li> <li>• Dust</li> <li>• Poor visibility</li> <li>• Poor ground conditions</li> <li>• Personnel in vicinity</li> <li>• Stranding/Breakdown</li> </ul>	<ul style="list-style-type: none"> <li>• SWMS</li> <li>• DBYD</li> <li>• PPE</li> <li>• Radio communications in all vehicles</li> <li>• Signage on powerlines, catenary wires</li> <li>• Check ground conditions</li> <li>• Inductions, trained and competent personnel</li> <li>• First aid kits and qualifications in crew</li> <li>• Check area before reversing or slewing</li> <li>• Vehicle setup and spares</li> <li>• Checking procedures</li> </ul>

Process	Hazards and Issues	Typical Management and Control Strategies
Pipe Stringing and Loadout	<ul style="list-style-type: none"> <li>Overhead hazards due lifting, carrying, strapping, rigging</li> <li>Crushing</li> <li>Swinging pipe</li> <li>Dropped loads</li> <li>Rolling pipe</li> <li>Trips, slips, falls</li> <li>Wet, uneven and/or slippery surfaces</li> </ul>	<ul style="list-style-type: none"> <li>SWMS</li> <li>Powerlines marked; vehicle heights and crane reach known</li> <li>Qualified and experienced dogmen and operators</li> <li>Areas kept clear where lifting activities take place</li> <li>Test loads</li> <li>Lifting equipment inspections and registers</li> <li>Stable areas nominated for pipe locations</li> <li>Hands clear of pipe the pipe</li> <li>PPE includes good footwear, gloves and hardhats</li> <li>Transport Management Plan</li> <li>Exclusion zones</li> <li>First aid kits and qualified personnel in crew</li> <li>Observe maximum working at heights limits</li> <li>Personnel clear of the fall zone of pipe</li> </ul>
Pipe cutting	<ul style="list-style-type: none"> <li>Crushing</li> <li>Falls from height</li> <li>Swinging pipe</li> <li>Trips, slips, falls</li> <li>Wet, uneven and/or slippery surfaces</li> <li>Burns</li> <li>Fire</li> </ul>	<ul style="list-style-type: none"> <li>SWMS</li> <li>PPE including gloves</li> <li>Double eye protection</li> <li>First aid kits and qualified personnel in crew</li> <li>Qualified and experienced dogmen and operators</li> <li>Personnel clear of the fall zone of pipe</li> <li>Ensure stable pipe support for cutting pipe</li> </ul>
Trenching including exposing buried services by hand	<ul style="list-style-type: none"> <li>Slips, trips, falls</li> <li>Electricity</li> <li>Manual handling</li> <li>Overhead hazards</li> <li>Underground hazards</li> <li>Dust</li> <li>Snakes, fauna</li> <li>Trench collapse</li> <li>Wet, uneven and/or slippery surfaces</li> </ul>	<ul style="list-style-type: none"> <li>SWMS</li> <li>Powerline signage</li> <li>DBYD</li> <li>First aid kits and qualified personnel in crew</li> <li>Remain clear of machines when starting</li> <li>Awareness of exposed moving parts</li> <li>Guarding to remain in place</li> <li>Remain safe distances from working machinery</li> <li>PPE to include hearing protection and safety glasses</li> <li>Persons setting range poles to be clear of and aware of ditching m/c</li> <li>No entering trenches &gt;1.5m</li> <li>Personnel to remain clear of trench edges</li> <li>Isolate machines for maintenance</li> </ul>

Process	Hazards and Issues	Typical Management and Control Strategies
Excavations	<ul style="list-style-type: none"> <li>• Public, personnel and fauna injury</li> <li>• Traffic hazards</li> <li>• Night-time hazards</li> <li>• Underground services such as power, water, telecommunications</li> <li>• Pipe damage</li> <li>• Confined space</li> </ul>	<ul style="list-style-type: none"> <li>• Barricading and barriers</li> <li>• Plant risk assessments conducted</li> <li>• Remain clear of machines when starting</li> <li>• Awareness of exposed moving parts</li> <li>• Guarding to remain in place</li> <li>• Remain safe distances from working machinery</li> <li>• PPE to include hearing protection and safety glasses</li> <li>• Notification</li> <li>• Minimise open trench</li> <li>• Procedures and processes to avoid trench entry</li> <li>• Lighting</li> <li>• Surveillance and/or security</li> <li>• Shoring</li> <li>• Minimise trench depth where possible</li> </ul>
Piling	<ul style="list-style-type: none"> <li>• Falling objects</li> <li>• Dropped loads</li> <li>• Swinging objects</li> <li>• Underground services</li> <li>• open penetration</li> <li>• Noise</li> <li>• Un authorised entry</li> <li>• Hammering</li> <li>• Line of fire</li> <li>• Crushing</li> <li>• Sparks, buffer wire, burrs</li> <li>• Broken grinding discs</li> <li>• Grinder kickback</li> <li>• Air pressure hoses</li> <li>• Slips, trips, falls</li> <li>• Eye injuries- dust, particles, weld flash</li> <li>• Burns</li> <li>• Fire</li> <li>• Oxygen and acetylene</li> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>• Signage, Barricading and barriers</li> <li>• Plant risk assessments conducted</li> <li>• Remain clear of machines when starting</li> <li>• Awareness of exposed moving parts</li> <li>• Guarding to remain in place</li> <li>• Remain safe distances from working machinery</li> <li>• PPE to include hearing protection gloves, double eye protection, Welding ppe</li> <li>• Notification</li> <li>• All Penetrations to be barricaded or covered</li> <li>• Procedures, SWMS</li> <li>• Surveillance and/or security</li> <li>• Supervision and qualified tradesman</li> <li>• Spotters</li> <li>• Qualified and experienced dogmen and operators</li> <li>• Areas kept clear where lifting activities take place</li> <li>• Test loads</li> <li>• Lifting equipment inspections and registers</li> <li>• Stable areas nominated for Laydown</li> <li>• No one in the line of fire /Personnel clear of the fall zone</li> <li>• Transport Management Plan</li> <li>• First aid kits and qualified personnel in crew</li> <li>• Observe maximum working at heights limits</li> <li>• LUEZ Exclusion zones</li> <li>• Pre-use inspections for equipment and cables</li> <li>• Flash Arrestors</li> </ul>



Process	Hazards and Issues	Typical Management and Control Strategies
Noise	<ul style="list-style-type: none"> <li>• Public complaints</li> <li>• Noise induced hearing loss</li> </ul>	<ul style="list-style-type: none"> <li>• Mufflers and attenuation</li> <li>• PPE</li> <li>• Substitution</li> <li>• Procedures</li> <li>• Exposure times minimised</li> </ul>
Welding, cutting and Tie-ins	<ul style="list-style-type: none"> <li>• Falling or swinging pipe</li> <li>• Springing pipe – pipe movement</li> <li>• Crushing</li> <li>• Sparks, buffer wire, burrs</li> <li>• Broken grinding discs</li> <li>• Grinder kickback</li> <li>• Air pressure hoses</li> <li>• Slips, trips, falls</li> <li>• Eye injuries- dust, particles, weld flash</li> <li>• Burns</li> <li>• Fire</li> <li>• Oxygen and acetylene</li> <li>• Electrical hazards (overhead, underground)</li> <li>• Manual handling</li> <li>• Wet, uneven and/or slippery surfaces</li> </ul>	<ul style="list-style-type: none"> <li>• SWMS</li> <li>• No standing between pipe and boom</li> <li>• First aid kits and qualified personnel in crew</li> <li>• PPE includes gloves, double eye protection, anti-flash safety glasses</li> <li>• Pre-use inspections for equipment and cables</li> <li>• Firefighting equipment</li> <li>• Water tank</li> <li>• Secure and stable skid piles</li> <li>• Cap unattended pipes</li> <li>• Earthing of pipe</li> </ul>
Blasting and Field Joint coating	<ul style="list-style-type: none"> <li>• Abrasive blasting</li> <li>• Pressure hazards</li> <li>• Dust</li> <li>• Chemicals</li> <li>• Manual handling</li> <li>• Air quality</li> <li>• Fire/explosion</li> <li>• Air pressure hoses</li> <li>• Slips, Trips and falls</li> <li>• Chemical fumes and skin exposure</li> <li>• Fire</li> <li>• Static electricity</li> <li>• Wet, uneven and/or slippery surfaces</li> </ul>	<ul style="list-style-type: none"> <li>• SWMS</li> <li>• Personnel to be clear of grit blasting area</li> <li>• First aid kits &amp; qualified personnel in crew</li> <li>• PPE to include safety glasses and blasting helmet</li> <li>• Ventilation suit with filter and air intakes clear</li> <li>• Pre-use inspection checks</li> <li>• Certified blasting equipment</li> <li>• Use less hazardous blasting medium</li> <li>• Hose fittings, dead man switches, whip checks, etc.</li> <li>• Housekeeping practices</li> <li>• SDSs, Chemical handling procedures</li> <li>• Manual handling training</li> <li>• PPE to include those required by SDS</li> <li>• Fire extinguishers</li> <li>• No smoking in vicinity of flammable chemicals</li> <li>• Job rotation</li> </ul>



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Process	Hazards and Issues	Typical Management and Control Strategies
Lower-in	<ul style="list-style-type: none"> <li>• Overhead hazards</li> <li>• Falling pipe</li> <li>• Crushing</li> <li>• Slips, Trips, Falls</li> <li>• Wet, uneven and/or slippery ground</li> <li>• Electricity</li> <li>• Open trench, trench collapse</li> </ul>	<ul style="list-style-type: none"> <li>• SWMS</li> <li>• First aid kits and qualified personnel in crew</li> <li>• Powerlines marked</li> <li>• No standing between pipe and boom</li> <li>• Spotters as necessary</li> <li>• Lifting equipment register</li> <li>• Pre-use inspections</li> <li>• PPE to include hard hats</li> <li>• Earthing strings</li> <li>• Trained in use of Jeeper</li> <li>• No entry to trench &gt;1.5 m</li> </ul>
Bedding, Padding, Backfill	<ul style="list-style-type: none"> <li>• Overhead hazards</li> <li>• Open trench, trench collapse</li> <li>• Dust</li> </ul>	<ul style="list-style-type: none"> <li>• Procedures and SWMS</li> <li>• First aid kits and qualified personnel in crew</li> <li>• No entry to trench &gt;1.5 m</li> <li>• Spotters</li> <li>• PPE to include safety glasses and dust masks</li> </ul>
Reinstatement	<ul style="list-style-type: none"> <li>• Overhead hazards</li> <li>• Moving plant</li> <li>• Fire</li> <li>• Uneven ground</li> </ul>	<ul style="list-style-type: none"> <li>• Procedures and SWMS</li> <li>• First aid kits and qualified personnel in crew</li> <li>• Reversing alarms, flashing lights</li> <li>• Marking of powerlines</li> <li>• PPE to include hearing protection</li> <li>• Eye contact with operators</li> <li>• Ensure area clear before operating equipment</li> <li>• Fire extinguishers</li> <li>• Water tank where required</li> <li>• Plant pre-use inspections</li> <li>• Assess area for hazards (e.g. excessive slope, rocks, slippery conditions, muddy conditions)</li> </ul>

Process	Hazards and Issues	Typical Management and Control Strategies
Clean and Dry Pipe and test	<ul style="list-style-type: none"> <li>Chemicals and fuel</li> <li>Slips Trips Falls</li> <li>Electricity</li> <li>Working in Bellholes</li> <li>Manual handling</li> <li>Welding (see above)</li> <li>High pressure hoses</li> </ul>	<ul style="list-style-type: none"> <li>Procedures and SWMS</li> <li>Appropriately rated whip checks</li> <li>Correctly rated hoses</li> <li>SDSs</li> <li>Fire extinguishers</li> <li>Pre-use inspections</li> <li>Emergency plan for site</li> <li>Tested and tagged equipment</li> <li>Lifting aids such as cranes</li> <li>Radio communications</li> <li>Monitoring of pressures</li> <li>Signage and barricading of the area</li> <li>Access and egress from bellhole</li> <li>Earthing</li> <li>Secure the area</li> </ul>
NDT	<ul style="list-style-type: none"> <li>Radiation exposure</li> <li>Radiation Sources</li> <li>Chronic health effects</li> <li>Long term illness and /or death</li> </ul>	<ul style="list-style-type: none"> <li>Procedures and SWMS</li> <li>First aid kits and qualified personnel in crew</li> <li>Radiation Management Plan</li> <li>Trained and qualified personnel</li> <li>Signage</li> <li>Barriers</li> <li>Training and induction of personnel</li> <li>Radiation monitoring</li> </ul>
Refuelling	<ul style="list-style-type: none"> <li>Fire</li> <li>Explosion</li> <li>Slips, trips Falls</li> <li>Spills</li> </ul>	<ul style="list-style-type: none"> <li>SWMS</li> <li>No source of combustion within 20m of refuelling activity</li> <li>Earthing</li> <li>SDS</li> </ul>
Fire Protection	<ul style="list-style-type: none"> <li>Bushfire, property damage, environmental damage</li> </ul>	<ul style="list-style-type: none"> <li>Firefighting equipment such as water carts, fire extinguishers,</li> <li>Clearing (where permitted)</li> <li>Training and induction</li> <li>Liaison and consultation with authorities</li> <li>Liaison and consultation with Jemena and councils</li> </ul>

Process	Hazards and Issues	Typical Management and Control Strategies
Power lines and Adjacent Infrastructure Including Underground Piping	<ul style="list-style-type: none"> <li>Induced voltage</li> <li>Touch and Step potential</li> <li>Fault currents</li> <li>Electrical storms and lighting</li> <li>Excavations hitting services</li> </ul>	<ul style="list-style-type: none"> <li>Identification of power lines and underground services on Alignment sheets</li> <li>DBYD</li> <li>Catenary wires and Flagging</li> <li>Notification to power authorities</li> <li>Supervision</li> <li>Working outside Exclusion zones</li> <li>Procedures for working in storms</li> <li>Earth mats</li> <li>Engineering review of work adjacent to or under power lines</li> <li>Spotters</li> </ul>
Working in Hazardous Area/Facility	<ul style="list-style-type: none"> <li>Live gas environments</li> <li>Live electrical equipment</li> <li>Unidentified hazards</li> <li>Simops</li> </ul>	<ul style="list-style-type: none"> <li>High Risk Work Permit</li> <li>Supervision</li> <li>Procedures</li> <li>SWMS</li> <li>Gas monitoring</li> <li>Barricading, fencing,</li> <li>Identification of high-risk areas/locations</li> <li>Authorised personnel</li> <li>Inductions</li> <li>Notifications and planning</li> <li>Spotters for mobile equipment</li> </ul>
Electrical Equipment and Electrical installation	<ul style="list-style-type: none"> <li>Electric shock</li> <li>Pinch injuries</li> <li>Hand tools</li> <li>Power tools</li> <li>Load handling</li> <li>Sharp objects</li> </ul>	<ul style="list-style-type: none"> <li>Electrical licenced personnel</li> <li>Procedures</li> <li>SWMS</li> <li>Permit To Work</li> <li>Pre-use inspections for equipment and cables</li> <li>Earthing</li> <li>Portable RCDs, including testing</li> <li>Housekeeping</li> <li>Test and tagging program</li> <li>Lock out Tagout</li> <li>Resuscitation qualified electrical personnel</li> <li>All electric leads kept dry</li> <li>All electric leads kept insulated</li> <li>Avoid live work situations</li> <li>Test for Dead</li> <li>DBYD</li> <li>Protect overhead cables</li> <li>PPE –cut 5 gloves</li> <li>Maintain safe clearances – exclusion zones</li> </ul>

Process	Hazards and Issues	Typical Management and Control Strategies
Lifting of Materials/Units	<ul style="list-style-type: none"> <li>Falling objects</li> <li>Dropped loads</li> <li>Swinging objects</li> </ul>	<ul style="list-style-type: none"> <li>SWMS</li> <li>Lift Plans where required</li> <li>Certified lifting equipment</li> <li>PPE</li> <li>Inspection of equipment</li> <li>Use of correctly rated equipment</li> <li>Training, Qualified personnel</li> <li>Procedures</li> <li>Minimise required access to height</li> <li>Spotters</li> <li>Drop Zones</li> </ul>
Form work /Concreting	<ul style="list-style-type: none"> <li>Muscular Skeletal Injuries due to:</li> <li>Posture strain</li> <li>Repetitive strain</li> <li>Vibration</li> <li>Crushing injuries</li> <li>Pinch injuries</li> <li>Hand tools</li> <li>Power tools</li> <li>Load handling</li> <li>Sharp objects</li> <li>Mobile plant</li> <li>Pumps</li> <li>Concrete Burns</li> </ul>	<ul style="list-style-type: none"> <li>SWMS</li> <li>Assess area for hazards</li> <li>clear access/egress</li> <li>PPE – gloves</li> <li>Load handling – team lifting</li> <li>Mechanical devices</li> <li>Rotate tasks</li> <li>Caps on reo-bars/star pickets</li> <li>Reversing alarms, flashing lights</li> <li>Appropriately rated whip checks</li> <li>Correctly rated hoses</li> <li>SDSs</li> <li>Spotters/ Positive communication</li> <li>Delineated work area</li> <li>Correct PPE as identified on SDS</li> </ul>
General Labouring	<ul style="list-style-type: none"> <li>Strains</li> <li>Sprains</li> <li>Work at height</li> <li>Slips, trips and falls</li> <li>Manual handling injuries (cuts and abrasions)</li> </ul>	<ul style="list-style-type: none"> <li>SWMS</li> <li>Task assessments/Take5s</li> <li>Pre-employment medicals</li> <li>First aid kits and qualified personnel in crew</li> <li>Rotate tasks</li> <li>Mechanical Lifting devices</li> <li>Procedures</li> <li>Load handling – team lifting</li> <li>Develop alternative handling techniques and use of equipment</li> </ul>

Process	Hazards and Issues	Typical Management and Control Strategies
Mechanical Equipment	<ul style="list-style-type: none"> <li>Falling objects</li> <li>Dropped loads</li> <li>Swinging objects</li> <li>Pinch injuries</li> <li>Hand tools</li> <li>Power tools</li> <li>Load handling</li> <li>Sharp objects</li> </ul>	<ul style="list-style-type: none"> <li>SWMS</li> <li>Lift Plans where required</li> <li>Certified lifting equipment</li> <li>PPE</li> <li>Inspection of equipment</li> <li>Use of correctly rated equipment</li> <li>Training, Qualified personnel</li> <li>Procedures</li> <li>Minimise required access to height</li> <li>Spotters</li> <li>Drop Zones</li> </ul>
Mechanical /bolt up	<ul style="list-style-type: none"> <li>Strains</li> <li>Sprains</li> <li>Work at height</li> <li>Slips, trips and falls</li> <li>Manual handling injuries (cuts and abrasions)</li> <li>Vibration</li> <li>Crushing injuries</li> <li>Pinch injuries</li> <li>Hand tools</li> <li>Power tools</li> </ul>	<ul style="list-style-type: none"> <li>SWMS</li> <li>Task assessments/Take5s</li> <li>Pre-employment medicals</li> <li>First aid kits and qualified personnel in crew</li> <li>Rotate tasks</li> <li>Mechanical lifting devices</li> <li>clear access/egress</li> <li>PPE – gloves</li> <li>Qualified personnel</li> </ul>
High pressure, Air hoses and high-pressure equipment	<ul style="list-style-type: none"> <li>Eye and other serious injuries</li> <li>Flailing equipment</li> <li>Noise exposure</li> </ul>	<ul style="list-style-type: none"> <li>SWMS</li> <li>Task assessments/Take5s</li> <li>Safety clips in place</li> <li>Safety valves</li> <li>Maintenance program</li> <li>Pre-inspection checks</li> <li>Hose inspections</li> <li>Cylinders stored correctly</li> <li>Pressure gauges checked</li> <li>Appropriate whip checks (Stainless steel or 'stocking' type) keepers, chains, slings, and proprietary special couplings</li> </ul>

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Process	Hazards and Issues	Typical Management and Control Strategies
Falls from Height	<ul style="list-style-type: none"> <li>• Injury</li> <li>• Death</li> </ul>	<ul style="list-style-type: none"> <li>• Eliminate the need to work at heights</li> <li>• Fall prevention devices</li> <li>• Work positioning systems</li> <li>• Fall arrest systems</li> <li>• Training in requirements</li> <li>• Supervision</li> <li>• ERP</li> </ul>
Handling of Chemicals	<ul style="list-style-type: none"> <li>• Spillage</li> <li>• Chemical exposure</li> <li>• Fire</li> <li>• Injury</li> <li>• Environmental damage</li> </ul>	<ul style="list-style-type: none"> <li>• Procedures and Manifests</li> <li>• Compliance with legislative requirements</li> <li>• SDS</li> <li>• Correct storage</li> <li>• Handling procedures</li> <li>• PPE</li> <li>• Material handling equipment</li> <li>• Signage</li> <li>• Training</li> </ul>
Hazard/Incident Reporting & Investigations	<ul style="list-style-type: none"> <li>• Lack of learning from incidents</li> </ul>	<ul style="list-style-type: none"> <li>• Reporting procedures</li> <li>• Training and induction</li> <li>• Records</li> <li>• Investigation processes</li> <li>• Corrective action database/list</li> <li>• Responsibilities assigned</li> </ul>
Management of Change	<ul style="list-style-type: none"> <li>• Lack of review of implications when changing process and plant</li> </ul>	<ul style="list-style-type: none"> <li>• Procedures</li> <li>• SWMS and SWMS review</li> <li>• Review of change implications prior to implementation</li> <li>• Communication of change</li> <li>• Document control processes</li> </ul>
Competency	<ul style="list-style-type: none"> <li>• Incidents and injury</li> <li>• Inefficient processes</li> <li>• Property and equipment damage</li> </ul>	<ul style="list-style-type: none"> <li>• Pre-employment processes</li> <li>• Interview and/or reference checks</li> <li>• On-the-job evaluation of skills</li> <li>• Inductions, Training records</li> <li>• Development of skills matrices</li> <li>• Training programs</li> </ul>

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Process	Hazards and Issues	Typical Management and Control Strategies
Fitness for Work	<ul style="list-style-type: none"> <li>• Personnel putting themselves and others at risk</li> <li>• Impaired judgement</li> <li>• Fatigue</li> <li>• Safety of the worker and others</li> </ul>	<ul style="list-style-type: none"> <li>• Evaluation of cycle breaks in early stages of project development</li> <li>• Fit for Work policies</li> <li>• Rehabilitation services</li> <li>• Provision of exercise facilities</li> <li>• Management of hours of work</li> <li>• Management of extremes of climate</li> <li>• Camp/accommodation</li> <li>• Fatigue minimization measures</li> <li>• Drug and Alcohol policies and procedures</li> <li>• Pre-employment screening</li> <li>• Drug and alcohol testing programs</li> <li>• Supervisor and worker education and awareness</li> </ul>

### 12.3 HIERARCHY OF RISK REDUCTION MEASURES

The approach to hazard control is based on selecting control methods from highest controls to least desirable controls as follows:

- Elimination
- Substitution/Isolation
- Engineering Controls
- Administrative Controls; then
- Personal Protective Equipment Controls

### 12.4 IDENTIFICATION AND ASSESSMENT METHODOLOGY

The Project Construction Manager, in consultation with the Client and Project Manager, will develop a base line Construction Risk Assessment Register for hazards identified for each project construction activity. The Construction Risk Assessment Register will be used to establish the means for setting priorities for the implementation of existing risk controls and developing additional controls to minimise potential hazards and risk for non-routine risk potential. The Construction Manager shall maintain the Construction Risk Assessment register as a Live Document. Where changes are being made, the Construction Manager shall inform the Client Representative of the changes

The register to be reviewed following any significant incidents. with the hazard source and corrective action entered into the Project Corrective Actions Register.

The Construction Manager will ensure that relevant parts of the Construction Risk Assessment Register are distributed to crew Supervisors as part of a work pack and be updated regularly for reference during SWMS.

The Construction Risk Assessment Register or relevant parts of it will be reviewed by Wasco with the Clients Representative as required with the site Management Team as part of the HSE standing agenda item during project weekly construction meeting.

The consequences and likelihood of occurrence of each hazard have been assessed in accordance with the agreed Client Risk Model. Control strategies have been developed in line with the Hierarchy of Hazard

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Control(s) to either eliminate the occurrence of the hazard, and/or minimise the risk to the Low or Moderate region of the Risk Model (where ALARP is assumed).

The methodology used for hazard identification and risk assessment is dependent on the required level of control and may include one or a combination of any of the following:

- Hazard/Incident Reporting
- SWMS
- Workplace Inspections
- Audits
- Construction Hazard Identification (HAZID) Workshops; and
- Construction Hazard eliminations (HAZOB Cards).

## 12.5 SWMS

The Project Management Team and each work crew supervisor will carry out task specific SWMS for all construction work processes and implement minimisation strategies for the hazards identified.

The Construction Manager shall ensure that all employees are to review the SWMS immediately prior to any new or changed work activity. This SWMS is to be conducted with each employee involved in the work activity when the work activity is conducted for the first time or where change has occurred in the construction process or receiving environment. The consequences and likelihood of occurrence of each hazard identified during task risk assessment will be assessed in accordance with the Wasco Risk Matrix.

In confirming the establishment of a Safe System of Work, all persons reviewing a SWMS are to sign off on the SWMS to confirm that they have understood the risks and controls with the task, have through Supervision and to the best of their ability, undertaken a risk assessment identified change that may constitute a hazardous situation. The Construction Manager, HSE Advisor, and Project Manager will sign off the SWMS before work commences. The signed SWMS will be kept with the Supervisor in a workpack on the job the SWMS will be revised if any changes are to be made.

In signing off on a SWMS, personnel will be acknowledging acceptance on their individual Duty of Care as per statutory requirements. No person, at any time will be requested by Supervision to commence an assigned task until they have signed off on the SWMS.

The Construction Manager will ensure that any person entering into the general area of the workplace activity who will be unsupervised (e.g. fuel truck driver, field fitter) and is not part of the designated work crew are required to review the SWMS and the Pre-start minutes and sign on to confirm their awareness of the general hazards and work activity. Where an activity is being carried out under a Permit to Work, persons other than visitors will also be required to sign on and off the Work Permit as appropriate. Alternatively, as a visitor not permitted to undertake any work activity, a person may remain in the area for a short period of time under the direct supervision of one of the work crew (delegated by the Crew Supervisor) who has signed onto the SWMS and is aware of the current construction process and receiving working environment. Visitors under supervision must still be briefed and sign onto the Pre-start minutes.

The Project Management Team will maintain a site/project SWMS Register and provide relevant and updated copies of Standard Operating Procedures/Work Instructions and relevant sections of the Project Hazard Register to work crew Supervisors as part of their Work Pack.

Where Chemical Substances, Hazardous Substances or Dangerous Goods are in use as part of a task, the crew Supervisor is to ensure that SDS information is reviewed during the SWMS process and a copy of the SDS information is attached to the completed SWMS to confirm that employees involved in the task have been made aware of the requirements to safely use the chemicals concerned.

The HSEs Supervisor will provide relevant copies of SDS information available to work crew Supervisors.



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## 12.6 TAKE 5

Take 5s is an on-the-job personal risk assessment tool, which allows personnel to stop and look for hazards, before commencing tasks. Using the take 5 steps, the identified hazards are assessed for the risks they may impose and then steps are taken to manage those risks.

1. Stop, step back and think
2. Identify the hazard
3. Assess the risk
4. Control the hazard(s)
5. Proceed safely

The Take 5s are reviewed by the Manager or delegate, Updates to the SWMS and Project Risk Register is undertaken if required.

## 12.7 CONSTRUCTION HAZARD ELIMINATIONS (HAZOB CARDS)

A hazard report card is used when workers have identified a potential hazard that cannot be simply and immediately fixed.

A hazard report card shows:

- What is the hazard?
- What are the potential risks if left untreated?
- What controls can be implemented to eliminate, or control the risks, to a level that is acceptable to all parties exposed to the current hazard

Hazobs are reviewed by the Manager or delegate, the Project Engineer enters them into the Corrective Action Hazard Register. All Hazard to be communicated to Jemena for input into Jemena Aspire system. Supervisors must discuss potential controls with all workers involved to allow for open consultation, and always to eliminate the hazard.

Once all the controls have been implemented management should monitor the changes and make sure that:

- It has been discussed with all parties involved, and
- It has been controlled to a level acceptable by all parties involved, and
- It has not created any new issues.

If, after review of the changes, that the hazard has been effectively controlled, the form can be signed off.

## 12.8 HAZARD AND RISK COMMUNICATION

The Construction Risk Assessment Register is made available by the Construction Manager to all personnel and referenced during induction training regarding its implications on project work activity. The Construction Risk Assessment Register is maintained as current by the Project Management Team and relevant sections of Construction Risk Assessment Register is provided for review by crew Supervisors during review of task specific SWMSs.

The primary method of in field Hazard and Risk communication on site is through the SWMS. This analysis requires that each Supervisor and all members of the work crew be involved in the identification and controlling hazards and risk on site by actively participating in the development of the SWMS.

Hazards identified and assessed during construction or as part of the project inspection and audit program are to be entered on the Construction Risk Assessment Register by the Project Management Team under the

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Supervision of the Project Construction Manager. Hazards and their control measures and updates to the Construction Risk Assessment Register will be discussed with site personnel during Toolbox Meetings by the Construction Manager with assistance provided by the Supervisors

### 13. SELECTION OF PERSONNEL, COMPETENCY AND TRAINING

The Wasco Project Team has the responsibility to ensure its management, supervision and employees have the necessary skills and knowledge and are competent to advise and enforce compliance of this CSMP.

In understanding the requirements for employee selection, competency and training it is important to recognise that almost all personnel involved in construction, operation and maintenance can create a hazard if they are not competent, qualified and suitably trained to carry out their role.

The Project Manager, in consultation with the Construction Manager, will assess and plan the human resource requirements of the project to ensure personnel are suitably fit, competent and have the necessary personal safety attributes for the tasks assigned and to contribute to a positive safety culture on site.

The Project Manager, in consultation with the Construction Manager, will refer to the project work description and identify the competency criteria and safety attributes necessary for each construction position. Where a work description identifies statutory competencies (i.e. certification) the Project Manager will ensure that evidence of statutory competencies is obtained prior to selection and retained on site as documentary evidence of such competencies.

Wasco will specify within its Human Resources Management Planning, provisions to ensure the confirmation of employee competency and fitness for work during the employment process, the process of capture of competency information, responsibility and arrangements for maintaining that information and methodology to ensure ongoing monitoring that employee competency remains current for the Project duration.

Sub-contractors will be responsible for engaging competent and experienced supervision and employees who hold the appropriate qualification for the required tasks

Certification – licenses – permits – will be maintained on site by the Construction Manager for occupations with this requirement and we list hereunder classifications that generally require certification:

- Mobile Plant and Equipment
- Cranes and Rigging
- Electrical Work
- Instrumentation Work
- Mechanical Fitting
- Welders
- First Aid Treatment
- Driving of vehicles
- NDT

#### 13.1 CERTIFICATES / RECORDS OF QUALIFICATION

The Project Engineer will ensure that all Project Team employees arriving on location comply with the appropriate licensing, permit and/or certification requirements of the relevant statutory authorities. The Project Engineer in consultation with the Project Manager will maintain at site the Project Training and Competency Matrix Register to support the facilitation of project training requirements completed and to monitor the adequacy and spread of location required task competency.

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Personnel at all levels will be experienced and qualified in accordance with legislative and Jemena requirements. Records of certification, licenses and permits will be maintained on site by the Project Engineer for all machine operators, vehicle drivers and those performing works that require a permit.

For the operation of types of plant or equipment that do not fall within the certification standard, there are national competency standards. Undertaking a formal competency assessment and meeting national competency standards is a requirement by Jemena for the operation of types of plant or equipment that do not fall within the certification standard.

Verification of Competence (VOC) Assessments will be overseen by the Construction Manager and must be on the similar equipment to be used on site.

## 13.2 CONSTRUCTION INDUSTRY INDUCTION (BLUE CARD / WHITE CARD)

In accordance with statutory requirements, the Construction Manager shall ensure that all project personnel are inducted and are the holders of a Construction Industry Induction completed to the standard CPCCOHS1001A WORK SAFELY IN THE CONSTRUCTION INDUSTRY, before they commence project site works.

## 13.3 INDUCTION AND TRAINING

In accordance with project requirements for Induction and Training, the Construction Manager is to ensure that all project personnel are inducted by the Jemena before commencement of project works. All personnel, including staff, inspectors and subcontractors will attend the Client's Project Induction before accessing or commencing work on the site.

Wasco personnel must have completed both the General Induction and Site-specific inductions to enter or work on the project prior to deployment to site. Contractors will need to undertake an induction appropriate to the sort of work they are undertaking on site. Visitors must undertake a visitors' induction and be accompanied by a fully inducted person at all times.

### 13.3.1 MANDATORY TRAINING

The following training is mandatory:

Mandatory Training			
Training Type	Supervisor	Worker	Subcontractor
Jemena HSE Induction	×	×	×
Jemena Environment Induction	×	×	×
Jemena Site Specific Induction	×	×	×
General Construction	×	×	×
General Wasco Induction	×	×	
Wasco Site Specific Inductions	×	×	×
Health and Safety Representative (HSR)		×	

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### 13.3.2 FURTHER TRAINING / COMPETENCIES

A training matrix will be developed to determine the training required by each individual on the project in accordance with their roles and responsibilities.

All personnel are to be trained and assessed as competent and authorised, by the Construction Manager, prior to performing required tasks. Where a nationally recognised license or certificate occurs, personnel will be required to provide evidence of their training, qualifications, and competence prior to arrival on site.

Further training / competencies required above and beyond are:

Training Type	Who attends
First aid & CPR	A minimum of one per 20 personnel High risk workplaces—one first aider for every 25 workers As per NSW code of Practice
Dogman / Rigger	Any worker performing rigging work or slinging of loads
Confined Space Entry	All supervisors & workers involved in CSE

Records of assessment and attendance are maintained in Rapid Online Induction Register, maintained by the Project Management Team.

The Construction Manager in consultation with the Project Management Team will periodically review training and competency records and monitor copies of training attendance.

### 13.3.3 WASCO PROJECT INDUCTION

All Wasco employees and sub-contractors engaged to work, as part of the project, will attend the project specific safety induction before commencing on site work. This induction will be reviewed and updated to suit the changing project conditions. The Project Manager shall develop, and the Project Engineer will as required deliver and monitor and report on implementation of induction requirements for project staff and contract personnel. The Project Team shall maintain a register of inducted personnel. It is the Project Team's responsibility to ensure that personnel do not commence field operations until inducted.

All personnel shall be required to sign and acknowledge that they have been inducted into the site and understand the requirements of the project. All licenses and certificates of competency held must be recorded in the skills matrix and copies of all such licenses and certificates attached.

The induction process will include an assessment indicating that the inducted employee has gained a suitable understanding of their responsibilities, project hazards and control measures.

The project induction will not only re-address relevant requirements of Jemena, but it will also address site specific health safety and environmental issues, safety management system and emergency response arrangements.

Consistent with the requirements of this CSMP, points of the Wasco project induction will include but not be limited to:

- Objectives of the project.
- Employee Consultative Arrangements

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- Emergency Response Procedures/Muster points
- Pre-start & Toolbox meetings.
- Project safety rules
- 12 Non-Compromising Rules
- Location specific hazards
- TMP
- Smoking policy
- Policies
- PTW Systems Awareness
- Safe Work Method Statements
- Equipment Tagging & Identification Systems
- Personal Protective Equipment requirements
- Environmental concerns and activities
- Hazard and Incident Reporting
- Identification & management of hazardous substances
- Specific Working Procedures
- Basic HSE rules

### 13.3.4 VISITOR INDUCTION TRAINING

Short-term day visitors (who are not performing any physical construction work) to the project site are required to attend a short site-specific information session to be conducted by a member of the Project Team covering specific requirements and guidelines for the particular site, which shall include informing attendees of:

- Emergency Response
- Minimum mandatory requirements for the wearing of PPE
- Specific access restrictions or
- Hazards to be aware of pertaining to the work site

All visitors are required to sign a declaration of understanding and agreement with site access requirements. Completed visitor induction forms shall be maintained on site by the Project Engineer.

All visitors to site are assigned a Sponsor and must always be escorted. The Sponsor assigned will have completed a full project induction.

All visitors must undertake a BAC test prior to entering

### 13.3.5 HSR TRAINING

As per the WHS Regulations 2011, all HSRs must undertake the relevant approved training course within six months of their election. Existing HSRs, who have not already completed the training, will have 3 months from to undertake this training. If a worker chooses not to undertake the training within the time period, they will no longer be eligible to fulfil the role of HSR and will need to be replaced.

HSRs and deputy HSRs can ask a person conducting a business or undertaking (Wasco) to attend approved courses. The Wasco will give HSRs paid time off to attend a course and pay the course costs and reasonable expenses within three months of the request

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## 13.4 HEALTH MENTORING SYSTEM

The Project shall establish systems that promote a healthy work environment and ensure that all personnel are fit to perform their work safely within the environment of the project, and ensure medical resources are appropriate and available to prevent and manage medical conditions arising during the project.

### 13.4.1 EMPLOYEE FITNESS AND HEALTH SURVEILLANCE

All personnel working on the Project are to be assessed for their fitness to carry out identified work activities on the project site. The Construction Manager will endeavor to ensure that all project personnel including sub-contractors are not affected by drugs or alcohol and are medically fit for the work to be undertaken.

All personnel will be BAC tested each day and that a random, for cause and suspicion drug testing program will be implemented.

Personnel taking any medicines for any reason – allergies, asthma, depression, heart problems, blood pressure or diabetes for example shall be encouraged to find out from their doctor or pharmacist how the medicine can affect them. All personal details of personnel medication will be kept on a register in confidence by a designed onsite register.

Where statutory health monitoring is required for exposure to noise, hazardous substances, ionizing radiation, etc. records of such monitoring are reported to authorities in line with legislation and the records are retained by the Wasco HR department on the employee's personal file.

The Project Management Team are to periodically review records of employee health monitoring to ensure programs to control risk exposure are effective.

## 14. PROTECTIVE CLOTHING AND EQUIPMENT

All personnel on site shall comply with PPE policies and procedures. Everyone will be issued with the mandatory PPE before commencing work on the site. The mandatory PPE requirements on the work site shall be:

- Lace up work boots with toe protectors (AS 2210)
- Vented Safety Helmet (AS 1800 & AS 1801)
- Eye Protection with side shields (AS 1336 & AS 1337)
- Hearing protection to AS1270 where SWMS and/or signs indicate hearing protection is required
- Hi-vis shirts with long sleeves – Cotton Day/night standard clothing
- Long trousers- Cotton
- As per SDS requirements and best practice
- Double eye protection for all cutting and grinding process
- Gloves as dictated by SWMS

The Project Manager shall ensure the supply of general personal protective equipment for all workers on site. The Project Construction Manager is to ensure that all visitors to site shall comply with the above PPE requirements. All visitors who do not have hi-vis clothing may be supplied with hi-vis safety vest where they are not performing any physical work.

The Project Manager in consultation with the Project Safety Advisor, and Construction Supervisor shall determine the full range of PPE safety gear/clothing/equipment required for tasks within the scopes of work and these shall be identified within the key safety documentation. The Project Engineer shall ensure adequate stocks are available to maintain compliance with all safety and health requirements.

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The Construction Manager is responsible to ensure that all employees under their supervision comply with the above PPE requirements.

PPE is to be considered as the last method of hazard control and only to be used after all other risk control measures have been investigated.

## 15. EMPLOYEES INVOLVEMENT AND COMMUNICATION

### 15.1 HEALTH AND SAFETY COMMUNICATION

Effective communication of Health and Safety matters is essential for ensuring all personnel are aware of the systems, client requirements, reporting and feedback mechanisms, and regulatory requirements. The different methods of communication include:

- HSE Meetings (prestart, HSE committee, toolbox, etc.)
- Incident and near miss reporting
- Suggestions for safety improvements
- Auditing
- Induction and orientation
- Project-specific Training
- Safety memos, alerts and bulletins
- Posters and noticeboards
- Safety stand-downs; and
- Other media as required

The Construction Manager will ensure a noticeboard is in place and accessible for the posting of the following in a community/meal area for access and reference by site employees:

- Emergency action plans
- Safety bulletins/Incident Report findings
- Posters and other information or promotional materials
- Copies of the relevant Legislation, Codes of Practice, etc.
- The CSMP; and
- Other key Client and Wasco documents and procedures

All personnel shall have the opportunity to be consulted with, to create positive health and safety culture for the Project and contribute to the continuous improvement of the Project and its CSMP.

Wasco recognises the importance of accurate and open communication with all personnel involved on the Project. Various techniques and forums shall be adopted to assist in achieving this goal. All personnel will be encouraged to participate where required.

### 15.2 EMPLOYEE ELECTED WORKPLACE HEALTH AND SAFETY REPRESENTATIVES (HSRS)

Wasco will encourage employees to elect a Health and Safety Representative (HSR) in accordance with the Work Health and Safety Act 2011. This shall be requested at the first opportunity where, if required, an election can be organised, anticipated to be the first Toolbox meeting. Elections shall be conducted in accordance with statutory guidelines with the successful candidate details forwarded for registration and training.

Where elected, employee HSR will take an active role in the workplace safety management. The Project Manager will ensure that the provision of resources for elected HSR is consistent with those required under the state legislation.



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## 16. PRE-START BRIEFINGS

The Construction Manager is to facilitate and organise shift/task Pre-start Meetings. Points of discussion / consultation will include but are not be limited to:

- Proposed activities and task assignments;
- Permit To Work (PTW) requirements;
- Activities to be conducted and Safe Work Method Statement (SWMS) requirements;
- Incidents and hazards that have recently occurred;
- Any changes that could affect current Standard Operating Procedure and require a SWMS;
- Changes to adjacent works and required a SWMS; and
- Individual concerns.
- Provide as appropriate a daily safety alert and/or other promotional information for inclusion to be addressed by field Supervisors
- Record these meeting and briefings
- Collect completed copies of meeting records to confirm attendance and facilitate any follow-up Requirements

### 16.1 TOOLBOX MEETINGS

Toolbox meetings are used to:

- Obtain feedback on safety performance from the workforce, including subcontractors
- Discuss and reinforce the requirements of this CSMP and associated Safety & Health rules and procedures.
- Communicate the results of health and safety activities
- Discuss any near misses, incidents or injuries that have been reported

Extraordinary special Toolbox meetings/briefings will follow an incident. These meetings will report on the findings and ensure any risks associated are understood and the necessary precautionary measures have been identified for each task to be conducted.

The Construction Manager is to:

- Conduct weekly toolbox meetings with all infield employees to discuss and report on safety issues;
- Invite Jemena Site Representative to attend Weekly Toolbox meetings and encourage and promote active participation in health safety and environmental awareness;
- Maintain a register of Toolbox meeting attendees;
- Maintain minutes of the Toolbox meetings;
- Ensure that minutes of these meetings are posted on safety notice boards around the workplace and in the main meals area;
- Review all meeting minutes and monitor that any action required has been recorded in the Corrective Action Register, has been implemented and advise Project Manager accordingly; and Investigate and raise a Hazard/Incident Investigation Report where appropriate, where an action has not been implemented.

## 17. SUBSTANCE ABUSE

In accordance with the Wasco Tobacco Alcohol and Drugs Policy (WAPL-HSS-POL-003), There will be Zero tolerance to Drug and Alcohol breaches.

The use of intoxicants, including excessive consumption of alcohol, 'unlawful drugs' or the willful abuse of non-prescription or prescription medications are practices that are unacceptable.



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The Construction Manager will ensure that adequate monitoring of the workforce is carried out in order to identify any instances of suspected willful substance abuse that is illegal and/or detrimental to the safe conduct of work.

0.00% BAC is required for all workers reporting for work or driving a company vehicle anywhere. ( as per Wasco Fitness for Work WAPL-HSS-PRC-003 Procedure) All workers ,sub-contractors will be tested for alcohol prior to starting work, each day. All Jemena personnel and visitors will be tested when signing into site.

A drug testing program will be implemented on the project that includes, random, for cause and suspicion

Any person reporting for duty who is suspected of being intoxicated or suffering from substance abuse will not be permitted to commence work or remain on a Project site.

## 18. MONITORING AND EVALUATION

The Project Manager shall monitor safety management performance throughout the project and ensure appropriate corrective action is implemented where required. The scope of performance assessment will be via monitoring the implementation and effectiveness of safe work activity inclusive of the following:

- Daily reporting of the implementation and effectiveness of safe work activity via daily site meetings;
- inspections; and outcomes.
- CARE Plan

The Project Engineer shall:

- Prepare, in consultation with the Construction Manager, a weekly report documenting incidents and identifying safety issues; and
- Forward a copy of these weekly reports to the Project Manager and Client
- Conduct weekly formal workplace inspections
- Inspections shall be structured to provide an overview of general conditions, specific elements and close out status of previous deficiencies. A different set of elements shall be selected where practical for each inspection. Specific items shall include, but not be limited to, the following elements:
  - Emergency equipment and awareness
  - Rigging and lifting equipment
  - Electrical equipment
  - High Risk Work qualifications
  - Access and egress
  - Mobile equipment / vehicles
  - Personal protective equipment
  - Personnel qualifications and training
  - Housekeeping.
- The Project HSE Advisor shall facilitate and conduct health and safety inspections with the Construction Manager
- Forward copies of health and safety inspection reports to the Project Manager for review
- Place copies of health and safety inspection reports and findings on notice boards
- Maintain a file of completed health and safety inspection records
- Assign actions to correct adverse findings; and
- Add items into the project corrective action register.

## 19. INCIDENT / ACCIDENT REPORTING

All incidents/accidents must be reported as WAPL-SYS-PRC-002\_Wasco Incident Reporting Procedure

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The Construction Manager will closely monitor serious accident/incidents and keep the Client fully informed at all times.

All incidents and near misses shall be reported to Jemena Representative within 24hours

## 19.1 INCIDENT REPORTING

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Project event reporting will include those persons who are injured or involved in a near miss or other hazardous incident, either on site or travelling to and from site and at provided accommodation. All Incidents and near miss incidents associated with community relations incidents must be reported. Event reporting of injury, incident or near miss are to be as soon as possible to the immediate supervisor or a member of the Project Management Team.

Incident Reports are completed initially by the employee and the Safety Advisor or Construction Manager or Project Manager.

All incidents are reported via Wasco Rapid Incident, and other documentation such as witness statements, investigation forms or forms as required by the Client or government authorities are to be submitted.

Unless a significant hazard exists, the scene of any serious injury or incident location will not be disturbed until all evidence drawings, photographs, etc. have been prepared or taken and necessary details have been accurately recorded.

In the event of a serious incident, unless a significant hazard continues to exists, the scene will remain undisturbed until authorisation has been received from the Project Manager in consultation with Jemena and any designated Government Authority (in the case of a fatality, the police).

As soon as practicable verbally, but within 24 hours, the Project Manager will provide a report to the Jemena Project Manager setting out fully all material facts and circumstances concerning the incident that the Wasco Project Management Team is aware of or is able, by reasonable search and inquiry, to find out.

In the event of a case of Medical treatment or Lost Time Injury the Safety Advisor or Project Engineer is to provide to the Project Manager the following:

- Details of personal particulars of the injured party
- Date and location of occurrence
- Details of extent of injury
- Anticipated duration of treatment and recovery to normal duties
- Summary of events leading to the injury
- Details of Corrective or Remedial Actions
- Injury Management

## 19.2 INJURY MANAGEMENT

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In the event of any person sustaining an injury, they are required to report the injury as soon as possible to their Construction Manager, and promptly be assessed and receive first aid treatment as required.

The Jemena Site Representative will be advised by the Construction Manager of all injuries of all project personnel immediately or as soon as the situation has been stabilised.

Personnel are responsible to ensure the Project Manager receives a copy of a doctor's medical certificate for any time lost from work due to a work associated injury or illness. Personnel will not be permitted to return to work unless a doctor's medical certificate is sighted by their respective employer and the Construction Manager.

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### 19.3 WORK COVER

All notifications to WorkCover are to be made in accordance with the Incident Notification Flowcharts listed in Wasco Incident Reporting Procedure

WorkCover must be immediately notified of any workplace incident that results in death or serious injury, or that exposes a person in the immediate vicinity to an immediate health or safety risk.

A written record of a notifiable incident must also be sent to WorkCover within 48 hours.

The site of a notifiable incident must not be disturbed until an inspector arrives or directs otherwise at the time of notification, although the site may be disturbed to protect a person's health or safety, to help someone who is injured, or to make the site safe.

The WorkCover incident notification form must be used to send WorkCover a written record of a notifiable incident.

### 19.4 CORRECTIVE AND PREVENTIVE ACTION

The Construction Manager shall ensure that the immediate corrective action section of the incident/injury investigation report is completed and raise a corrective action report within the database where improvements arise as the result of an incident/injury investigation and ensure that the corrective action is closed out within the database in a timely manner and controlled through a corrective action register.

Anyone can place recommendations in the corrective action section of an investigation report; however, the Project Manager shall ensure that the corrective action section of the investigation and corrective action report in the event of an incident is completed.

Additionally, the Project Manager shall raise an improvement form in consultation with the Operations Manager where improvements to management system documents are required as a result of audits. These corrective actions shall be issued by the Project Manager with a statement of actions required, date to be completed, and date where follow-up will be performed to ensure effectiveness of the changes.

The corrective action register maintained shall indicate the closing out of the corrective action.

## 20. INCIDENT INVESTIGATION

All incident investigations are to focus on identifying the causes of the incident so that appropriate control measures may be implemented to prevent recurrence of the incident. All incident reports and incident investigation reports shall be completed using an approved WAPL-SYS-PRC-003 Incident Investigation Procedure.

Wasco shall establish an incident investigation team comprising appropriately trained and qualified investigators. The Jemena HSE Advisor is to be invited to participate in all incident investigations.

The extent of the investigation will depend on the severity, or potential severity, of the incident. Wasco's preferred root cause analysis technique is the 5 Whys method. The Jemena HSE Advisor is to be invited to participate in all incident investigations.

Incident Reporting and Investigation Reports must be completed, and corrective action items implemented, verified, and signed off prior to the incident being closed out by the Wasco Project Manager and the Client Project Manager.

Closed out Incident Reporting and Investigation Forms and Reports shall be made available on Rapid Incident, Wasco's Online Incident Reporting System

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Wasco shall develop and maintain a Corrective Actions Register for the duration of the Project, and report on the status of close-out of actions in the Monthly Safety Performance Report.

## 21. EMERGENCY RESPONSE

The Construction Manager, in consultation with the Project Management Team any situation which requires emergency assistance to prevent or reduce harm to people, property or the environment actions to be taken, control measures required on Wasco site.

### 2018-HSS-PLN-002 Emergency Response Plan

- Fire or explosion
- Medical emergencies (i.e. life-threatening injury requiring urgent medical attention)
- Uncontrolled release of a flammable gas or liquid
- Major spill or other environmental emergencies (i.e. release of a substance other than flammable gas which presents a significant risk to safety or the environment).
- Significant Weather event

The procedure will be used in conjunction with the Jemena Emergency Response Plan – TBC

## 22. HAZARDOUS SUBSTANCES - MATERIALS

For each chemical substance brought to site, a Safety Data Sheet (SDS) that conforms to the Work Safe Australia Code of Practice will be made available for all personnel required to use or work near a chemical substance.

The construction manager is to ensure that all SDS's for chemical substances be brought on site have been reviewed and all required risk management requirements (PPE, spills management, first aid etc.) for these substances have been fulfilled.

A hazardous materials register will be maintained and updated by the Construction Manager at the Site Office. The Construction Manager shall ensure subcontractors provide an updated inventory of chemicals on site, and a copy of the relevant SDS information is provided to the Construction Manager prior to subcontractor works beginning.

All flammable and/or hazardous substances will be stored in accordance with the Explosives and Dangerous Goods Legislation and relevant Australian Standards.

Where radioactive source instrumentation is to be used as part of construction testing, these will be stored, handled and installed in accordance with the Radiation Safety Legislation and the relevant codes of practice for radioactive substances.

The NDT Contractor will be required to demonstrate the adequacy of safe work practice to the Construction Manager / Construction Manager prior to their engagement. All Xray testing to be scheduled and notified Jemena Representative.

## 23. PERMITS

Wasco will comply with the Client's Permit System to ensure the highest level of personal safety for all people working on, or within, any recognised hazardous work area.

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Where permits are required, for example on a flow line tie-in to operating facilities, the appropriate Client plant operations personnel will be notified, and permits obtained for the work to be carried out prior to commencing any work.

The objectives of the Permit System include ensuring that:

- A safe system of work and necessary precautions are implemented
- Authorisation is obtained for all work to be performed
- The identification of potential risks involved and the precautions necessary to minimise those risks to ALARP, and
- A Permit Authority is aware of the number and location of personnel working in each permit area and the type of work in progress

The Construction Manager will ensure that requirements of the Client's Permit System are followed.

## 24. SIGN POSTING

Safety Signs and/or Barricading shall be used to draw attention to objects and situations that may affect personnel safety and health.

All signposting shall be representative of a management instruction and conform to Australian Standards specification coding presented as:

- RED CIRCLE AND BAR (Prohibited)
- BLUE CIRCLE - WHITE PICTURE (Mandatory)
- YELLOW - BLACK WRITING (Caution)
- RED OR GREEN - WHITE WRITING (Fire or Safety)
- BLACK, RED AND WHITE (Danger)
- YELLOW - BLACK WRITING TRIANGLE (For Radiation, Fire or Explosion)

Where there is a potential hazard or an area which must be isolated, suitable delineation/barricading shall be erected around this location to limit access.

## 25. TAGS

The Construction Manager specifies the assignment of responsibility and provisions and strategies planned for the implementation of Isolation/Out of Service and Danger Tagging. The project induction training shall ensure that all personnel are instructed in the use of the "Danger and Out of Service Tagging" requirement.

### 25.1 ISOLATION/OUT OF SERVICE TAGS

Wherever it is necessary to access Wasco controlled plant for the purpose of maintenance, upgrade, cleaning or repair the Operator/Service man will ensure plant is isolated using isolation devices and, where practicable, locked using lockout devices.

The Operator/Service man will ensure that construction plant and equipment which is under maintenance or found to be faulty or in an unsafe condition during the project are mechanically or physically isolated (Quarantined) and identified as "Dangerous", and/or "Out of Service" by means of tagging. The requirement to tag unserviceable or damaged plant is mandatory for electrical plant.

Construction utility power systems requiring isolation are in accordance with Wasco isolation and tagging requirements under the control of a licensed electrician.

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## 25.2 DANGER TAGS

As per AS1319:

- Isolated equipment shall be danger tagged whenever personnel would be at risk if the equipment were energised or operated
- Locks are used where practicable
- Isolations are established to effectively protect all personnel

Danger Tags will not be used when personnel are not at risk (where personnel are not at risk 'Out of Service' tags may be used where plant is damaged or withdrawn from service)

## 26. PURCHASING PLANT AND EQUIPMENT

Plant and equipment that is purchased/leased/hired must be in accordance with specified standards and fit for its intended purpose. Vendor selection ordering, verification of purchased product and traceability must be in accordance with company quality, health and safety requirements and be inclusive of:

- Precise identification of the goods and services
- Relevant technical/HS&E material (eg specifications, permits, certification)
- Inspection/maintenance and test methods/records
- Methods of operating/control and handling of goods and services
- Contractual terms and conditions

## 27. MAINTENANCE, INSPECTION, TESTING, PLANT AND EQUIPMENT

The project shall ensure the provision of suitable plant, equipment and facilities be established so a safe place of work, safe systems of work and appropriate levels of response can be maintained and achieved.

All project plant and equipment shall be sized and specified to be able to execute the required works safely within its operating requirements. All incoming plant and equipment shall be inspected prior to being unloaded on site for compliance with required equipment standards and for maintenance and service history records. The Construction Manager will ensure that all plant and equipment is accompanied by

- Plant Log Book
- Plant Operating Manual
- Plant Hazard/Risk assessment document
- Fire extinguisher
- First Aid Kit
- Reversing alarms (as required)
- Amber coloured flashing warning lights (as required)
- Historical Records of Maintenance/Testing & Inspection as appropriate.

Also load-shifting equipment must be provided with certification and load charts.

All plant and equipment will be entered in the Plant and Equipment register 2018-HSS-REG-Plant and Equipment Register

All plant and equipment shall be maintained and service in accordance with the manufacturers' specification. Service and maintenance register shall be maintained by the Project Team for the life of project the register shall at a minimum record the following:

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- Plant details (make/model/year/registration/ID number)
- Plant odometer reading
- Plant last service
- Plant next service
- Plant issues/maintenance requests
- Plant onsite dates

Plant or equipment which is under maintenance or found to be faulty or in an unsafe condition, will be isolated and identified as "Danger", and "Not for Use" or "Out of Service", as set out in Wasco's Safe Work Method Statements. The Project Engineer will maintain a Register of plant maintenance.

The condition of plant and equipment is the responsibility of the Construction Manager, and those personnel operating the plant or equipment. The condition of plant and equipment is monitored by:

- Initial plant inspections and plant risk assessments
- Daily pre-start inspections
- Weekly inspections as required or designated
- Scheduled maintenance
- Defect reporting
- Tag and isolation procedures
- Breakdown and repairs

## 28. PRESSURE TESTING OF PIPES AND VESSELS

All personnel assigned to pressure testing will attend a task specific training session to ensure they are aware of hazards relating to the testing of pressure containment pipes and vessels.

Before commencement of any pressure test, the Construction Manager shall:

- Review and authorize for use the hydrostatic testing procedure
- Ensure that all instruments and gauges to be used on the test are of suitable pressure range or test limits, and that valid calibration certificates are present
- Ensure that test areas will be isolated

All pressure testing of the pipeline and vessels will be carried in accordance with the Wasco Health & Safety Management System, Wasco Procedures, and Client requirements.

## 29. SAFE OPERATING PROCEDURES AND STANDARDS

Safe Operating Procedures are developed for standard activities so as to provide a standardised approach for the communication and implementation of safety precautions whilst engaged on a specific activity and/or working environment on the project. They are also subject to risk assessment and management of change via SWMS.

Safe systems of work on the Project are to be established and updated throughout the project. Regular review will address existing safety systems with a view of improvement and reflecting task specific activities.

Safe Work Method Statements (SWMS) will be used to identify and communicate the hazards and risks associated with a task and the safe work method statements that apply to the specific task. All tasks are required to have a SWMS carried out prior to the commencement of the task and signed off at the completion of the task. The SWMS is to be reviewed/revised if any part of the task execution is to be changed.

For all work, which requires a permit, the specific procedure or work instruction being referenced must be identified on the permit and a SWMS specific to the job must accompany the displayed permit. A SWMS will need to be conducted prior to the following activities (but not limited to):



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- Hot work
- Working at heights
- Excavation
- Lifting operations
- Energy isolations

Project specific procedures developed by Wasco, in consultation with the Client as required, will be progressively reviewed, and/or developed from this baseline of approved work practice by Wasco. All changes to Project specific procedures are approved by the Project Manager.

Project specific Construction Execution Procedure standards of operating practice are developed for the following routine construction processes as applicable and are subject to SWMS:

- Survey and site set out
- Service Identification
- Clear and grade
- Excavation and Trenching
- Stringing
- Welding
- Coating
- Lowering in and Backfill
- Flange Management
- Hydrostatic Proof and Leak Test

In addition to this list, Procedures will be developed for any other operating activity identified during construction.

Any work activity whether routine or non-routine will have a SWMS carried out immediately prior to commencing the task for the first time or where change has occurred in the construction process or environment.

The Construction Manager is responsible to ensure the highest level of personal safety for all people working on, or within, any phase of Construction activity under their control.

The Construction Manager and the Project Management Team are to monitor that all Project personnel comply with all construction safety instructions as required, in particular the control measures as identified in the SWMS process.

## 30. WORKPLACE ENVIRONMENT

The Construction Manager will specify the assignment of particular responsibility and provisions to ensure that a safe place and systems of work are provided.

### 30.1 SITE ACCESS

Wasco shall ensure all personnel travelling to site are aware of the route and provide all other relevant information prior to travelling to the site.

A Traffic Management Plan (TMP) will be implemented

The TMP specifies the assignment of responsibility and provisions and strategies planned for the movement and control of:

- Personnel, plant and materials,
- The selection and management of designated road access,
- Land Access requirements



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- Journey Management
- Loading and Unloading (LUEZ)
- Jemena site requirements
- Weed and Seed requirements
- The safety of the public in relation to planned construction activity interfaces.

The Plan will have the following objectives relating to construction access:

- To ensure that there is no damage to existing and new equipment onsite.
- To Ensure Land Access/ Landowner requirements are adhered to
- To ensure that personnel are protected whilst equipment is moved onsite.
- To minimize traffic hazards.
- To minimize impacts to fauna

### 30.2 SITE SECURITY AND PUBLIC SAFETY

The Project Manager in consultation with the Construction Manager specifies the assignment of particular responsibility and provisions and strategies planned for managing site security and public safety.

The Construction Manager will enforce the following requirements:

- Enforce security rules and regulations
- Secure tools, equipment and materials
- Report losses of tools, equipment, material, or other breaches of security to the Project Manager as soon as they are discovered.

The Project Manager in consultation with the Construction Manager will ensure that only authorised persons are working on or visiting the site and any associated areas and that all personnel in that controlled area are able to be accounted for in Emergency situations.

To ensure all operating equipment is secured from trespassers/vandals, the doors and windows shall be locked when left over night in areas deemed not secure.

The Construction Manager is to assess risk (likelihood and probable severity of public injury) in consultation with the Project Manager for all construction work undertaken in order to formulate and implement risk minimisation controls.

Necessary precautions will consider factors such as:

- Proximity to the public
- Hazards on the site (and the degree to which they can be made safe when unattended)

### 30.3 RIGHT OF ENTRY

All right of entry request will be dealt with in accordance with the Fair Work (Commonwealth Powers) and Other Provisions Act 2009 and the Work Health and Safety Act 2011.

### 30.4 FIREARMS AND WEAPONS

The use, possession and distribution of firearms, deadly weapons or unauthorized explosives are strictly prohibited on site.

### 30.5 PETS

Pets are not allowed on the project site.

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### 30.6 SMOKING

Smoking is only permitted in designated smoking areas.

### 30.7 DRIVING

Only licensed drivers are permitted to drive vehicles on the project. All road rules must be obeyed, and site-specific rules shall always be observed. Traffic Management Plan to be followed

### 30.8 COMMUNICATION AND TWO-WAY RADIO OPERATION

Wasco will establish a radio communication system, which shall have full coverage over the entire project area. The communication system shall remain in operation until all works are complete. Unless an alternative adequate communications protocol is established, this communication system shall be made available to all personnel working within the contract area including Client and authorities nominated by the Construction Manager.

The system shall be implemented during construction that will enable personnel working on the project to identify their position. The ability for personnel to identify their position is of paramount importance in the event of an emergency.

For communications outside of radio range, satellite phone will be provided to Crew Supervisors and in specific circumstance, lone workmen.

VHF #28	General Construction Communications (Note: This becomes the Emergency Channel on the greenfield site where the situation does not extend to Client Operations)
UHF# 28	Plant & Machinery

### 30.9 WORKPLACE LIGHTING

All project personnel including sub-contractors are required to obtain approval from the Construction Manager for any work to be conducted before/after normal daylight hours. The following activities are excluded from this requirement subject to a strict requirement to carry out a SWMS:

- Pressure testing activities
- Field Services

For any night work the intensity of illumination will be subject to risk assessment and as shall be such that permits the work to be performed in a workmanlike manner without risk to personnel or property

### 30.10 WORKING HOURS

The working hours and shift patterns are in accordance with the Wasco Certified Agreement. It is not expected that night work is common but may be appropriate for non-destructive testing (x-ray operations and testing operations. Wasco will comply with the laws and regulations governing work site hours for personnel

All night work is to be approved by the Construction Manager and Client representative. Night works are to be conducted in a manner consistent with the requirements subject to SWMS review.

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### 30.11 LONE WORK

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No person shall be permitted to undertake physical construction work activities alone in the absence of an approved Safe Method of Work. Lone work is defined as:

- A person shall be deemed to be "Alone" or performing "Lone Work" when that person is more than 400 metres from another person, or 800 metres in the case of plant operators and is without access to communications (i.e. radio) for any period greater than 30 minutes.
- "Physical" is any construction activity that requires manual Labour, and includes but is not limited to, Plant Operation, Mechanical Repairs, Underground Service Location and Repairs, Fauna and Flora Monitoring, Survey Activities, Loading and Unloading of Plant and Transport, Refueling, Operation of Valves, NDT, etc.
- In situations of lone work, an assessment shall be undertaken, considering location of work in relation to Project, distance separating persons, traffic frequency, environmental conditions, and transport available to the individual.

### 30.12 FATIGUE MANAGEMENT

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Working hours 6:00 am to 18:00pm

If more than Twenty-one days, the construction manager will conduct a fatigue risk management analysis prior to continuance of work. All extension risk assessment to support continuance of working past 21 days shift are to be reviewed by Jemena HSE and approved by Jemena Project Manager.

### 30.13 CONSTRUCTION NOISE LEVEL

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The noise levels emitted from Wasco construction plant / activities will be monitored by the Construction Manager. Should the emitted noise be excessive, the Construction Supervisor must immediately notify the Construction Manager.

Should any construction activity, procedure, or any item of construction plant emit noise at levels beyond those permitted or recommended, the Construction Manager will either suspend the operations and/or as an immediate and temporary measure, provide appropriate personal protective equipment.

### 30.14 FIRE PREVENTION

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The Construction Manager is responsible for ensuring that:

- There are adequate Fire Protection precautions in place
- An adequate number and type of fire extinguishers available to meet requirements and they are properly serviced and maintained in good working condition
- The workforce is aware of the hazard of ignition sources in "PROHIBITED AREAS"
- The workforce is aware of general fire restrictions, the risk of ignition and the potential spread of fire
- All vehicles, plant and equipment have appropriate fire extinguishers and they are serviced and checked on a regular basis

The Construction Manager will ensure that project employees are aware of the location points and correct use and operation of all firefighting equipment through induction and toolbox training.

The Construction Manager is responsible for ensuring that documented evidence of employee training in the use of firefighting equipment and will maintain on site a register of test and tagging of all fire extinguishers.

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### 30.15 HOUSEKEEPING

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All personnel are responsible for ensuring that their work areas, offices, plant sites, vehicles are kept clean and tidy in accordance with the Client and Wasco's Health and Safety Management System.

### 30.16 ELECTRICAL SAFETY

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The Construction Manager, in consultation with a licensed electrician, will specify the assignment of particular responsibility, provisions and strategies planned for the supply of electricity for the differing requirements of the construction activity and details the day to day management of electrical supply and electrical safety.

All portable electrical equipment will utilise a power supply protected with a Residual Current Device (RCD).

The Project Engineer will maintain a register for all electrical maintenance, testing and inspection activities carried out and made available to the Construction Manager for review on request.

### 30.17 COMPRESSED GAS CYLINDERS

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All compressed gas cylinders shall be firmly secured by means of a chain or rope in the upright position. Empty cylinders may be laid down provided they are protected from possible damage and suitably chocked to prevent rolling. Empty cylinders should be clearly marked "empty".

Cylinders shall be stored in a ventilated area, out of direct sunlight. A fire extinguisher must be attached to all trolleys containing oxy-acetylene cylinders

### 30.18 WORKPLACE AMENITIES

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The provision of work site amenities is an integral part of the general duty of care. The Construction Manager will ensure that sufficient and adequate amenities are provided for the welfare of personnel on the project site.

#### 30.18.1 DRINKING WATER

Filtered clean potable drinking water, and ice are to be readily accessible and located where the water is unlikely to be contaminated.

Each employee on arrival to site will be issued with a lunch box cooler and a 5-litre water bottle. Each employee is required to carry with them to work at start of shift a minimum of 5 litres of drinking water.

#### 30.18.2 ABLUTION FACILITIES

The Project Manager in consultation with the Construction Manager is to review and provide for adequate on-site ablution facilities. An ablution block shall be placed at the main laydown facility, amenities for both female and males shall be provided. A porta loo will be on the right of way

The placement of any ablution block on the worksite shall be approved by Jemena due to its classification of hazardous waste.

#### 30.18.3 CRIB ROOM FACILITIES

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The Project Manager in consultation with the Construction Manager is to review and provide for adequate crib room facilities for the work crew. The crib room shall be air-conditioned and be maintained with potable water, seating and tables and a refrigerator if required.

Cribbing and ablution facilities size and occupancy limits will be in accordance with current NSW state guidelines and the site COVID management plan.

### 31. EXCAVATION

All excavations shall be in accordance with the SWMS and Permit to Work (When required).

The Construction Manager will ensure the following have been assessed and control measures are in place:

- Location of utilities
- Ventilation
- Fumes or toxic atmosphere
- Wall and faces in excess 1.5 metres
- Daily or more frequent inspections
- Shoring battering sloping (if necessary)
- Hazard warning signs – marker lights (night)
- Records inspections, SWMS's, confined space permits
- DBYD
- Hazard assessment
- Potential flammables
- Low oxygen levels
- Entry and exit and ramps
- Training of employees
- Barricading
- Ladders (where required)

### 32. CONFINED SPACE ENTRY MANAGEMENT

Confined space work is deemed High Risk Construction Work and requires a Safe Work Method Statement.

In the Work Health and Safety Regulation 2011 NSW, a confined space is defined as follows:

Confined space means an enclosed or partially enclosed space that:

- (a) is not designed or intended primarily to be occupied by a person; and
- (b) is, or is designed or intended to be, at normal atmospheric pressure while any person is in the space; and
- (c) is or is likely to be a risk to health and safety from:
  - (i) an atmosphere that does not have a safe oxygen level; or
  - (ii) contaminants, including airborne gases, vapours and dusts, that may cause injury from fire or explosion; or
  - (iii) harmful concentrations of any airborne contaminants; or
  - (iv) engulfment;

For compliance with the NSW legislation, the Construction Manager will ensure that the SWMS is reviewed, and that a Confined Space Permit is completed before any work can take place.

### 33. WORK NEAR TO OVERHEAD POWERLINES

OES Guideline for Management of Electrical Hazards shall be adhered to.

The Construction Manager / Client will establish Permit and Isolation requirements where appropriate by contacting the Client / Power Supply Authority.

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Where overhead powerlines cross or are in close proximity to the Works, signs saying “Power Lines Overhead” shall be erected during the clear and grade operation to warn construction personnel of their presence.

No item of mobile plant may operate closer than 4 metres to High Voltage powerlines unless the lines have been isolated and/or work is carried out in accordance with approved Permit to Work Method Statements by the supply authority.

#### 34. WORK IN THE VICINITY OF LIVE GAS PIPELINES

All works in the vicinity of a live gas pipeline shall be under the third-party approval, detection, SWMS and permit system.

#### 35. MOVEMENT AND CONTROL OF VEHICLES – PLANT AND EQUIPMENT

All drivers will be fully and currently licensed, and competent to drive the type of vehicle they are using and will observe and obey local Road Laws at all times except where Traffic Signs impose further restrictions.

No vehicles are to be driven after dark, unless prior approval is provided by the Construction Manager / Client, and such approval will normally only be provided in emergency situations. The Construction Manager in providing such approval will have already obtained similar approvals from the Client.

Traffic control in areas of public road access will comply with local Road Traffic Authority and requirements as specified and referenced against AS 1742.4 - 1996.

Where there is a requirement to establish a strategy to ensure the safety of road users and/or the public in relation to general activity along the Major Roads, and in circumstances where there is crossing of a Major Road and/or an excavation of the road is required - A Traffic Management Plan/Controls will be developed and strictly adhered to by the Project Team.

Where appropriate, prior to commencement of any work involving road crossings involving excavation, the Traffic Management Plan will be prepared and issued for review by the local Road Traffic Authority.

Vehicles carrying hazardous goods or chemicals will carry appropriate signs, which will be clearly visible.

Where required for the operation of vehicles/equipment in poor visibility conditions, all vehicles will be fitted with a roof-mounted amber flashing beacon and a two-way radio.

All employees utilised for Road Traffic Control will have undertaken specific training in this area.

All personnel working on Road Traffic Control will wear high visibility clothing when directing traffic or working in a traffic control situation.

All vehicles on site will be registered. No vehicle will be permitted to enter the controlled area or remain on a construction activity location without the approval of the Construction Manager.

Vehicles with loads extending beyond the length of the vehicle will be flagged. Similarly, loads extending beyond the width of any vehicle will be clearly indicated by a notice on the front and rear of the vehicle, and vehicles will be escorted. Escort personnel must remain in continuous radio communication with that vehicle's driver as per Road Transport Legislative requirements.

Travel to and from site and long journeys shall be according to the Wasco Journey Management Plan

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### 36. MATERIALS HANDLING, LIFTING EQUIPMENT AND LIFTING

The Construction Manager is to specify the assignment of particular responsibility and provisions and strategies planned for the risk assessment of manual handling activities, the selection, inspection and management of lifting equipment and the management of loads requiring a detailed lifting plan.

Manual handling is one of the major activities of the project. Manual Handling occurs on a construction project many times per hour and subsequently the risk rating for this group of hazards is high if nothing is done to control the hazards. A procedure has been developed to assist in understanding the Manual Handling group of hazards and how to address the control of these hazards. All manual handling tasks will be subject to SWMS and risk assessment.

All lifting and rigging equipment, including cranes and the equipment containers shall be certified in accordance with applicable load testing and lifting standards. Certificates and logbooks shall be maintained for all equipment with a lifting capacity exceeding a WLL of 10.0 tonne. Lifting equipment shall be labelled with its Safe Working Load (SWL) in accordance with Australian Standards and site requirements. All lifting equipment will have available a Load Chart.

All rigging work is to be carried out by certified competent riggers in accordance with statutory requirements. All slings, shackles etc., are to be clearly marked with their safe working load (SWL) or working load limit (WLL), rigging equipment is not to be used for other than its intended purpose.

The Construction Manager shall establish a rigging loft onsite that provides for clean, dry and chemical-free storage of all rigging equipment. A register of lifting equipment shall be maintained on site.

Only qualified operators who are properly trained in the operation of the type and size of lifting equipment and who hold the appropriate certification will be permitted to operate such equipment.

A Certificate of Competency (High Risk License) issued by State statutory health and safety authority will be required if operating any (National Standard for Licensing Persons Performing High Risk Work 2006). These include:

- slewing crane, tower crane, derrick crane, or portal boom crane;
- non-slewing mobile crane of capacity greater than 3 tonnes;
- vehicle self-loading crane (Hiab) of capacity 10 metre-tonne or greater.

Licensed operators will be directly responsible for ensuring that all equipment is used within its recommended load limitations and stored in a proper manner when not in use.

Lifting equipment will only to be used for the purpose for which it is designed and within its rated capacity and a Certified dogger (or Rigger) will sling loads where either:

- judgement is needed to either determine the mass, determine the centre of gravity of the load, select a sling, or select a sling configuration; or
- signalling to a crane/plant operator where the load is out of the operator's view.

The operator has the full responsibility for a safe operation when using hoisting equipment to make lifts and is required to provide a Critical Lifting Plan where required.

The operator will conduct a Critical Lift Assessment where:

- The load exceeds 75 percent of rated load chart for crane;
- The load exceeds 50 percent of rated load chart for crane, and possible failure would endanger existing facilities (thus always in and around operating plant);



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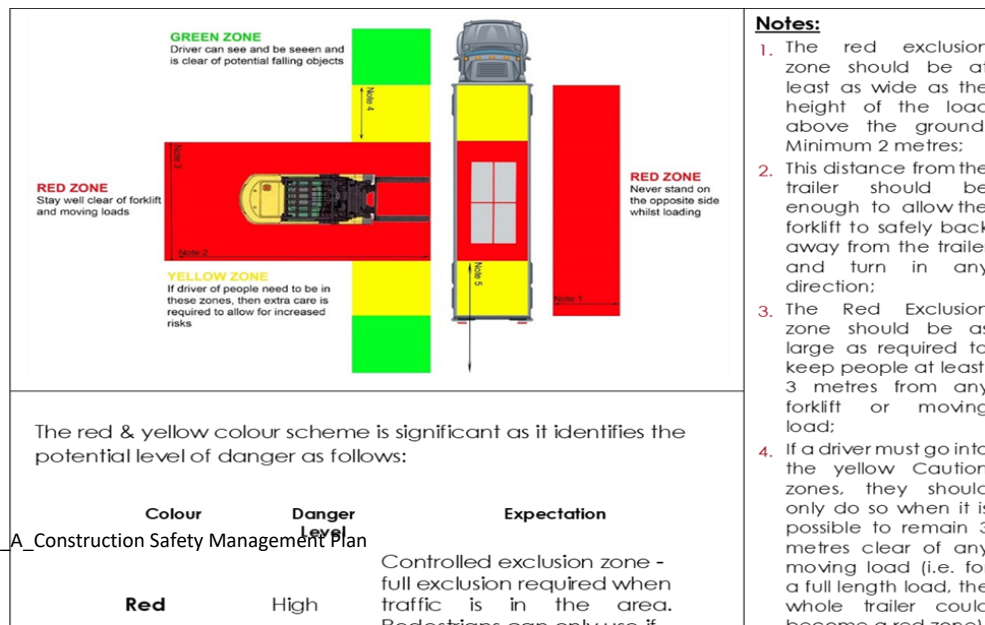
- Two booms are required to make the lift;
- The load Weighs over 20 tonnes
- Loads may be lifted in areas of difficult terrain
- Poles or derricks have been erected for this specific lift;
- Areas are heavily populated; and
- Loads may be lifted over or through critical plant areas where a Jemena Critical Lift Plan is in place.
- Where more than one crane is used to lift a load, the hoisting will be supervised by a competent person not otherwise involved in the operation. A Critical Lift Permit is also required.

### 36.1 SAFETY OF PERSONNEL



Site personnel and vehicles not directly involved in the operation of the crane will be excluded from areas of entrapment or danger from the load by use of signs, bunting or other relevant methods.

- LUEZ zones will be maintained at all times (see Diagram) All lifting will be subject to SWMS and risk assessment.
- As far as practicable, loads will not be suspended or travel over workers (especially where a vacuum, friction or magnetic device is used).
- Loads will not be suspended or travel over the public (and the public must be excluded from the area).
- Riding on loads is prohibited. Passengers on the plant will only use dedicated seats.
- Persons will only be suspended by a crane/hoist by the use of a state statutory health and safety authority approved workbox.
- Persons in a workbox must wear a safety harness and attachment and written instructions will be given to both the person in the workbox and the crane driver by the task Supervisor.
- The plant and its load will be operated such that it will not breach the 'Danger Zone' for power lines.
- Loads that may become unstable will be appropriately restrained.
- All loads require Tag lines (control lines) to be used.
- All rigging equipment to be used will be inspected by a licensed Rigger during mobilization and thereafter on a monthly basis.
- The Construction Manager will monitor that rigging equipment has been inspected prior to mobilization and at the prescribed defined intervals as required and details of inspection recorded in a Rigging Register and that all inspection certificates are available as appropriate for audit.
- The competent person will tag as 'Out of Service' all rigging equipment that has been quarantined for disposal.
- Required documentation includes Lift Plans/Drawings, Safe Work Method Statements, Rigging Equipment Register, and Lifting Equipment Register.

### LUEZ DIAGRAM





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### 37. HEALTH

In the event of any person sustaining an injury, they will be required to report the injury as soon as possible to their immediate supervisor.

An Injury/Illness Report will be completed in all cases where a person is injured to the extent that the person requires First Aid assistance and/or Medical treatment.

The Construction Manager will notify the Client as soon as possible after any incident involving an injury that requires medical treatment. A full incident investigation will be carried out and a Hazard/Incident Report initiated after medical treatment is given to the injured person.

In the event of a serious injury incident, written signed and dated statements will be recorded as soon as possible following the incident. The original copy of any statement will be attached to the original copy of the Hazard/Incident Report and duplicate copies distributed to the Client as soon as practicable. Those injured (if their condition permits) will be interviewed regarding specific details leading up to the incident. Each statement will be accurately recorded and signed as a true and correct record and witnessed.

Should any incident need to be reported to a Government Authority, this requirement will be met by the Manager HS&E in accordance with information as specified in AS 1885.1.

Unless further danger exists, any serious injury incident scene will not be disturbed until the required drawings and/or photographs are prepared or taken and details have been accurately recorded and any attendance required by Government Departments has occurred.

In the event of injury or ill health, the worker's Construction Supervisor and /or Construction Manager will arrange for the person to receive the proper treatment.

The Construction Manager will make arrangements for the provision of emergency assistance, including ambulance service in the case of serious injury/illness, and will co-ordinate medical treatment in conjunction with RFDS or Care Flight Medical Staff and utilise RFDS or Care Flight services when necessary.



Employees will be responsible to ensure their employer receives a copy of a doctor's Medical Certificate for any time lost from work due to a work associated injury or illness. Personnel will not be permitted to return to work until such time a clearance declaring them fit for suitable duties or able to resume normal duties is supplied

### 38. FIRST AID

The Construction Manager will provide and maintain appropriate First Aid facilities

As a minimum, one person in each separate workplace shall hold a current first aid qualification Provide First Aid HLTAID003 and HLTAID001 Provide CPR. Identification of nominated first aiders will be conveyed during induction training. Where the assessment of a workplace location has identified significant risk, additional trained first aid personnel will be assigned as appropriate.

- First Aiders shall be identified by a Green Cross sticker affixed to their hat.
- A list of all qualified "First Aiders" will be circulated and posted on all notice boards.

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- The Construction Manager will monitor supplies of first aid equipment and ensure all first aid boxes are always sufficiently maintained. All Wasco vehicles will carry a first aid kit.
- The Construction Manager will record First Aid Treatment and use records for reporting and replenishment of first aid kits.
- All first aid treatments must be entered into the incident register by the Construction Manager and forwarded to the HSEQ Manager daily for statistical purposes

## 39. MANAGEMENT OF CHANGE

Inadequate management of change significantly increases the risk of incidents. Uncontrolled modifications to plant and equipment or operating procedures have led to disasters. For this reason, Wasco has identified strategies, policies and procedures that will ensure that all modifications are reviewed by competent people, are appropriately authorised and documented and that necessary training is provided before the modifications are implemented.

### 39.1 RISK ASSESSMENT OF CHANGE

In every case, care is taken to ensure the safety implications of change are identified and assessed, and any risks are either eliminated or controlled.

Proposed construction process program changes are submitted to the Client's Representative by the Project Manager, who will in consultation with the Client's Representative assess the potential impact, give due consideration to the original design basis or management process and the effect of the change on other disciplines or other parts of the project.

Where project-controlled documents are required to be revised, these are updated, and the superseded documents removed from circulation in accordance with document control procedures.



### 39.2 MANAGEMENT SYSTEM / PROJECT SCOPE MODIFICATIONS

The Project Manager shall:

- Evaluate changes to Management Plans and scope by comparing them with the requirements of this document, standards and policies prior to being implemented
- Assess, in consultation with the Construction Manager as appropriate, the potential of impact on the original design basis and on the overall project program and schedule

Approved scope of work changes, including any additional risk controls or project modifications, are documented as approved before change implementation is initiated where appropriate. All variations and revisions to controlled documents are to be updated and superseded documents removed from circulation.

#### 39.2.1 HANDOVER OF RESPONSIBILITIES

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The Construction Manager shall:

- Ensure that Project personnel carry out a suitable handover to ensure the succeeding incumbent is fully conversant with their responsibility and work status
- Ensure that supervisors handing over to succeeding incumbents' complete handover notes, which may be in the form of a diary, notes or a checklist of responsibilities and/or work status
- Ensure that, in the assignment of replacement personnel or the re-delegation of duties, personnel are competent to undertake the assigned duties and that the assigned workload (increase/decrease) is assessed for any change in risk/risk potential

Supervisors shall:

- Complete handover notes, when handing over to succeeding incumbents, which may be in the form of a diary, notes or a checklist of responsibilities and/or work status;
- Ensure that succeeding incumbents are fully conversant with the status of the project and responsibilities involved; and
- Familiarise themselves with the status of the work and site prior to recommencing work.

### 39.3 PROJECT CHANGE MANAGEMENT



Project changes, however minor, have the potential to create significant hazards. All changes to the project design are to be identified and assessed prior to implementation. Changes in design, organisational structure, materials or construction processes are to be initiated by the design or Construction Manager and recorded through technical query management process and be authorised by the Project Manager. The Project Manager will assess the potential safety and risk implications of the change/query on the original design basis, impact on other project disciplines and on the Project and facility operations.

Where necessary the Project Manager will assign competent personnel to independently review the technical query and proposed change and revise the risk assessment documentation or registers accordingly.

The Project Manager will notify project team members of approved changes or modification.

### 39.4 WORK ACTIVITY MODIFICATIONS/PROCEDURAL AND CHANGES

All work instructions/standard operating procedure changes are required to be documented and monitored relative to implementation requirements and adequacy. Proposed changes are submitted to the Project Manager for review. Approved changes are confirmed by the Project Manager and documented. Major work activity modifications and changes are approved by the Project Manager and all relevant documentation including drawings are amended as required. The Project Manager and Construction Manager respectively will notify project team members of approved changes or modifications.

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The only exception is for identified immediate risk control or in emergencies where the requirement is recognised as a non-routine situation or an immediate threat to the safety of personnel or the environment exists.

Changes which have the potential to impact on construction personnel and activities are communicated through the Pre-Start or Toolbox Meetings and documented in the SWMS.

### 39.5 PLANT AND EQUIPMENT CHANGE MANAGEMENT

Formal risk assessment processes are established by the Construction Manager as required to ensure that new materials and components are thoroughly tested and evaluated before being introduced into the construction process.

## 40. SUB-CONTRACTS

### 40.1 PRE-QUALIFICATION

An online pre-qualification assessment will be undertaken via Rapid Contractor Management, to substantiate and qualify each Subcontractor's submission. In the evaluation process, preference will be given to those organisations that can demonstrate that they are currently assessed under an Industry recognised third party auditing system.

Where a Subcontractor is a "Major Subcontractor" they will be required to provide a copy of their Safety Management Plan along with records such as:

- Lost Time Injury and Medically Treated Injury Frequency Rate for the last two years (LTIFR / MTIFR) Total recordable Injury frequency Rate (TRIFR)
- Workcover Claims details for the last two year
- Plant / Machinery registrations and maintenance records
- Plant operator / Prescribed occupation qualifications
- Insurance Certificates



### 40.2 SUBCONTRACTOR MANAGEMENT

In managing subcontracted activities, as with all activities, the key is planning. Therefore, the Project Manager in consultation with Jemena where required, will document and agree to all subcontracted activities prior to implementation.

The Project Manager has overall responsibility for monitoring the safety performance of subcontractors.

The Project Manager is to:

- Ensure that subcontractor's or service providers are provided with a copy of the applicable HSE documentation and environmental documentation.

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- Review the adequacy of each subcontractor's or service provider's submission.
- Ensure that a pre-qualification assessment of the preferred sub-contractor is undertaken as part of the final selection process and prior to appointment.

The Construction Manager is to:

- Ensure subcontractors or service providers have in place standard operating procedure and participate in the SWMS process for each task prior to commencement in accordance with the SWMS and risk management requirements.
- Ensure that all subcontractor personnel fulfil their health and safety obligations.

All subcontractors and service providers are to:

- Comply with all health and safety obligations and reporting requirements.
- Comply with and enforce the provisions of the relevant state health and safety legislation, Australian Standards and Codes of Practice.
- Comply with the most current version or edition of relevant standards.
- Comply with all contractor policies, instructions and safe work practices.
- Establish and participate in all Health & Safety Committees and consultative arrangements as determined by Wasco or where required under the Contract.
- Provide, upon specific request by Wasco, a copy of their relevant health and safety plans, procedures and documentation.
- Participate in drills, pre-start meetings/handovers, toolbox talks in addition to attending all project meetings requiring attendance.

In addition to, and in support of Project Safety Management Planning, subcontractors will participate in risk assessment workshops as directed by the Project Manager, identifying hazards and assessing the adequacy of existing controls, interaction between the differing phases of contracted activity and existing operational infrastructure, and public impact potential.

The result of these Project Risk Assessment workshops will facilitate the development of a project Hazard Register, incorporating specific control actions and strategies.

The subcontractor shall actively encourage and facilitate the ongoing identification of hazards by its employees, agents and subcontractors during construction activities.



Where a Subcontractor is a "Minor Subcontractor" such as a welder they will be required to comply with the Wasco Safety Management Plan and Safety Management System.

## 41. RECORDS & REPORTING

All project information maintained by the Construction Superintendent, Construction Supervisors, such as correspondence, notes, minutes of meetings, incident records, etc. will be filed in a dedicated project file in the central filing system. These records will be available for review on request.

All sub-contractor information, such as correspondence, notes, minutes of meetings, etc. will be filed in a dedicated project file in the central filing system, and available for review on request.

With respect to incident reporting in accordance with Occupational Safety & Health Legislation, where a notifiable incident occurs involving an employee or registered plant, the Construction

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Superintendent / Construction Superintendent will ensure that the incident is reported to the Project Manager and HSEQ Manager.

The Project Manager is responsible to report all incidents immediately to the to the Company representative.

The Daily Construction Report will be provided to the Client and shall provide the following statistics:

- Lost time incidents
- Lost time duration
- Lost time frequency (monthly)
- First Aid statistics
- Medically treated injuries
- First Aid treatments (FAT)
- Hazardous incidents
- Non conformance
- Any other site Health and Safety

## 42. REVIEW AND IMPROVEMENT

During the Project, the Client's Representative and the Project Manager will periodically review the effectiveness of the CSMP through regular weekly progress reports and meetings. The objective of the review process is to determine which arrangements adopted for the project are being effective in meeting the Client's and Wasco' safety policy objectives.

An Audit and a Lesson Learnt review will be conducted at the end of the Project

The review process will focus on the effectiveness of implementation of the HSE Plan. Health and Safety Documentation used during the review process will include the following:

- Daily Construction Report
- Weekly reports
- Incident/Loss Reports and Investigations
- Site Inspection Reports
- The Project Hazard Register
- The Corrective Action Hazard Register
- Care plan