September 2016

roma to brisbane pipeline

access arrangement submission.

attachment 4-4 – Pipeline Management Plan (QLD)

APA Group

Pipeline Management Plan

Chapter 3: QLD Operations

320-PL-AM-0025

Pipeline Management System

Pipeline Management Plan
Chapter 3: QLD Operations

QLD Petroleum Pipeline Licence 2, 24, 41, 42, 50, 51, 74, 120, 123 & 129

SA Pipeline Licence 18

Version:	1.2
Released:	December 2015
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DOCUMENT CONTROL

Summary of Changes	V1 - Initial issue. V1.1 – General Review V1.2 – Updated to Updated to include the Integrated Operations Centre and APA National Emergency Response Plan	
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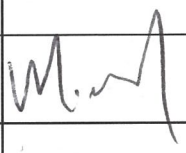
Approved	Managing Director - M. McCormack	
Changes to be approved by	General Manager Field Services East Coast	

PROPOSALS FOR AMENDMENT

This document has been prepared to support APA Group in achieving business objectives by delivering standardised processes. Improvements can be made and feedback on this document is encouraged, and should be directed to the document owner.

PRINTED WORKING COPY CONTROL

The official copy of this document is located on the APA Intranet. Hard copy versions are uncontrolled.

Table of Contents

1. REFERENCES

Reference	Title / Description
Legislation	Petroleum and Gas (Production and Safety) Act 2004 and Amendments
Legislation	Petroleum and Gas (Production and Safety) Regulation 2004 and Amendments
Legislation	Petroleum Act 1923 and amendments
Legislation	Petroleum and Geothermal Energy Act 2000 (SA)
Legislation	Petroleum and Geothermal Energy Regulation 2013 (SA)
Legislation	Workplace Health and Safety Act 1997 and Amendments
Legislation	Work Health and Safety Act 2011 and Amendments
Code	Australian Pipeline Industry Association (APIA) Code of Environmental Practice-Onshore Pipelines (Part B-Operations), 1998
Policy	Risk management, including Health, Safety and Environment (HSE) risk, as per APA Group's corporate policies
Contract	APA Group Gas Transportation Agreements
Guideline	QLD Environmental Protection Agency (EPA) Guidelines for Preparing EMPs
AS 2885.1	Pipelines – Gas and Liquid Petroleum – Part 1 – Design and Construction
AS 2885.2	Pipelines-Gas and Liquid Petroleum, Part 2 – Welding
AS 2885.3	Pipelines – Gas and Liquid Petroleum – Part 3 – Operations
AS/NZS 2832.1	Cathodic Protection of Metals, Part 1-Pipes and Cables
API Specification 5L	American Petroleum Institute-Steel Pipe
API Standard 6D	Specification for Pipeline Valves, Gate, Plug, Ball and Check Valves (14th Edition) March 1971
AS4041-2006	Pressure Piping
MSS – SP75 1970	Specification for High Test Wrought Butt Weld Fittings
MSS-SP44	Specification for Flanges
ASME B31.3	Chemical plant and refinery piping
AS3000-2000	Electrical Installations (Wiring Rules)
AS 3862 1991	Fusion Bonded Epoxy Coating

2. DEFINITIONS / ABBREVIATIONS

Term	Definition
AC	Alternating Current
AGA	Australian Gas Association
ALARP	As Low As Reasonably Practical
APA Group	APA Group
API	American Petroleum Institute

Term	Definition
APIA	Australian Pipeline Industry Association
AS	Australian Standard
CMP	Crisis Management Plan (APA Group)
CP	Cathodic Protection
CS	Compressor Station
CSG	Coal Seam Gas
DBYD	Dial Before You Dig
DNRM	Department of Natural Resources and Mines
DN	Diameter Nominal
EMP	Environmental Management Plan
ESD	Emergency Shutdown
FBE	Fusion Bonded Epoxy
GC	Gas Chromatograph
GIS	Geographical Information System
GJ	Gigajoule i.e. 10^9 Joules
GTA	Gas Transportation Agreement
H	High
HASIF	Hazard and System Improvement Form
HAZOP	Hazard and Operability (study)
HDD	Horizontally Directionally Drilled
HSE	Health, Safety and Environment
HSEQ	Health, Safety, Environment and Quality
I	Intermediate
IJ	Insulation Joint
IMS	Integrated Management System
IOC	Integrated Operations Centre
IS	Inlet Station
JHA	Job Hazard Analysis
KP	Kilometre Post
KPI	Key Performance Indicator
kPa	Kilopascal i.e. 10^3 Pascals
kPag	Kilopascals Gauge
L	Low
LAN	Local Area Network
LTI	Lost Time Injury
MAOP	Maximum Allowable Operating Pressure
MEG	Main Earth Grids
MLV	Main Line Valve

Term	Definition
MOP	Maximum Operating Pressure
MP	Mile Post
Mpa	Megapascal i.e. 10^6 Pascals
MS	Meter Station
MSDS	Material Safety Data Sheets
MTI	Medical Treatment Injury
N	Negligible
OEM	Original Equipment Manufacturer
PIO	Permit Issuing Officer
PJ	Petajoule i.e. 10^{15} Joules
PL	Pipeline Licence
PPE	Personal Protective Equipment
PR	Plant Release
PRS	Pressure Reduction Station
PTW	Permit To Work
QA	Quality Assurance
RBP	Roma Brisbane Pipeline
RMS	Risk Management System
ROW	Right of Way
SAOP	Safety and Operating Plan
SCADA	Supervisory Control & Data Acquisition
SCC	Stress Corrosion Cracking
SS	Scraper Station
SMP	Safety Management Plan
SMS	Safety Management Systems
SS	Sale Station
SWQP	South West Queensland Pipeline
T	Telemetered
TJ	Terajoule i.e. 10^{12} Joules
UT	Ultrasonic Testing
Wobbe Index	Gross Calorific Value / Specific Gravity$^{0.5}$
WMS	Works Management System
YTD	Year to Date

3. PURPOSE

This Pipeline Management Plan Chapter 3: QLD Operations (Chapter 3) provides a description of the pipelines, the pipeline locations and operations. Chapter 3 also sets out the risk assessment, policies, procedures and standards that are specific to FSNE assets.

3.1 Safety Management Plan

The Pipeline Management Plan Chapter 1: Safety Management (Chapter 1) and Chapter 3 jointly form the Safety Management Plan (SMP) for FSNE. The SMP is written in accordance with the *Petroleum and Gas (Production and Safety) Act 2004* (the Act) and the *Petroleum and Gas (Production and Safety) Regulation 2004* (the Regulation), specifically in relation to the requirements of safety management plans under section 675 of the Act.

The SMP also covers the portion of the QSN link located in South Australia and in that respect has been prepared in accordance with the *Petroleum and Geothermal Energy Act 2000* (SA) and the *Petroleum and Geothermal Energy Regulations 2013* (SA).

APA Group operates and maintains its operating plant to the risk assessment, policies, procedures and standards as set out in the SMP.

4. SCOPE

The SMP applies to all Field Services North East (FSNE) Transmission Facilities Owned by the following APA Group Companies: APA (SWQP) Pty Ltd, APA Pipelines Investments (BWP) Pty Limited, Roverton Pty Limited, APT Pipelines (QLD) Pty Limited, APT Petroleum Pipelines Limited and Kogan North Central Gas Processing Facility owned by Energy Infrastructure Investments Pty Ltd.

4.1 APA Group

APA Group provides the labour and resources required for the necessary management and services for pipeline operations. These services include technical management and engineering expertise, regulatory support, a range of operating and maintenance services and project management activities, including design, approvals and construction of infrastructure.

4.2 FSNE Operating Plant

The SMP covers the following operating plant:

- PL No. 2 Roma Brisbane Pipeline;
- PL No. 24 South West Queensland Pipeline;
- PL No. 41 Carpentaria Gas Pipeline;
- PL No. 42 Cannington Lateral Gas Pipeline;
- PL No. 50 Mica Creek Meter Station;
- PL No. 51 Mt Isa Lateral;
- PL No. 74 Peat Lateral;
- PL No. 120 Kogan North Central Gas Processing Facility;
- PL No. 123 Berwyndale to Wallumbilla Pipeline;
- PL No. 129 QSN Link (Queensland); and
- PL No. 18 QSN Link (South Australia)

7. INTRODUCTION

The SMP details the policy of the APA Group relating to personnel, public and environment protection. As identified in risk assessments carried out on each facility, items include measures to:

- Protect the facility and associated installations;
- Promote public awareness of the facility;
- Operate and maintain the facility safely;
- Respond to emergencies;
- Prevent and minimise product leakage;
- Conduct facility inspections and assessments;
- Ensure that the plans and procedures continue to comply with the engineering design; and
- Ensure the appropriate change management processes and approvals are followed.

The overall accountability for the development, implementation, maintenance and review of the SMP rests with the APA Group.

APA Group is responsible for providing the necessary resources (including human and financial) for implementation of the requirements of the SMP including the application of policies, procedures and work instructions.

The Technical Regulatory Manager is responsible for ensuring that the plan is monitored, reviewed and updated as required, every two years and, in any event, when the scope of any single change is significant. Any comments, suggestions for improvements, errors or omissions should be brought to the attention of the Technical Regulatory Manager in the first instance.

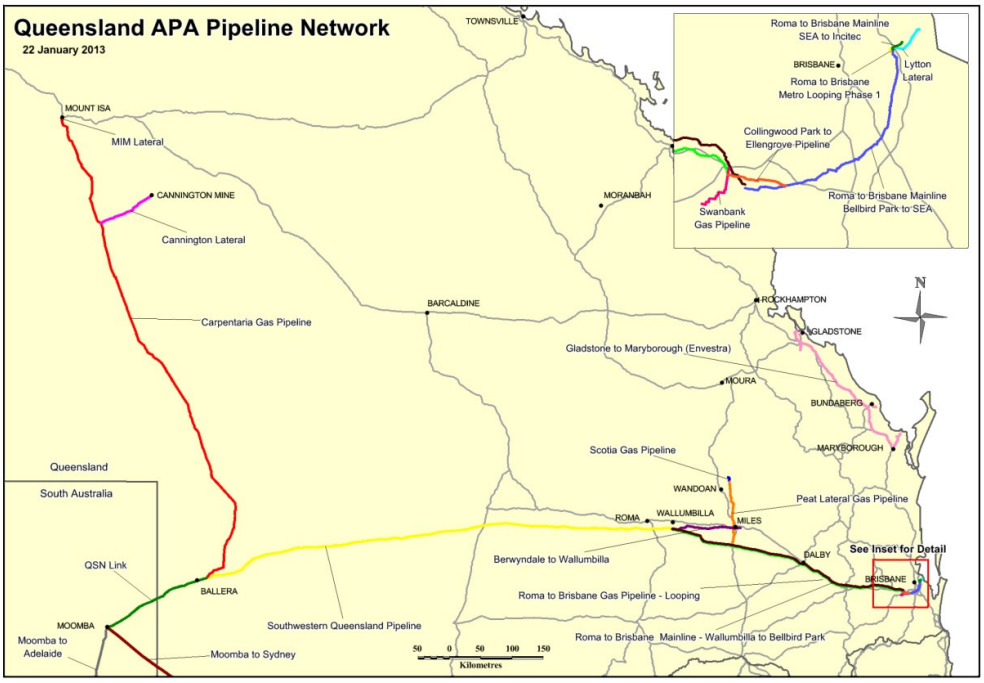
This document is controlled within APA Group's Queensland document management system.

8. DESCRIPTION OF THE OVERALL QLD PIPELINE SYSTEM

This section describes the whole QLD pipeline system as operated by APA Group Transmission. Details for each facility can be found in the appendices.

8.1 Overview of the Pipeline Systems

The figure below is a graphical overview of the QLD / FSNE pipeline assets. All APA Transmission pipelines north and east of Moomba are within the FSNE operations area.



8.2 Roma to Brisbane Pipeline System

The Roma to Brisbane Pipeline (RBP), PPL2, is a complex pipeline system with a number of components. It spans approximately 440 km between Wallumbilla and Brisbane and has numerous receipt and delivery points and compressor facilities.

Refer to Appendix A for details.

8.3 Peat Lateral Pipeline

The DN250 Peat and Scotia Lateral Pipeline, PL 74, spans 121 km and transports gas from the Scotia and Peat production facilities to the RBP at Arubial, near Condamine.

Refer to Appendix E for details.

8.4 Carpentaria Gas Pipeline System

The DN300 Carpentaria Gas Pipeline (CGP), PL 41, spans approximately 840 km from Ballera to Mt Isa. The pipeline was commissioned in 1998. It has a number of laterals supplying mine sites and power stations in northwest Queensland.

The CGP system is comprised of the following pipelines:

- The CGP, PL24;

- The Cannington Lateral Pipeline, PL42;
- The Mica Creek Metre Station, PL50 and;
- The Mount Isa Lateral Pipeline, PL51

Refer to Appendix B for details.

8.5 South West Queensland Pipeline System

The South West Queensland Pipeline (SWQP) is comprised of the following pipelines:

- The DN400 South West Queensland Pipeline (SWQP), PL24, spanning 754 km from Ballera to Wallumbilla. The line was commissioned in 1996.
- The DN450 South West Queensland Expansion Pipeline (SWQE), PL24, also spanning 754 km from Ballera to Wallumbilla. The line was commissioned in 2012.
- The DN400 QSN link, PL129 QLD and PL18 SA, spanning 182 km from Ballera to Moomba. The line was commissioned in 2008.
- The DN450 QSNE link expansion, PL129 QLD and PL18 SA, spanning 182 km from Ballera to Moomba. The line was commissioned in 2012.

Refer to Appendix H for details.

8.6 Berwyndale Wallumbilla Pipeline

The DN400 BWP, PL123, consists of one scraper section spanning 112km from Berwyndale to Wallumbilla. The line was commissioned 2008. An offtake station and interconnecting pipeline to the Silver Springs pipeline system (owned by others) was added in 2011.

Refer to Appendix G for details.

8.7 Kogan North Central Gas Processing Facility

The KNCGPF is a gas processing and compression facility with associated pipeline infrastructure licensed under PPL 120. It is operated by APA Group and comprises:

- Inlet low-pressure pipeline
- Gas compression, dehydration and metering facilities
- Outlet high-pressure pipeline exporting to the Roma Brisbane Pipeline

Refer to Appendix F for details.

8.8 Operation and Control of the Pipeline Systems

The pipelines are operated and controlled from an Integrated Operations Centre (IOC) located in Brisbane, Queensland using the APA Clear SCADA System. The main IOC is located at APA's offices in 121 Wharf Street, Spring Hill with a backup centre at 60 Schneider Road, Eagle Farm. The IOC is described in Chapter 1 of the PMP.

8.8.1 Control, SCADA and Communications Systems

Compressor stations, metering stations and other key sites are provided with telemetry and communications equipment enabling remote control and monitoring via SCADA.

The key parameters monitored include gas quality and pressure at inlet sites, site security, CP voltages and currents, gas pressure and temperatures, gas quality and flow metering data. Field data is transmitted to SCADA over various telecommunications media.

8.8.2 SCADA Communication Overview

The Integrated Operations Centre (IOC) has been provided with an un-interruptible power supply that has sufficient capacity to ensure continuous operation through a reasonable power outage. The centre uses reliable technology and has an appropriate 24 hour-a-day security system.

Response to incidents regarding supply of natural gas, major equipment failures or third party hits is managed in accordance with the Emergency Response Plan. Typically an emergency management team will be assembled in the Brisbane office.

8.9 Valve, Scraper, Off-takes, Meter Stations and Odorant

All major pipelines are provided with scraper facilities at end-of-line stations and at appropriate intervals, typically between 50-200km. Mainline valves are provided at intervals as per the approved design of each pipeline. Some mainline valves are telemetered and remotely actuated while others are manually operated.

Custody transfer metering at receipt and delivery points is carried out by a range of meter technologies including orifice plates, turbine meters, Coriolis meters and ultrasonic meters.

The Queensland transmission pipeline system generally transports unodorised gas. Odorant facilities are provided at Lytton (downstream of the Lytton Lateral) and at Mica Creek for gas transported into the Mt Isa lateral. Odorisation of gas in the distribution networks connected to the RBP, including the Brisbane metropolitan area, is done by the Networks operators.

8.10 Rotating Plant

Gas compression equipment that is currently installed on the QLD pipeline system is detailed in the table below.

Roma Brisbane Pipeline	
Location	**Unit Description**
Oakey	Solar T1602 S20 – C168 wet seal compressor
Dalby	Solar T6100 C50 – C334 dry seal compressor (Unit 2)
Kogan	Solar T1602 S20 – C168 wet seal compressor
Carpentaria Gas Pipeline	
Location	**Unit Description**
Morney Tank	Solar T1602 S20 – C166 dry seal compressor
Davenport Downs	Solar T6100- C50 – C334 dry seal compressor
South West Queensland Pipeline	
Location	**Unit Description**
Moomba	Solar Mars 90 – 3 units (MCS)
Cooladdi (QCS4)	Solar Taurus T60 Version 7802 and Solar C3341
Wallumbilla	Waukesha L7044GSI, Ariel JQK/4 – three units (WCS1)
	CAT3608TALE, Ariel JGK/4 – three units (WCS2)
	Solar Mars 90 – three units (WCS3)
Kogan North CGPF	
Location	**Unit Description**
KNCGPF	CAT / Ariel (3 units)

9. LEGISLATIVE FRAMEWORK

The construction, operation and maintenance of transmission pipelines in Queensland are regulated primarily under the Petroleum and Gas (Production and Safety) Act and Regulations 2004 and the Environmental Protection Act and Regulations 1994.

The construction, operation and maintenance of transmission pipelines in South Australia are regulated primarily under the Petroleum and Geothermal Energy Act and Regulations 2000 and the Environmental Protection Act and Regulations 1993.

The operation and maintenance of the pipelines is impacted by other legislation and standards. APA Group, being the Operating Authority, has the responsibility to ensure full compliance with the regulatory obligations. This includes:

- Maintaining regular liaison with the relevant regulators in relation to technical regulatory compliance;
- Participating in the development and review of new legislation;
- Developing management tools in accordance with the technical regulatory requirements; and
- Developing management tools to ensure full compliance with existing legislation.

APA Group as the licensee has external reporting requirements in accordance with the Petroleum and Gas (Production and Safety) Act 2004 and amendments and the Petroleum and Gas (Production and Safety) Regulations 2004 and amendments.

The licensee reporting obligations for the South Australian portion of the QSN link are pursuant to the Petroleum and Geothermal Energy Act and Regulations 2000.

9.1 Periodic Reports – Queensland

9.1.1 Petroleum Transmission Report

The holder of a pipeline licence for a transmission pipeline must, within 20 business days after the last day of each 6-month period for the licence, lodge a petroleum transmission report for the period.

The report must contain each of the following in a form acceptable to the chief executive –

- The type and volume of any petroleum component transported through the pipeline during the period;
- For an impurity, including, for example, carbon dioxide or inert gases, transported through the pipeline during the period -
- The volume of the impurity; or
- The volume by weight of the impurity; or
- The concentration by volume of the impurity in the petroleum component.

9.1.2 Annual Report for a Petroleum Facility Licence or Pipeline Licence

For section 552(1) of the Act, the following information must be contained in an annual report for a petroleum facility licence or pipeline licence –

- The authorised activities for the licence carried out during the reporting period; and
- A statement of the authorised activities proposed to be carried out under the licence for the next 12 month period.

9.1.3 Executive Safety Manager must give Annual Safety Report

The Executive Safety Manager for an operating plant must, on or before 1 September each year, lodge a safety report for all assets in relation to the preceding financial year that complies with section 690 of the Petroleum and Gas (Production and Safety) Act 2004 and amendments.

9.1.4 Safety Management Plans

APA Group as the licensee has safety requirements in accordance with the Petroleum and Gas (Production and Safety) Act 2004 and amendments, the Petroleum and Gas (Production and Safety) Regulations 2004 and amendments.

The operator of an operating plant must –

- For each stage of the plant, make a safety management plan that complies with section 675; and
- Implement and maintain the plan.

As noted in section 3.1, the Pipeline Management Plan Chapters 1 and 3 form the Safety Management Plan for the purpose of the Act.

9.1.5 Annual Measurement Report

The controller of a meter must, on or before 1 September each year, lodge a measurement report about its measurement scheme for the preceding financial year that complies with section 651 of the Petroleum and Gas (Production and Safety) Act 2004 and amendments.

9.2 Periodic Reports – South Australia (QSN Link and MIP)

9.2.1 Review of Statements Of Environmental Objectives

An approved statement of environmental objectives under the Petroleum and Geothermal Energy Act 2000 must be reviewed at least once in every 5 years.

A review must take into account, or address—

- changes in information or knowledge in relevant areas; and
- community expectations in relation to relevant environmental issues; and
- changes in the use of land; and
- changes in operational practices; and
- other matters determined to be relevant by the Minister.

9.2.2 Fitness for Purpose Assessment

APA as licencee must carry out fitness for purpose assessments at least once in every 5 years and submit the report within 2 months after completion of the assessment.

An assessment must comply with the requirements prescribed by the Petroleum and Geothermal Energy Regulations 2013.

9.2.3 Emergency Response Drill and Report

APA as licensee must, at intervals not exceeding 2 years, conduct a practice drill of the emergency response procedures for all facilities operated on land within the area of the licence.

Under the Petroleum and Geothermal Energy Regulations 2013, a report on the drill must be submitted within 2 months after completion of the drill.

9.2.4 Annual Report

For section 33 of the Petroleum and Geothermal Energy Regulations 2013 APA must within 2 months after the end of each licence year, submit an annual report. The report must be in a form approved and include the requirements prescribed by the Regulations.

9.2.5 Annual HSE Management System Self Assessment

APA must conduct and annual self assessment of its HSE management system to maintain a Low Level Operator Classification pursuant to the Petroleum and Geothermal Energy Act 2000

9.3 Prescribed Event/Incident Reporting Queensland

Under the Petroleum and Gas (Production and Safety) Act and Regulations certain events and incidents must be reported to the administering authority within strict timeframes. The administering authority's staff in each region operate an emergency response roster with a designated emergency number for each region. If an emergency occurs outside working hours, 000 should be called. Emergency Services has the emergency numbers and will contact the on-call inspector rostered on at that time. A listing of the duty inspector's mobile phone is available in the front of this document and also below this section.

The following is an excerpt from the Petroleum and Gas (Production and Safety) Regulations showing timeframes and methods of communications.

The Inspectorate staff in each region operate an emergency response roster with a designated emergency number for each region. If an emergency occurs outside working hours, 000 should be called. Emergency Services has the emergency numbers and will contact the on-call inspector rostered on at that time. A listing of the duty inspector's mobile phone is available in PMP Chapter 1 and also below this section.

In writing includes the use of Electronic Transactions as per the Electronic Transactions Act.

Incident Type	Notify P&G Inspectorate **by Telephone**	Notify P&G Inspectorate **In writing**
An incident involving death of a person	✓ Immediately	✓ As soon as practicable
An incident involving injury to a person requiring medical treatment.	✓ Immediately	✓ As soon as practicable
An emergency, including an emergency alarm activation other than as part of a routine test, at an operating plant that is a major hazard facility under the Work Health and Safety Regulation 2011	✓ Immediately	✓ As soon as practicable
A fire at an operating plant	✓ Immediately	✓ As soon as practicable
An unplanned or uncontrolled release of petroleum, fuel gas or prescribed storage gas, attended by emergency services	✓ Immediately	✓ As soon as practicable
An incident with the potential to cause a general shortage of fuel gas in Queensland or an area of Queensland	✓ Immediately	✓ As soon as practicable
An incident involving damage to property that substantially increases the risk of damage to plant or equipment or injury to persons	✓ Immediately	✓ As soon as practicable
An incident that had the potential to, but did not, cause the death of, or injury to, a person or damage to plant or equipment	✓ Immediately	✓ As soon as practicable but no later than 5 business days after the incident occurs
an unplanned or uncontrolled release of a gas that is petroleum or prescribed storage gas or fuel gas from an operating plant, at a concentration of more than the lower flammable alarm level for the gas stated in the safety management plan for the plant, not attended by emergency services	✗	✓ As soon as practicable
An incident at an operating plant to which the *Workplace Health and Safety Act 2011* does not apply, if the incident is not otherwise mentioned in this schedule	✗	✓ As soon as practicable but no later than 5 business days after

		the incident occurs
A work-related illness of a person at an operating plant to which the *Workplace Health and Safety Act 2011* does not apply	✗	✓ As soon as practicable but no later than 5 business days after the operator of the plant becomes aware or, ought reasonably to have been aware, of the illness

The Petroleum & Gas Inspectorate is a division of the Department of Natural Resources and Mines contact details	
Method	**To**
Immediately by telephone (24 hour Emergency Contact numbers)	**Emergency Advice and Notification Hotline** 1300 910 933
In writing as soon as practicable to:	Email: gassafe@dnrm.qld.gov.au

9.4 Incident Reporting South Australia (QSN Link & MIP)

APA will notify the relevant public authority of any significant events that occur along the length of the QSN Link pipeline and MIP or at any of the pipeline facilities.

APA will investigate any major accident and provide the necessary information to the relevant public authority within the time specified by that body.

Section 85 of the Petroleum and Geothermal Energy Act 2000 requires reporting of a serious incident ie;

- one in which a person is seriously injured or killed;
- poses an imminent risk to public health or safety;
- serious environmental damage occurs;
- imminent risk of serious environmental damage arises;
- Security of natural gas supply is prejudiced or an imminent risk of prejudice to security of natural gas supply arises;
- An event that compromises the physical integrity of an asset or facility; which must be reported to the Minister as soon as practicable after its occurrence in accordance with regulation 32 of the Petroleum Regulations 2000.

Reportable incidents (i.e.; incidents other than serious incidents) are reported on a quarterly basis within one month after the end of each quarter, which include;

- an escape of petroleum, a processed substance, a chemical or a fuel that affects an area that has not been specifically designed to contain such an escape; and
- an incident identified as a reportable incident under the relevant statement of environmental objectives

10. APPENDIX A ROMA BRISBANE PIPELINE LICENCE NO.2

10.1 Pipeline System Operation

This section describes the RBP Pipeline Licence No. 2 and above ground facilities, important features of the design, and measures included in the design that enhances the security of the system. Pipeline Licence No. 2 states that the pipeline licence is for an indefinite licensed period.

10.1.1 Design Life

A design life for the original RBP mainline, which encompasses the DN200, DN250 and DN300 sections of PL2, has been unknown due to the limitation of records available from the early design.

APA undertook a design life review in 2009, when this asset was 40 years old, as 40 years was considered to be a typical design lifetime for a pipeline asset of this era. That review concluded that the pipeline could continue operating subject to appropriate ongoing integrity management.

Subsequent to that design life review, further pipeline integrity management activities have been ongoing such as high-resolution MFL intelligent pigging, XZY and caliper pigging, and subsequent excavation for verification and repair, pipeline and coating refurbishment, and stress corrosion cracking direct assessment.

At the time of preparation of this plan (2014), those activities are ongoing. Due to a pipeline failure on the DN250 at the Toowoomba Range, another Remaining Life Review is required in accordance with AS 2885.3-2012. This plan shall be updated when further information is available.

10.1.2 Overview of the Pipeline System

The Roma to Brisbane natural gas pipeline system consists of:

- Two independent parallel pipelines; one running from Wallumbilla to Bellbird Park which is approximately 396.8 km long DN250, and one running from Wallumbilla to Swanbank Power Station approximately 405.55 km long DN400.
- In 2012 the Dalby compressor station was upgraded to include a Centaur 50 compressor which was commissioned in July 2012 and currently services the DN400 pipeline. The Oakey and Kogan compressor stations service the DN250 pipeline[1].
- The RBP Metropolitan pipeline extends from Bellbird Park to Gibson Island. This section is approximately 40.2 km long, has an operating pressure of up to 4,600 kPag, and consists of 37.6 km of DN300 and 2.6 km of DN200. The section of the DN300 downstreawm from the MLV at Mt Gravatt and the DN200 has a MAOP of 4,200kPa.
- The Lytton Lateral, A 5.4 km, DN200 extension from the end of the DN300 at the SEA Block Valve to the Caltex Refinery was installed and commissioned in 2010.
- A section of 5.815 km, D400 of Brisbane metro looping pipeline from Carina (Mile Post 268.4) to Paringa Road Scraper Station was installed and commissioned in 2012.
- The Swanbank lateral forms part of the RBP DN400 mainline constructed from Redbank Meter Station to Swanbank Power Station at a length of 8.75 km.
- The DN400 lateral pipeline running from Collingwood Drive to Ellengrove Gate Station is approximately 9.5 km long. .

[1] The Solar S20 compressors at Gatton, Condamine and Yuleba are currently isolated from the pipeline and are not considered operational. Refer to section 10.1.10 below.

- 59 isolation valves along the length of the pipelines. These are strategically located to shut down and de-pressurise the pipeline in the event of emergency.
- 16 Sale Stations (SS) and 5 Inlet Stations (IS) at various points along the pipeline including bidirectional inlet/outlet connections at selected locations.

There was no Australian Standard specifically for high pressure hydrocarbon pipelines at the time of design and construction of the original pipeline, i.e. DN250mm, DN300 and DN200, American Standard ANSI B31.8 – 1967 was used. Subsequent additions, repairs or modifications have been designed to the pipeline standards at the time, i.e. AS1697 and AS2885.

The Pipeline is currently operated in accordance with AS2885.3.

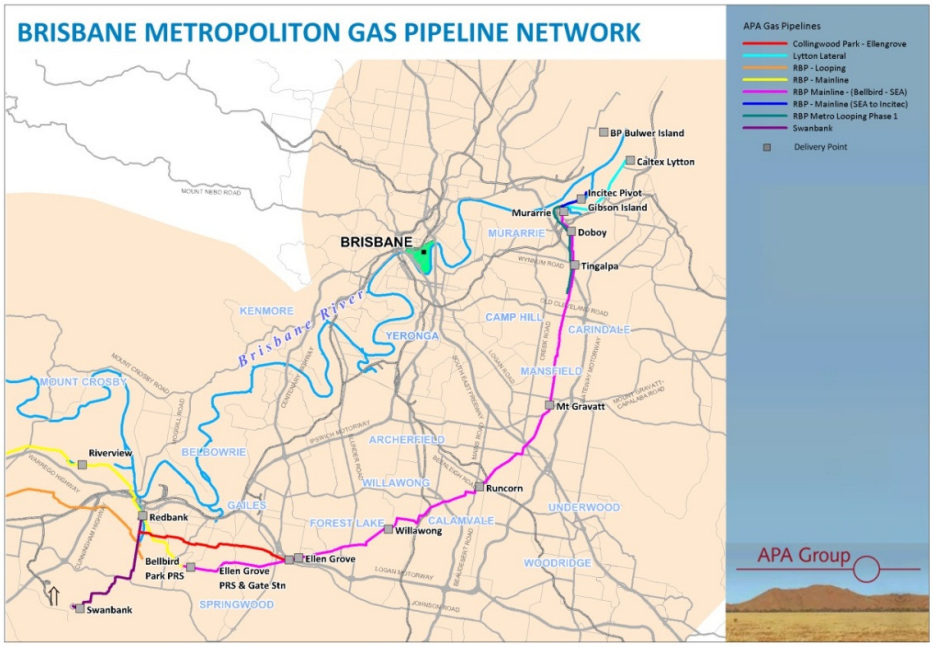
The Pipeline is regulated under the Petroleum and Gas (Production and Safety) Act and Regulation 2004 and amendments, under the instrument of Pipeline Licence (PL) No.2. PL No.2 is named as a strategic pipeline in Schedule 5 of the Petroleum and Gas (Production and Safety) Regulation 2004 and amendments.

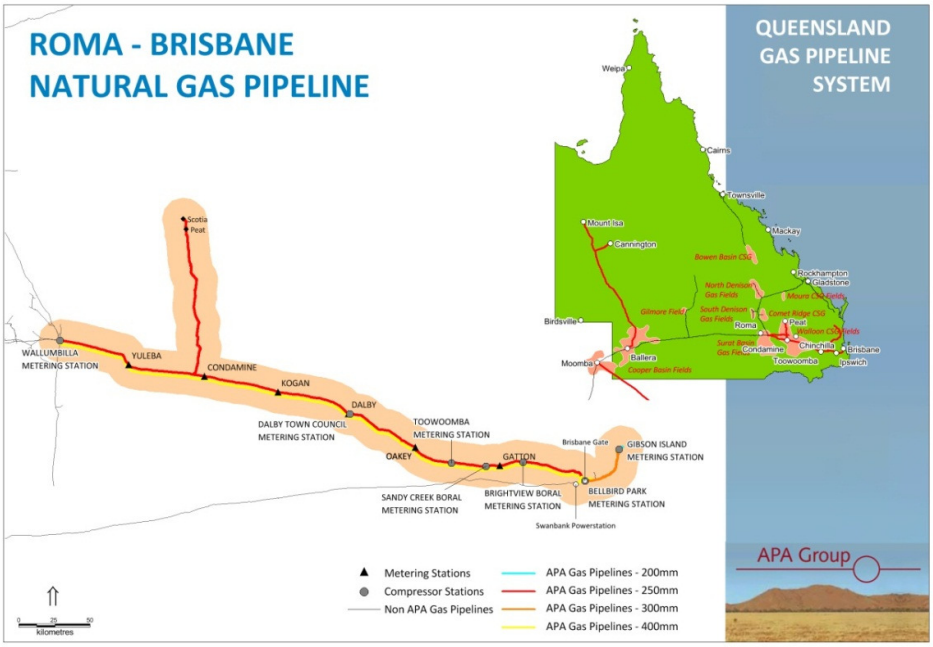
From Wallumbilla to Brisbane the Pipeline is contained within a 15 metre wide easement or right-of-way in rural areas and a 6 wide metre easement in metropolitan areas or road reserve. Easements are shown on Registered Plans, at the Land Titles Office, Brisbane (Qld).

Refer to below for a general route map of the Pipeline.

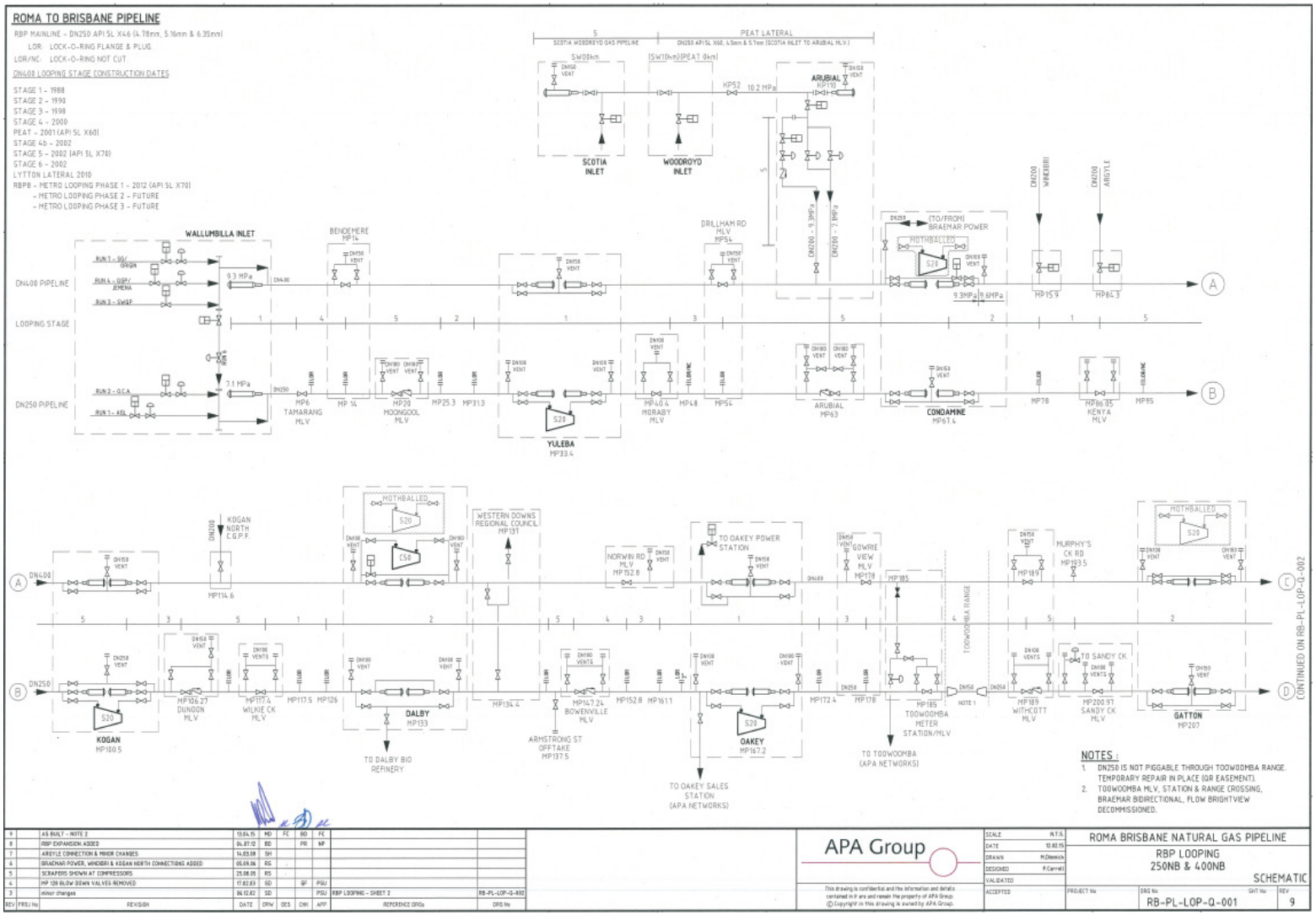
Refer to below for a schematic diagram showing major item details of the Pipeline.

10.1.3 General Route Map

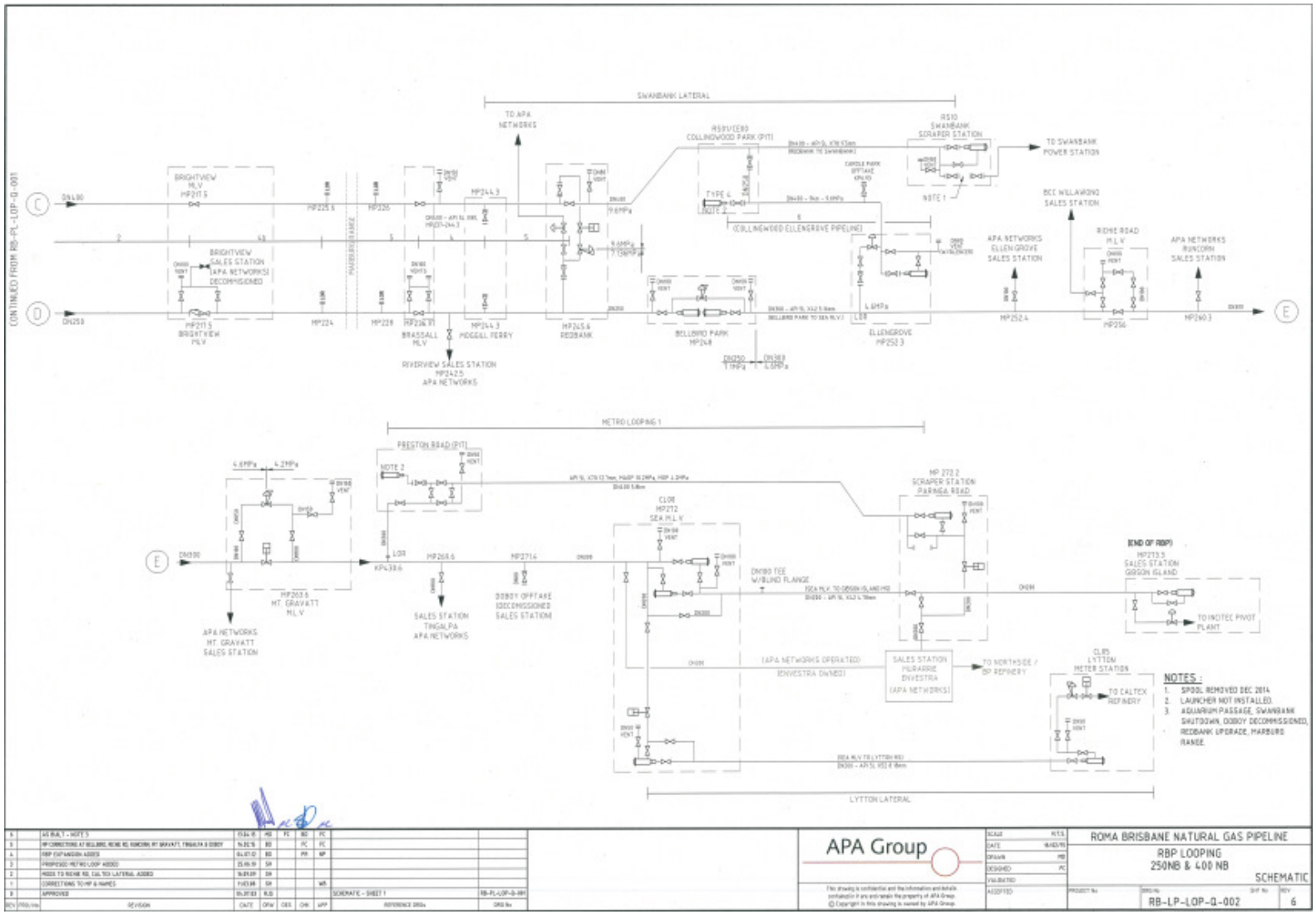




10.1.4 Pipeline Schematic RBP



10.1.5 Pipeline Schematic Metro Area RBP



10.1.6 Key Design Features of the Pipeline

The Pipeline dimensions are in accordance with the requirements of the design standards. The key design features of the Pipeline are:

	DN200	DN200 Lytton Lateral	DN250	DN300	DN400
Substance conveyed	**Natural Gas**	**Natural Gas**	**Natural Gas**	**Natural Gas**	**Natural Gas**
Length of pipeline	2.56km	5.4km	396.8km	37.6km	411.365km
Outside diameter	219.1mm	219.1mm	273.1mm	273.1mm	406.4mm
Wall Thickness	4.78mm	8.18mm	4.78-6.35mm	5.16mm	Stage 1&2 6.4-9.5mm Stage 3&4 6.6-9.5mm Stage 5 5.7-8.1mm +9.5mm,9.8mm Stage 6 9.5mm Metro Looping Phase 1 12.7mm
Pipe specification	API 5L X46	API 5L X52	API 5L X46	API 5L X42	API 5L with Stage 1-4* X60 Part Stage-4 X80 MP 237.50 -MP244 Stage 5 X70,+X60 (Swanbank X70) Stage 6 X60 (Ellengrove) Metro Looping Phase 1 API 5L X70

*Stages refer to the stages of looping that are shown on the network schematic diagram.
The Alignment Sheets, read in conjunction with actual Depth Survey Reports, for this Pipeline indicate minimum specified depth of cover, sections where heavy wall pipe has been used, and in hazardous areas where special arrangements using concrete covering of the pipeline has been utilised.

The Pipeline has an external coating, comprising field-applied PE tape wrap on the 1969 RBP sections, extruded HDPE on the DN400 looping, fusion-bonded epoxy on the Lytton Lateral and Metro Looping, and liquid-applied epoxy in some areas.

Underground pipelines have a combination of impressed current and sacrificial anode cathodic protection systems applied to mitigate corrosion. All above ground pipe work and steelwork is painted with a high quality paint system to resist corrosion. This applies to all above ground pipe work at line valves and scraper stations.

The specifications for the mainline valves (ball valves) are, manufactured and tested in accordance with API 6D.

Flanges and fittings are specified to meet the pipeline's required design pressure at the time of construction. Due to this requirement most flanges are ANSI Class 600 and ANSI Class 300 for the metropolitan pipeline.

Further design and construction features that enhance the security of the Pipeline are:

- Provision of a minimum depth of cover ranging from 750 mm in rural areas, road reserves 900 mm, roadways 1200 mm, Collingwood Drive to Ellengrove 1200 mm, Metro Looping Phase 1 1200mm;
- Increase in wall thickness and/or depth of cover where the Pipeline passes specific land features or roads;
- Installation of trench barriers on steep slopes on the DN400 pipeline;
- Protection against external corrosion for underground and above ground facilities using cathodic protection and coatings;
- HDD bored sections for environmental and regulatory requirements;
- Lightning protection by use of surge protectors at above ground facilities and buried Insulation joints;
- Remotely, and manually operable line valves;
- Scraper stations at regular intervals to facilitate in-line inspection;
- Above ground posts and buried survey marks to mark the easement;
- Warning signs, aerial markers;
- Security fencing around above ground facilities; and
- Telemetered signals from sensing points along the Pipeline.
- The more important of these features are described in greater details below.

10.1.7 Maximum Allowable Operating Pressure

The MAOP is the maximum pressure at which a pipeline or section of a pipeline may be operated, following hydrostatic testing in accordance with the AS2885.1 (2007) standard.

The MOP is the operating pressure limit imposed by the Licensee from time to time for pipeline safety or process reasons.

	DN200	**DN200 Lytton Lateral**	**DN250**	**DN300**	**DN400**
Substance conveyed	**Natural Gas**	**Natural Gas**	**Natural Gas**	**Natural Gas**	**Natural Gas**
Maximum Allowable Operating Pressure	4,612 kPag	9600kPag	7,136kPag	4,612 kPag 4,200 kPag down stream of Mt Gravatt MLV	9,600 kPag with exception MP 0 to MP 6 - 9,423 kPag

10.1.8 Above Ground facilities

The main above ground facilities are shown in Table below.

Chainage from Wallumbilla Miles (km)	Site Names	Telemetered	Site Type	
0 (0)	Wallumbilla	T	SS IS,MS MLV MLV	 DN400 DN250
MP 6 (9.65)	Tamarang		MLV	DN250
MP14 (22.53)	Bendemere		MLV	DN400
MP20 (32.18)	Mongool		MLV	DN250
MP33.4 (53.75)	Yuleba CS	T	CS SS MLV MLV	DN250 DN400 DN400 DN250
MP40 (64.37)	Moraby Creek		MLV	DN250
MP54 (86.90)	Drillham Road		MLV	DN400
MP63 (101.38)	Condamine River Arubial (Peat Inlet*)	 T	MLV IS,MS	DN250
MP67.4 (108.46)	Condamine CS Braemar Power connection (DN400 upstream side)	T	(CS) SS MLV MLV	DN400 DN250 DN400 DN250 DN250
MP 75.9 (122.14)	Windibri	T	IS	DN400
MP 84.3 (135.66)	Argyle	T	IS	DN400
MP86 (138.39)	Kenya Block Valve		MLV	DN250
MP100 (160.93)	Kogan CS	T	CS SS MLV MLV	DN250 DN400 DN400 DN250
MP106 (170.58)	Kogan Block Valve		MLV	DN250
MP114.6 (KP184.4)	Kogan North Central Gas Processing Facility Inlet	T	IS	DN400
MP117 (188.29)	Wilkie Creek		MLV	DN250

Chainage from Wallumbilla Miles (km)	Site Names	Telemetered	Site Type	
MP133 (214.04)	Dalby CS	T	CS	DN400
			SS	DN250
	Dalby Biorefinery offtake connection at this location from DN250 pipeline		MLV	DN400
			MLV	DN250
MP134 (215.64)	Western Downs Regional Council		MS	Offtake
MP147 (236.56)	Bowenville		MLV	DN250
MP152.8 (245.90)	Norwin Rd		MLV	DN400
MP167 (268.75)	Oakey CS	T	CS	DN250
			SS	DN400
			MLV	DN400
			MLV	DN250
	Oakey APA Network Offtake		MS	
	Oakey Power Offtake	T	MS	
MP178 (286.45)	Gowrie View		MLV	DN400
MP185 (297.72)	Toowoomba MS	T	MS	
MP189 (304.15)	Withcott		MLV	DN250
			MLV	DN400
MP201 (323.47)	Sandy Creek	T	MLV	DN250
			MS	
MP207 (333.12)	Gatton	T	CS	DN400
			SS	DN250
			MLV	DN400
			MLV	DN250
MP217 (349.21)	Brightview	T	MLV	DN250
			MLV	DN400
			(MS)	
MP237 (381.40)	Brassall		MLV	DN250
			MLV	DN400
MP244.1 (392.95)	Moggill Ferry		MLV	DN250
			MLV	DN 400
MP244.3 (393.15)	Riverview	T	MS	DN250
MP245.6 (395.24)	Redbank	T	MLV	DN400

Chainage from Wallumbilla Miles (km)	Site Names	Telemetered	Site Type	
			MS	
MP246.2 (396.21)	Collingwood Drive Offtake		MLV	DN400
MP251.1 (404.09)	Swanbank	T	MLV SS MS	DN400 DN400
MP248 (399.11)	Bellbird Park (City Gate)	T	SS MLV MLV	DN 250 DN250 DN300
MP252.3 (406.03)	Ellengrove Gate station	T	SS MLV MS	DN400
MP 252.4	Ellengrove APA network off take	T	MS	DN300
MP255.5 (411.17)	Ritchie Rd MLV and Willawong Offtake	T	MLV MS	DN300
MP 260	Runcorn Networks Offtake	T	MS	DN300
MP263.5 (424.05)	Mt Gravatt MLV and Networks Offttake	T	MLV MS	DN300
MP 268.4 (432.2)	Preston Road Pit (start of Metro Looping 1)		MLV	DN400
MP270 (434.51)	Tingalpa (Stanton Rd)	T	MS	DN300
MP271 (440.95)	Doboy (now decommissioned)		MS	DN300
MP272 (440.95)	Southern Electrical Authority (SEA) scraper station	T	MLV SS MLV SS MLV SS	DN300 DN200 DN200
MP274 (440.95)	Paringa Road Scraper Station and Murarrie Networks Offtake	T	MLV MS SS	DN200 DN400
MP275 (442.56)	Gibson Island	T	MLV SS	DN200

Chainage from Wallumbilla Miles (km)	Site Names	Telemetered	Site Type	
			MS	
	Lytton Meter Station	T	MLV SS MS	DN200

IS Inlet Station
MS Meter Station
CS Compressor Station
SS Scraper Station
MLV Main Line Valve
T Telemetered
MP Mile post

10.1.9 Operations and Maintenance Bases

The main operations and maintenance offices and bases for the Pipeline are located at Wallumbilla, Condamine, Dalby, Gatton and Brisbane. Emergency equipment is stored at Wallumbilla, Dalby, Gatton and Brisbane.

10.1.10 Compressor Stations

The Kogan and Oakey compressor stations compress gas in the DN250 pipeline. Each of these compressor stations consists of a single, turbine driven, centrifugal compressor unit with the shaft horsepower of each gas turbine unit not exceeding 1185kW at ISO conditions.

The Dalby compressor station, which consists of a Solar C50 compressor, currently compresses the DN 400 pipeline[2].

Each compressor site has scraper facility for both the DN400 and DN250 pipeline sections.

The compressors are operated and maintained in accordance with Maintenance Procedures.

10.1.11 Meter Stations

Meter Stations supplied directly from the main pipeline are listed in Table below.

Relevant measurement and status data are telemetered back to the IOC at Brisbane.

[2] Six compressor stations were commissioned from 1981 to 1986, located at the existing scraper stations. When the DN400 looping was completed in the early 2000s, these were reconfigured and separated so three compressors serviced each of the two independent pipelines. In 2012 the Dalby compressor station was upgraded to include a Centaur 50 compressor (Unit #2) which was commissioned in July 2012 to service the DN400 pipeline with Yuleba, Kogan and Oakey servicing the DN250 pipeline. The Solar S20 compressors at Gatton, Condamine and Yuleba are currently isolated from the pipeline and are not considered operational.

Station Metering	Type	Measurement Standard	Compressibility Standard	Volume Measurement Uncertainty
Wallumbilla	Orifice	AGA 3	AGA 8	+/- 1%
Western Downs Regional Council	Coriolis	AGA11	AGA 8	+/- 1%
Oakey Meter Station	Positive Displacement	B 109.3	NX 19	+/- 1%
Oakey Power Station	Turbine	AGA 7	AGA 8	+/- 1%
Toowoomba	Turbine	AGA 7	AGA 8	+/- 1%
Sandy Creek	Positive Displacement	B 109.3	AGA 8	+/- 1%
Bright View	Positive Displacement	B 109.3	AGA 8	+/- 1%
Riverview	Turbine	AGA 7	AGA 8	+/- 1%
Redbank	Turbine	AGA 7	AGA 8	+/- 1%
Swanbank	Turbine	AGA 7	AGA 8	+/- 1%
Ellengrove	Turbine	AGA 7	AGA 8	+/- 1%
Runcorn	Turbine	AGA 7	AGA 8	+/- 1%
Mt Gravatt	Turbine	AGA 7	AGA 8	+/- 1%
Tingalpa	Turbine	AGA 7	AGA 8	+/- 1%
Murarrie	Orifice	AGA 3	AGA 8	+/- 1%
Gibson Island	Orifice	AGA 3	AGA 8	+/- 1%
Lytton	Coriolis	AGA 11	AGA 8	+/- 1%

10.1.12 Corrosion Protection

The Pipeline has an external coating, with a combination of impressed current and sacrificial anode cathodic protection systems applied to mitigate corrosion. The coatings of the pipeline system are as follows:

- DN200 pipeline - Double wrap PE tape - 55% overlap;
- DN200 pipeline - Dual Layer FBE to AS/NZS 3862 (Lytton Lateral);
- DN250 pipeline - Single wrap PE tape;
- DN300 pipeline - Double wrap PE tape - 55% overlap; and
- DN400 pipeline - HDPE AS 1518

The RBP is not internally lined.

Test points are typically 1.6 km apart. Cross bonding is in place for the DN400 pipeline.

10.2 Operating Parameters

10.2.1 Guidelines

The purpose of these guidelines is to establish a basis for operational decision making by documenting mandatory and desirable operating parameters used in the operation of the RBP.

10.2.2 Scope

The section of pipeline covered by this licence is from Wallumbilla to Brisbane. There are two fully separated pipelines predominately sharing a common easement. Some sections do diverge where it was required during construction.

Note that it does cover the section of pipeline running from Redbank to Swanbank and the extension to the Caltex Refinery.

10.2.3 Operating Parameters

The operating parameters listed in this document have been developed acknowledging that there are a number of system constraints that affect the operation of the pipeline on any specific day. A number of these constraints are listed below.

10.2.4 System Constraints

- Gas Transportation Agreement (GTA) parameters;
- MAOP;
- System capacity;
- Daily nomination;
- Gas quality; and
- Inlet and outlet pressures and temperature requirements.

10.2.5 Operating within System Constraints

- The RBP is operated as required to exceed the minimum requirements specified in the GTAs for the pipeline.
- In general, this means that the CSs are operated only as necessary to maintain the minimum pipeline outlet pressures as stated in the GTAs. As at June 2008, the minimum delivery pressures at the RBP delivery points are:
    - 4,000 kPag Braemar - Condamine
    - 1,500 kPag all other delivery points.
- In addition to this minimum pressure requirement, the RBP is operated to allow for the provision of a Storage Service. The quantity of gas in and out of the pipeline is strictly controlled in accordance with the specific requirements outlined in the GTAs.
- The RBP experiences a seasonal fluctuation in throughput, with the peak flows recorded generally during winter. During this period, the compressor stations normally operate to maintain the minimum delivery pressure requirements.
- In general, more compressor stations are on line during the week as the throughput of the pipeline is increased, to maintain the minimum pressure at Swanbank. The number of compressors on line is then reduced across the weekend as the required throughput drops off. Both the DN250 and DN400 pipelines are used to provide the storage and pressure requirements described above. In general, the DN250 pipeline is maintained at a constant throughput, and the DN400 pipeline is used to provide the weekly swing in pressure that is required to achieve the pressure requirements. In practice, however, the relationship between the two pipelines is not as simple as this due to the interaction of pressure and flow from one pipeline to the other.
- Gas quality is monitored closely at each of the pipeline IS. The gas quality specifications are detailed in each GTA, and are in accordance with the Access Principles published for the pipeline. If the gas being presented for receipt into the pipeline does not meet the gas quality requirements specified in the GTA, then the GTA allows for the refusal to accept the gas. The decision to refuse entry of the gas is made by the Gas Contracts Specialist Queensland. In the first instance, communication is made with the relevant shipper to advise of the out-of-specification gas, and in most cases, the shipper will take action to return the gas to specification.

- The pipeline receipt points operate in a flow control mode. The quantity of gas receipted each day through the Wallumbilla Runs 1, 2, 4 and 7 (AGL, OCA, Origin and Jemena) are controlled by the IOC to meet shipper nominations. The other receipt points of Wallumbilla Run 3 (Epic), Woodroyd, Scotia (Peat lateral); Windibri and Argyle are controlled by others. Note that the interconnect point between the Peat Lateral and the RBP at Arubial is controlled by the IOC. This "receipt" point for the RBP is controlled as required to move gas from the Peat Lateral into the RBP at the appropriate times

10.2.6 Operating to Maintain Integrity

- The MAOP of the various segments of the RBP are as follows:
  - DN400 from MP 0 (Wallumbilla) to MP 6 (Tamarang) MAOP 9,423 kPag;
  - DN400 from MP6 (Tamarang) 9,600 kPag;
  - Note that a spec break is in place at Condamine compressor station. The Wallumbilla to Condamine section of the DN400 pipeline is operated to a MOP of 9,300 kPag and downstream of Condamine the DN400 pipeline is operated to a MOP of 9,600 kPag.
  - DN250 MAOP 7,136 kPag;
  - DN300 MAOP 4,612 kPag and 4,200 kPag downstream of Mt Gravatt;
  - DN200 MAOP 9600 kPag (Lytton Lateral); and
  - DN200 MAOP 4200 kPag (Gibson Island lateral).
- It is worth noting the pipeline is not operated in a manner that is specifically designed to avoid Stress Corrosion Cracking (SCC). As stated above, the pipeline is operated to provide services to the shippers as per their GTAs.
- The pipeline is operated to ensure that the pressure is kept at or below MAOP and MOP at all times. Each of the pipeline receipt points has an automatic high pressure override function that will restrict flow into the RBP that prevents the pressure exceeding the MAOP and an automatic Emergency Shut Down (ESD) valve that will typically close if the pressure at that point exceeds the MAOP by more than 5%. A set of alarms in the SCADA system is used to warn the pipeline controller that the pressure limit for the pipeline is approaching so action can be taken to avoid an over pressure situation.
- Each of the RBP S20 compressor stations is equipped with a series of automatic over pressure control systems. The first is a SCADA control limit that will not allow the pipeline controller to accidentally enter a set point higher than the pipeline MAOP. The second is a software limit programmed into the compressor station RTU to shut down the compressor if it is tripped. The third is a hard wired pressure switch to shut down the compressor station if the MAOP of the pipeline is exceeded by more than approximately 4%. The fourth is a station relief valve that is set to trigger if the MAOP is exceeded by more than 10%.
- Dalby Compressor Station Unit 2 has full PLC control of the station and the compressor using appropriate safety-rated PLCs for safety-critical functions including overpressure protection, unit shutdowns and site ESD functionality.
- Other pressure regulation stations and delivery points are protected from over pressure by either relief valves or ESD valves.

11. APPENDIX B CARPENTARIA GAS PIPELINE LICENCE NO. 41

11.1 Pipeline System Operation

This section describes the pipeline and above ground facilities, important features of the design, and measures included in the design, that enhance the security of the system. Pipeline Licence is stated as 40 years from start date.

11.1.1 Design Life

The design life of the CGP is 40 years and life end date is December 2038.

In accordance with the APA Group pipeline management system and AS 2885.3 requirements, remaining life reviews are required to be carried out at typically 10-year intervals.

11.1.2 Overview of the Pipeline System

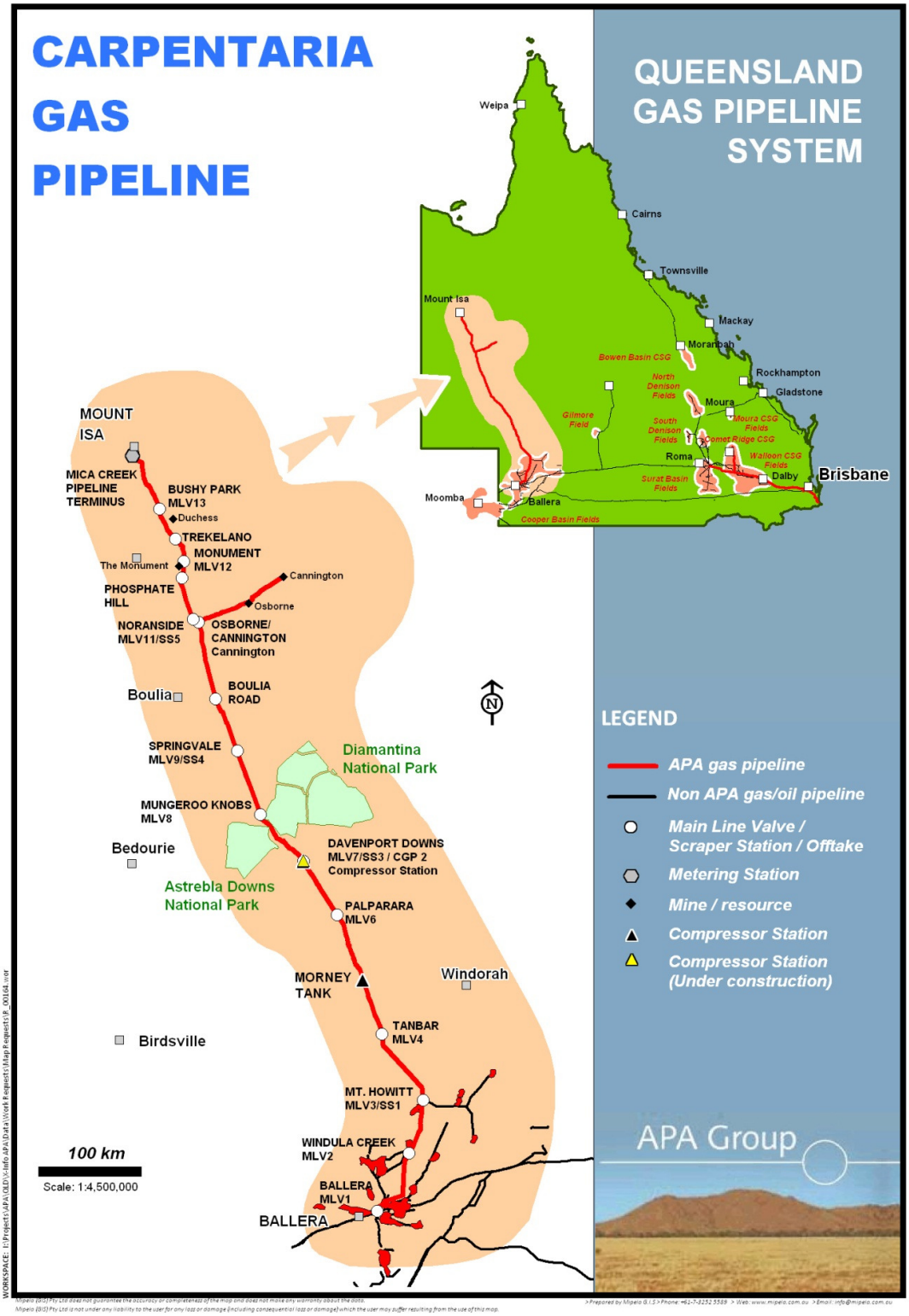
The CGP consists of 840 km of pipeline between the Ballera gas processing hub in south western Queensland and Mt. Isa in north western Queensland. Construction of the Pipeline commenced in 1997 and was completed in 1998. It has a free flow capacity of approximately 82 TJ/day and 175 TJ/day with future compression.

The CGP has connections to the Santos Ballera gas plant, the APA Group SWQP at Ballera, a decommissioned inlet station at Mt Howitt, Cannington Lateral off-take, WMC Phosphate Hill lateral off-take and Trekelano future off-take are connected to the CGP as well as the Mica Creek meter station servicing power stations and mine sites in the Mount Isa region.

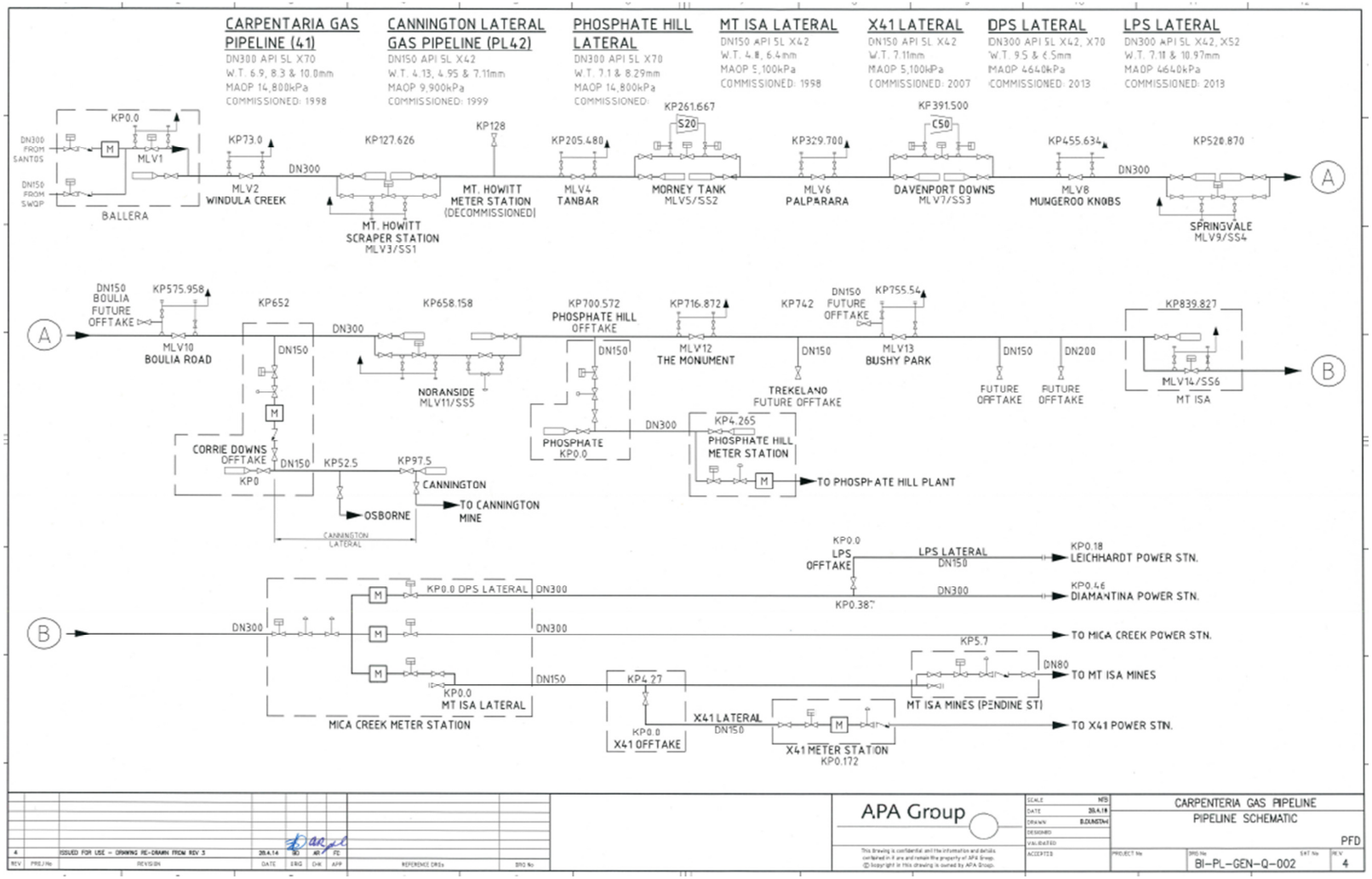
- The pipeline was designed to comply with the requirements of Australian Standard 2885-1987. Wall thicknesses in excess of the requirements of this standard have been adopted. The DN 300 pipeline has been designed for a Maximum Allowable Operating Pressure (MAOP) of 14,800 kPag.
- From CGP runs in a 30 metre wide Miscellaneous Transportation Infrastructure Corridor (MTIC). When the Queensland Government set up this MTIC, it was envisaged that other services would run within the MTIC in parallel with the Pipeline.
- One compressor station was commissioned at Morney Tank (scraper station 2) in December 2002. A second compressor station was commissioned in July 2009 at Davenport Downs (scraper station 3).
- Fourteen isolation valves are along the length of the pipeline. These are strategically located to shut down and de-pressurise the pipeline in the event of emergency.

The pipeline is currently operated in accordance with AS2885.3. The pipeline is regulated under the Petroleum and Gas (Production and Safety) Act and Regulation 2004, under the instrument of Pipeline Licence (PL) No 41. PL 41 is named as a strategic pipeline in Schedule 5 of the Petroleum and Gas (Production and Safety) Regulation 2004.

11.1.3 General Route Map



11.1.4 Pipeline Schematic



11.1.5 Key Design Features of the Pipeline

The pipeline dimensions are in accordance with the requirements of the design standards. The key design features of the pipeline are:

Nominal Bore	**DN300**
Substance conveyed	**Natural Gas**
Length of pipeline	840 km
Outside diameter	323.9 mm
Wall Thickness	Standard 6.91 mm for 1.0 Third Party Factor Heavy 8.29 mm for 1.2 Third Party Factor Extra Heavy 10.00 mm for 1.44 Third Party Factor
Pipe specification	API -5L X70

The Alignment Sheets for this pipeline indicate a minimum specified depth of cover, sections where heavy wall pipe has been used, and in hazardous areas where special arrangements using concrete covering of the pipeline has been utilised.

The pipeline has an external coating, and a combination of impressed current and galvanic cathodic protection systems applied to mitigate corrosion. All above ground pipe work and steelwork is painted with a high quality corrosion resistant paint system. This applies to all above ground pipe work at line valves and scraper stations.

The specifications for the mainline valves (ball valves) are, manufactured and tested in accordance with API 6D.

Flanges and fittings are specified to meet the pipeline's required design pressure at the time of construction. Due to this requirement most flanges are Class 900.

Further design and construction features that enhance the security of the Pipeline are:

- Designed to meet or exceed code requirements in the selection of the material and the standards of fabrication;
- Provision of a minimum depth of cover ranging from 750mm in rural areas, roadways 1200mm;
- Increase in wall thickness and/or depth of cover where the Pipeline passes specific land features or roads;
- Protection against external corrosion for underground and above ground facilities using cathodic protection and coatings;
- Lightning protection by use of surge protectors at above ground facilities and buried Insulation joints;
- Remotely, and manually operable line valves;
- Scraper stations at regular intervals to facilitate in-line inspection;
- Above ground posts and buried survey marks to mark the easement;
- Warning signs, aerial markers;
- Security fencing around above ground facilities; and
- Telemetered signals from sensing points along the pipeline.

The more important of these features are described in greater details below.

11.1.6 Maximum Allowable Operating Pressure

The MAOP is the maximum pressure at which a pipeline or section of a pipeline may be operated, following hydrostatic testing in accordance with the AS2885.1 (2007) standard.

The MOP is the operating pressure limit (lower than the MAOP) imposed by the Licensee from time to time for pipeline safety or process reasons.

	DN300
Substance conveyed	Natural Gas
Maximum Allowable Operating Pressure	14800 kPag

11.1.7 Above Ground facilities

Consideration of the requirements of the standards applicable at the time and of Safety/Risk factors resulted in the following:

Average Valve Spacing on the Pipeline is 60 Kms.

KP	Site Name	Telemetered	Site Type
0	Ballera Meter Station / MLV1	T	MS MLV
73	Mainline Valve 2 (Windulah Creek)	T	MLV
127	Mt Howitt Scraper Station 1 / MLV3	T	SS MLV
205	Mainline Valve 4 (Tanbar)		MLV
261	Morney Tank Scraper Station 2 / Compressor Station / MLV5	T	SS/CS MLV
329	Mainline Valve 6 (Palparara)		MLV
391	Davenport Downs Scraper Station 3 / Compressor Station / MLV7	T	SS/CS MLV
455	Mainline Valve 8 (Mungeroo Knobs)		MLV
520	Springvale Scraper Station 4 / MLV9	T	SS MLV
575	Mainline Valve 10 (Boulia Road)		MLV
652	Corrie Downs (Cannington / Osborne Offtake)	T	OT
658	Noranside Scraper Station 5 / MLV11	T	SS MLV
700	Phosphate Hill Offtake	T	OT
716	Mainline Valve 12 (The Monument)		MLV
742	Trekelano Offtake	T	OT

775	Mainline Valve 13 (Bushy Park)		MLV
840	Mica Creek Scraper Station 6 / MLV14	T	SS MLV

Legend

MS Meter Station
SS Sales Station
CS Compressor Station
SS Scraper Station
MLV Main Line Valve
OT Off Take
T Telemetered
KP Kilometre Post

11.1.8 Operations and Maintenance Bases

The main operations and maintenance offices and bases for the Pipeline are located at Windorah, Boulia, and Mt Isa. Emergency equipment is stored at Windorah, Boulia, and Mt Isa.

11.1.9 Compressor stations

Due to increase demand in 2002 one compressor station was commissioned at Morney Tank scraper station at KP 261. This compressor station consists of a single turbine driven Solar Saturn 20 compressor unit with the shaft horsepower of each gas turbine unit not exceeding 1185kW at ISO conditions.

Due to increase demand in 2009 a further compressor station was commissioned at Davenport Downs scraper station at KP 391.5. This compressor station consists of a single turbine driven Solar Centaur 50 compressor unit with the shaft horsepower not exceeding 4850 kW at ISO conditions.

11.1.10 Meter Stations

There is only one meter station, at Ballera, included in the CGP pipeline licence:

Station Metering	Type	Measurement Standard	Compressibility Standard	Volume Measurement Uncertainty
Ballera	Orifice	AGA 3	AGA 8	+/- 1%

11.1.11 Corrosion Protection

The external coating of the pipeline system is an extruded HDPE to AS 1518.

The CGP is not internally lined.

Fusion Bonded Epoxy (FBE) is used as the coating material for 10Km downstream of Ballera and 5Km downstream of Morney Tank and all planned scraper stations because of the possibility of higher temperatures in those regions if compression is installed. FBE is applied as per AS3862-1991 to a minimum average dry film thickness of 375microns (0.375mm).

Cathodic protection is provided by a combination of galvanic and impressed current cathodic protection systems in accordance with AS 2832.1. Test points are typically 2.5km apart.

11.2 Operating Parameters

11.2.1 Guidelines

The purpose of these guidelines is to establish a basis for operational decision making by documenting mandatory and desirable operating parameters used in the operation of the CGP.

11.2.2 Scope

The section of pipeline covered by this licence is from Ballera to Mica Creek at Mt Isa.

- Note that the pipeline terminates at a flange within the Mica Creek scraper station compound, and does not include any of the Mica Creek metering station (MCMS). The MCMS is covered by a different pipeline licence and specifics are contained in Appendix D.
- The CGP does not include any of the Cannington Lateral pipeline (approx 112 km pipeline from Corrie Downs to Cannington).
- At Phosphate Hill, the CGP terminates at the downstream flange of the ANSI Class 900 valve located at the pipeline offtake. The short pipeline (approx 5 km) from the Phosphate Hill offtake across to the plant and meter station are owned, operated and licenced to others.
- At Mt Howitt, the CGP does not cover any of the pipeline from the Eromanga gas plant to Mt Howitt (approx 50 km), as this pipeline is owned, operated and licenced to others. The Mt Howitt inlet meter station is currently decommissioned.

11.2.3 Operating Parameters

The operating parameters listed in this document have been developed acknowledging that there are a number of system constraints that affect the operation of the pipeline on any specific day. A number of these constraints are listed below.

11.2.4 System Constraints

- Gas Transportation Agreement (GTA) parameters;
- MAOP;
- System Capacity;
- Daily nomination;
- Gas quality; and
- Inlet and outlet pressure and temperature requirements

11.2.5 Operating within System Constraints

- The South West Queensland Producers (SWQP) GTA places an obligation on the shipper (SWQP) to maintain a receipt pressure at Ballera of 14,800 kPag. Note that this is regardless of flow meaning that this pipeline operates with its Ballera receipt point in a pressure control mode. The flow and pressure at Ballera is managed and controlled by SWQP at their Ballera plant. If they are not maintaining their contractually obligated pressure (i.e. the Ballera pressure is lower than 14,800 kPag), then our remedy is to contact the shipper via telephone or escalate via client commercial services.
- If the pressure being delivered by SWQP at Ballera is above the MAOP of the pipeline (14,800 kPag) by more than 5%, then an automatic Emergency Shut Down (ESD) valve will close and stop all flow of gas into the pipeline at Ballera. An operator is required to attend site to reset this ESD valve before the flow of gas can resume.

- There is a receipt point near the Mt Howitt scraper station to receipt gas from the Energy Equity Corporation (EEC) gas plant at Eromanga. This gas plant has been idle since early 2002, and there are no plans in place to resume operation. This could change at any time.
- A gas chromatograph monitors the quality and composition of the gas as it enters the pipeline at Ballera, and as it exits the pipeline at Mica Creek and Phosphate Hill.
- A moisture analyser monitors the level of water vapour in the gas that is entering the pipeline at Ballera.
- Compressor stations are installed at Morney Tank and Davenport Downs. These compressors are used as required to maintain a delivery pressure at Mica Creek above 3,000 kPag. Note that the operation of these compressor stations is dependant upon the throughput of the pipeline. Whilst the pipeline throughput is below approximately 86 TJ/d, operation of the compressors is not required. For pipeline throughput above this, the compressors are used to build pressure at Mica Creek (up to say 7,500 kPag), and then shut down while the pressure at Mica Creek decays again. The compressors are restarted when the Mica Creek pressure falls to around 4,000 kPag, to allow time for its impact to reach Mica Creek (580 km) before the Mica Creek pressure falls below 3,000 kPag.
- The contractual delivery pressure at Mica Creek is 2,000 kPag, with an aim to maintain a pressure above 3,000 kPag. The same requirement exists at the Phosphate Hill delivery point. It is noted that if this delivery pressure is maintained at Mica Creek, then it will also be met at the upstream delivery points of Phosphate Hill and Corrie Downs. The contractual delivery pressure at Corrie Downs is 5,000 kPag. If the pipeline is operated to maintain a pressure at Mica Creek above 3,000 kPag, then the pressure at Corrie Downs is usually above 6,000 kPag.

11.2.6 Operating to Maintain Integrity

- The pipeline is operated to ensure that the pressure is kept at or below MAOP at all times. ESD valves provide an automatic trip if the pressure exceeds MAOP by 5%. Alarms in the IOC are used to warn that the pressure is approaching MAOP so that an action can be taken to avoid exceeding MAOP. As discussed above, the MAOP for the pipeline is 14,800 kPag; and
- It must be at a temperature which is not less than 0oC and not higher than the greater of:
    - 50oC; or
    - the ambient temperature plus 12oC but in any event not to exceed 60oC.

12. APPENDIX C CANNINGTON LATERAL LICENCE NO. 42

12.1 Pipeline System Operation

This section describes the pipeline and above ground facilities, important features of the design, and measures included in the design, that enhance the security of the system. Pipeline Licence No. 42 is stated as 40 years from start date.

12.1.1 Design Life

The design life as per the Pipeline Licence condition is 40 years and life end date is November 2038.

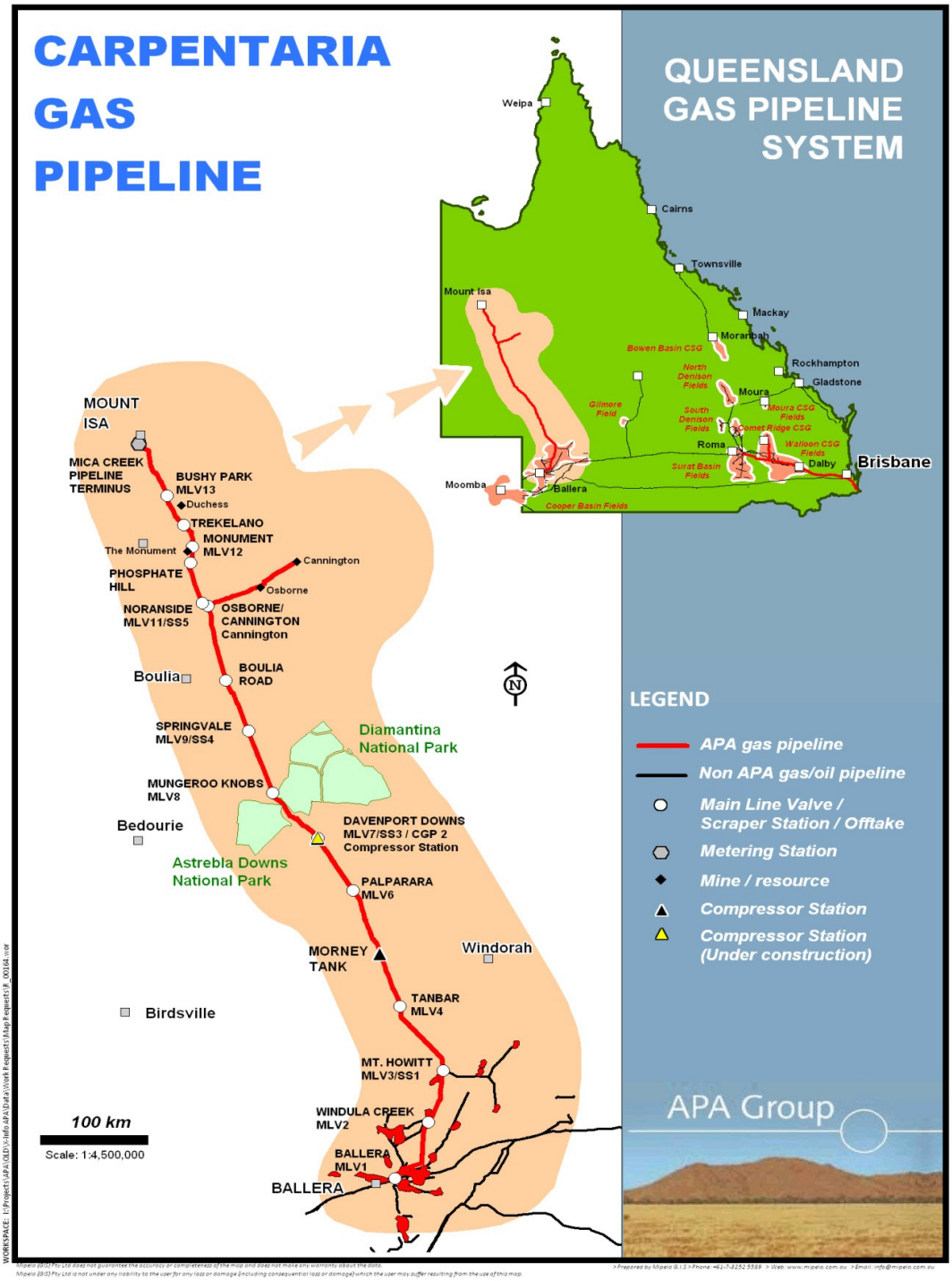
In accordance with the APA Group pipeline management system and AS 2885.3 requirements, remaining life reviews are required to be carried out at typically 10-year intervals.

12.1.2 Overview of the Pipeline System

- The Cannington Lateral consists of 98 km of DN150mm pipeline originating at Corrie Downs off-take on the Carpentaria Gas Pipeline (CGP) and running due east of the CGP. The Cannington Lateral transports gas from gas fields at Ballera in south western Queensland to the Cannington and Osborne Mines in north western Queensland. The Cannington Lateral was constructed in 1997 and was completed in 1998. It has a free flow capacity of approximately 12.8 TJ/day.
- The pipeline has been designed to comply with the requirements of Australian Standard 2885.1. Wall thicknesses in excess of the requirements of this standard have been adopted. The Pipeline DN 150 pipeline has been designed for a Maximum Allowable Operating Pressure (MAOP) of 9,900 kPag.
- The pipeline runs in a 30 metre wide easement.
- Isolation valves are located at either end of the lateral. These are strategically located to shut down and de-pressurise the pipeline in the event of emergency.

The pipeline is currently operated in accordance with AS2885.3. The pipeline is regulated under the Petroleum and Gas (Production and Safety) Act and Regulation 2004, under the instrument of Pipeline Licence (PL) No 42. PL No 42 is not named as a strategic pipeline in Schedule 5 of the Petroleum and Gas (Production and Safety) Regulation 2004.

12.1.3 General Route Map



12.1.4 Key Design Features of the Pipeline

The pipeline dimensions are in accordance with the requirements of the design standards. The key design features of the pipeline are:

Nominal Bore	**DN150**
Substance conveyed	Natural Gas
Length of pipeline	98 km
Outside diameter	168.3 mm
Wall Thickness	Standard 4.13 mm Heavy 4.95 mm used at two locations where overhead power lines cross the lateral at KP51.318 And KP 95.484.
Pipe specification	API -5L X42

The Alignment Sheets for this pipeline indicate minimum specified depth of cover, sections where heavy wall pipe has been used, and in hazardous areas where special arrangements using concrete covering of the pipeline has been utilised.

The pipeline has an external coating, and galvanic anodes provide cathodic protection to mitigate corrosion. All above ground pipe work and steelwork is painted with a high quality corrosion resistant paint system. This applies to all above ground pipe work at scraper stations.

The specifications for the mainline valves (ball valves) are, manufactured and tested in accordance with API 6D.

Flanges and fittings are specified to meet the pipeline's required design pressure at the time of construction. Due to this requirement most flanges are Class 600.

Further design and construction features that enhance the security of the Pipeline are:

- Designed to and bettering of code requirements in the selection of the material and the standards of fabrication;
- Provision of a minimum depth of cover ranging from 750mm in rural areas, roadways 1200mm;
- Increase in wall thickness and/or depth of cover where the Pipeline passes specific land features or roads;
- Protection against external corrosion for underground and above ground facilities using cathodic protection and coatings;
- Lightning protection by use of surge protectors at above ground facilities and buried Insulation joints;
- Remotely, and manually operable station valves;
- Scraper stations at both ends to facilitate in-line inspection;
- Above ground posts and buried survey marks to mark the easement;
- Warning signs, aerial markers;
- Security fencing around above ground facilities; and
- Telemetered signals from sensing points at both ends of the pipeline.

The more important of these features are described in greater details below.

12.1.5 Maximum Allowable Operating Pressure

The MAOP is the maximum pressure at which a pipeline or section of a pipeline may be operated, following hydrostatic testing in accordance with the AS2885.1 (2007) standard.

The MOP is the operating pressure limit (lower than the MAOP) imposed by the Licensee from time to time for pipeline safety or process reasons.

	DN150
Substance conveyed	Natural Gas
Maximum Allowable Operating Pressure	9.900 kPag

12.1.6 Above Ground facilities

Consideration of the requirements of Australian Standard 2885.1 and of Safety / Risk factors resulted in the following:

There are no intermediate valves and the valve spacing on the Pipeline is 98 km.

KP	Site Name	Telemetered	Site Type
0	Corrie Downs	T	MS SS
52.36	Osborne take off		OT
98.02	Cannington	T	SS PR

Legend
PR Pressure Reduction
MS Meter Station
SS Scraper Station
OT Offtake

12.1.7 Operations and Maintenance Bases

The main operations and maintenance offices and bases for the Pipeline are located at Boulia, Mt Isa, and Brisbane. Emergency equipment is stored at Boulia, and Mt Isa.

12.1.8 Compressor Stations

There is no compression on this pipeline.

12.1.9 Meter Stations

Meter Stations supplied directly from the main pipeline are listed in below.

Station Metering	Type	Measurement Standard	Compressibility Standard	Volume Measurement Uncertainty
Cannington	Turbine	AGA 7	AGA 8	+/- 1%
Osborne	Coriolis	AGA 11	AGA 8	+/- 1%

SPECIAL NOTE: the above MS is not part of this PMP; the information is for reference only.

12.1.10 Corrosion Protection

All of the welded joints and pipes are hand coated using a tape coating system. (Polyken tape 943 with Polyken 955 outer wrap).

Cathodic protection is provided by a galvanic system. CP test points are typically 2.5km apart.

The Cannington Lateral is not internally lined.

12.2 Operating Parameters

12.2.1 Guidelines

The purpose of these guidelines is to establish a basis for operational decision making by documenting mandatory and desirable operating parameters used in the operation of the CGP and the Cannington Lateral.

12.2.2 Scope

The section of pipeline covered by this licence is from Corrie Downs to the upstream face of the inlet flange on the Cannington meter station.

12.2.3 Operating Parameters

The operating parameters listed in this document have been developed acknowledging that there are a number of system constraints that affect the operation of the pipeline on any specific day. A number of these constraints are listed below.

System Constraints

- Gas Transportation Agreement (GTA) parameters;
- MAOP;
- System Capacity;
- Daily nomination;
- Gas quality; and
- Inlet and outlet pressure and temperature requirements

12.2.4 Operating within System Constraints

- It is worth noting that the GTA's that apply to the Cannington lateral are different to those that apply to the Carpentaria Gas Pipeline (CGP).
- The inlet to this pipeline is operated in a pressure control mode, with the pressure set point set to approximately 7,500 kPag via a pneumatic pressure control system on site. The IOC is not able to

adjust this pressure set point. Note that the receipt pressure should be in the range from 5,000 kPag to 9,900 kPag.

- The IOC is able to shut in the pipeline at Corrie Downs via Shut Down Valves (SDV's) if required.
- There is no gas quality monitoring on this pipeline. The gas quality (composition and moisture) is monitored on the Carpentaria Gas Pipeline (CGP), and is assumed to be consistent with the gas that is flowing in the Cannington Lateral pipeline.
- The delivery point pressure requirement is 2,000 kPag at the outlet of the pipeline (upstream face of the inlet flange on the Cannington meter station).
- There is very little control available for this pipeline. There are no compressors, and the receipt point pressure control set point can only be changed on site. The control elements available are restricted to shutdown valves at Corrie Downs that are designed to avoid over pressuring the pipeline.

12.2.5 Operating to Maintain integrity

- Pressure fluctuations on this pipeline are limited where possible through the use of a pressure control system at the inlet to the pipeline;
- The pipeline is operated to ensure that the pressure is kept at or below MAOP at all times. ESD valves provide an automatic trip if the pressure exceeds MAOP by 5%. Alarms in the IOC are used to warn that the pressure is approaching MAOP so that an action can be taken to avoid exceeding MAOP. As discussed above, the MAOP for the pipeline is 9,900 kPag; and
- It must be at a temperature which is not less than 0oC and not higher than the greater of:
    - 50oC; or
    - the ambient temperature plus 12oC but in any event not to exceed 60oC.

13. APPENDIX D MICA CREEK METER STATION (INCLUDING DIAMANTINA POWER STATION LATERAL) LICENCE 50 AND MT ISA LATERAL LICENCE 51

13.1 Pipeline System Operation

This section describes the pipeline and above ground facilities, important features of the design, and measures included in the design, that enhance the security of the system. Pipeline Licences are stated as 40 years from start date.

13.1.1 Design Life

The Mt. Isa Mines (MIM) Lateral and Mica Creek Meter Station design life is 40 years and life end date is March 2038.

The Diamantina Power Station (DPS) Lateral design life is 25 years and life end date is February 2038.

In accordance with the APA Group pipeline management system and AS 2885.3 requirements, remaining life reviews are required to be carried out at typically 10-year intervals.

13.1.2 Overview of the Pipeline System

Pipeline Licence 50

The MCMS (Pipeline Licence Number 50) is the terminal facility at the northern end of the CGP. The facility consists of a fully fenced compound with an area less than 6000 square meters and less than 250 metres long and includes the portion of the DPS Lateral pipeline to the property boundary fencing. The MCMS comprises a series of gas treatment and pressure reduction skids with various MAOPs commencing at the CGP MAOP of 14800 kPag then after the first stage pressure reduction an MAOP of 10,200kPa. After the second stage pressure reduction the MAOP is 3600 kPag. The design MAOP for the DPS lateral is 4640 kPag.

The DPS Lateral was commissioned in 2013 and consists of approximately 460 m of DN 300, 6.5mm wall thickness and dual layer FBE coated pipe that commences at Mica Creek Meter Station and runs directly to the Diamantina Power Station with a DN 150 off-take through a tee and valve for the Leichardt Power Station Lateral at approximately 380 m chainage. The lateral is designed in accordance with AS 2885 and crosses underneath the existing Carpentaria Gas Pipeline with a minimum clearance of 500mm. At the MCMS end the DPS lateral is connected to the station piping through a MIJ to skid 11 and at the DPS end the lateral is tied to the gas skid through a MIJ and a riser. Isolation for electrical faults and Cathodic Protection is by insulating joints or Flange Insulation Kits at each end of the buried pipeline. The last valve on the pipework (V796) shall be the final point of isolation between the MCMS and DPS. “Routine” isolation shall be at DPS.

The portion of the DPS Lateral from Mica Creek Meter Station to the Mica Creek Meter Station property boundary falls under Pipeline Licence Number 50 as it is considered part of the station piping. This portion of the DPS Lateral is operated by APA Group.

The portion of the DPS lateral from the Mica Creek Meter Station property boundary to the Diamantina Power Station is an unlicensed pipeline. This portion of the DPS Lateral is operated by others and is outside the scope of this PMP

The Mica Creek Meter Station (Pipeline Licence Number 50) adjoins the Carpentaria Gas Pipeline (Pipeline Licence Number41) on the inlet end and adjoins the separately licensed and operated laterals to MIM (Pipeline Licence Number 51) and the Mica Creek Power Station (Pipeline Licence Number 49 held by others) at the outlet. Significant parts of this system are comprised of above ground pipe and are designed to AS 4041.

The pipelines are currently operated in accordance with AS2885.3. The pipelines are regulated under the Petroleum and Gas (Production and Safety) Regulation 2004, under the instrument of Pipeline Licences (PL) No.50 and No.51. PL No.50 and No.51 are not named as a strategic pipeline in Schedule 5 of the Petroleum and Gas (Production and Safety) Regulation 2004.

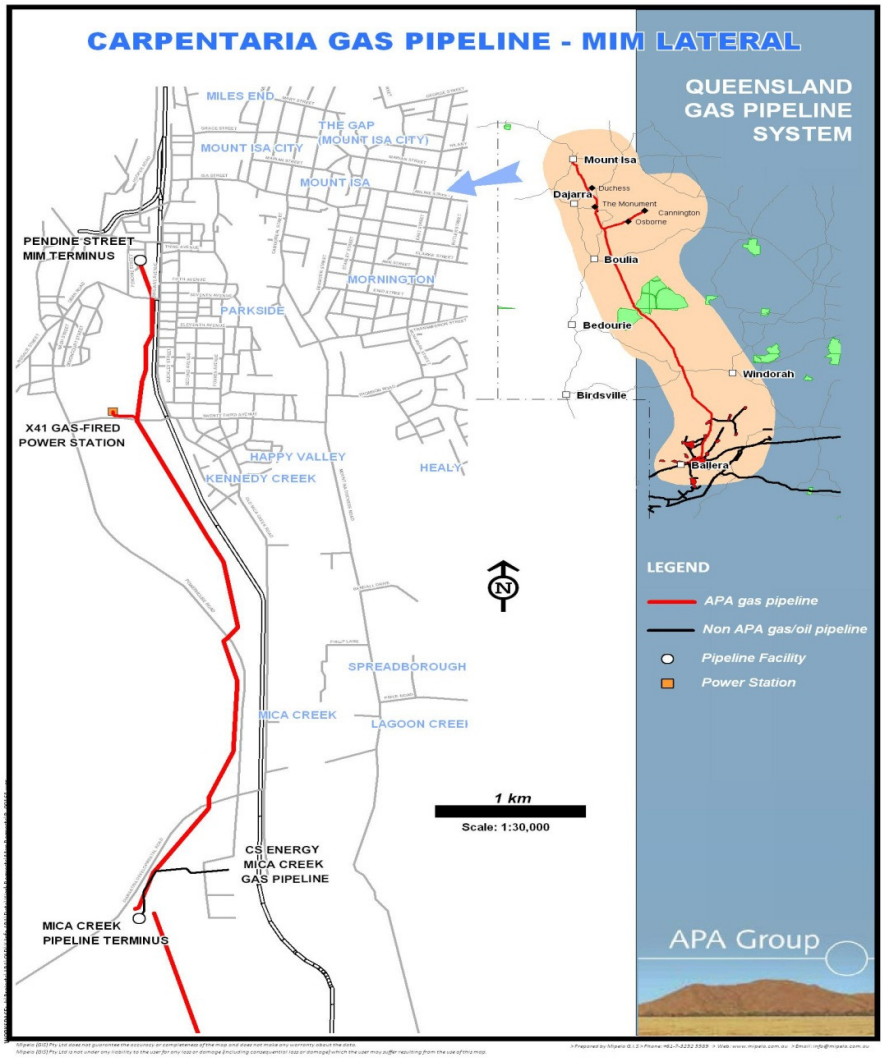
Pipeline Licence 51

The MIM Lateral (Pipeline Licence Number 51) consists of a DN150 pipeline 6.2 km long to transport natural gas from the Mica Creek Meter Station (MCMS) to Mount Isa Mines. The meter station and the lateral were commissioned in 1998. The lateral has a nominal capacity of approximately 26 TJ/day with an operating pressure of 2,700 kPag at the inlet terminal point and 1,000 kPag at the outlet terminal point.

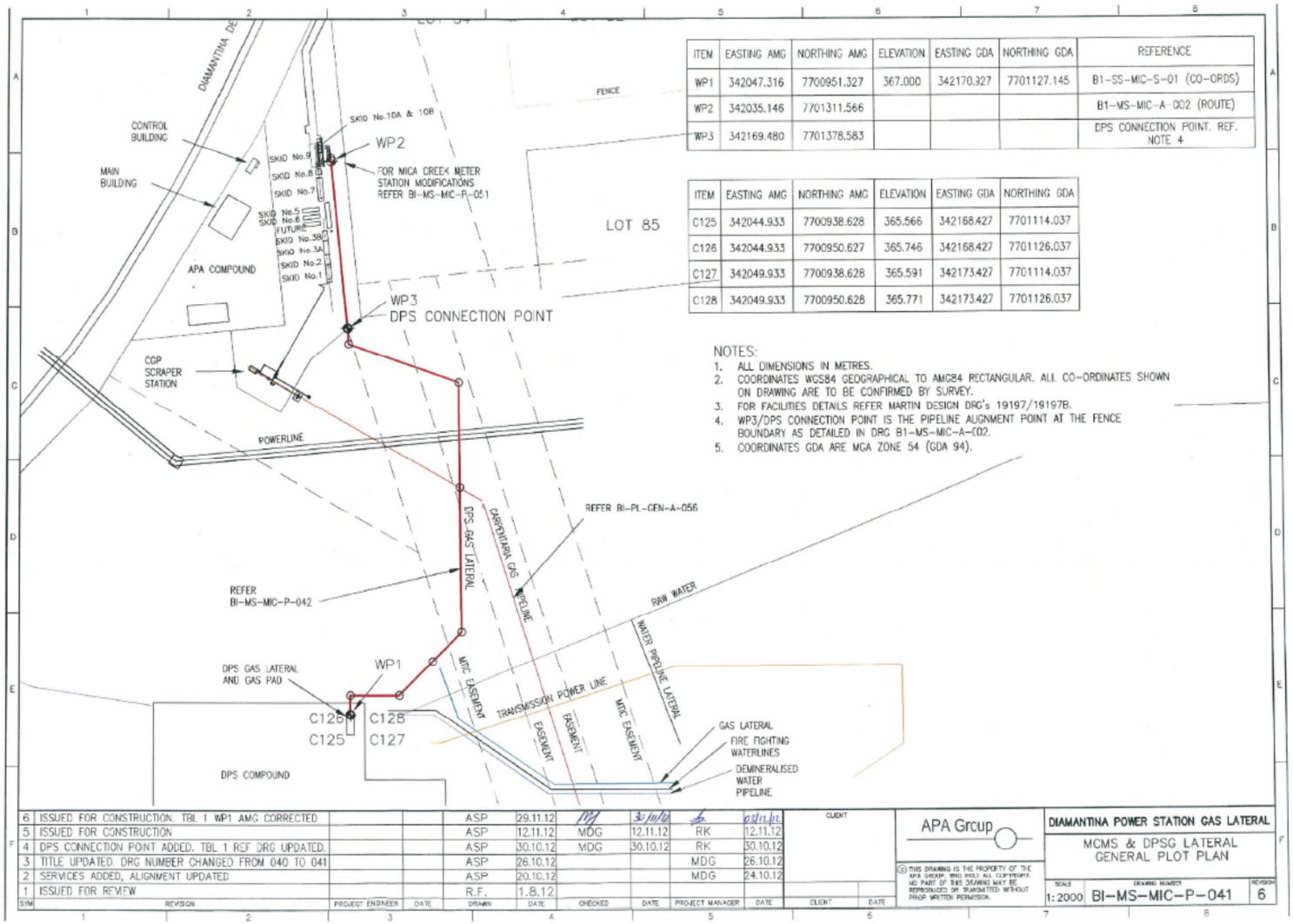
The MIM lateral has been designed to comply with the requirements of Australian Standard 2885.1-1997. Wall thicknesses in excess of the requirements of this standard have been adopted. The lateral has been designed for a Maximum Allowable Operating Pressure (MAOP) of 5,100 kPag in the DN 168.3 mm section, and 1,960 kPag for the reminder of the pipeline.

The extension of the MIM Lateral to the X41 Power Station consists of approximately 243 m of DN150 pipeline that runs directly to the X41 Power Station and was commissioned in 2007. This also includes a gas metering and pressure reduction facility (X41 Meter Station). In 2012, the X41 Meter Station was upgraded to enable the supply of gas to a new power station. The upgrade works included the installation of 150m of DN150 pipeline that runs from the X41 Meter Station to the new power station (this pipeline is owned and operated by others) and the installation of a second flow meter at the X41 Meter Station.

13.1.3 General Route Map – MIM Lateral



13.1.4 General Plot Plan – DPS Lateral



ITEM	EASTING AMG	NORTHING AMG	ELEVATION	EASTING GDA	NORTHING GDA	REFERENCE
WP1	342047.316	7700951.327	367.000	342170.327	7701127.145	B1-SS-MIC-S-01 (CO-ORDS)
WP2	342035.146	7701311.566				B1-MS-MIC-A-002 (ROUTE)
WP3	342169.480	7701378.583				DPS CONNECTION POINT. REF. NOTE 4

ITEM	EASTING AMG	NORTHING AMG	ELEVATION	EASTING GDA	NORTHING GDA
C125	342044.933	7700938.628	365.566	342168.427	7701114.037
C126	342044.933	7700950.627	365.746	342168.427	7701126.037
C127	342049.933	7700938.628	365.591	342173.427	7701114.037
C128	342049.933	7700950.628	365.771	342173.427	7701126.037

NOTES:
1. ALL DIMENSIONS IN METRES.
2. COORDINATES WGS84 GEOGRAPHICAL TO AMG84 RECTANGULAR. ALL CO-ORDINATES SHOWN ON DRAWING ARE TO BE CONFIRMED BY SURVEY.
3. FOR FACILITIES DETAILS REFER MARTIN DESIGN DRG's 19197/19197B.
4. WP3/DPS CONNECTION POINT IS THE PIPELINE ALIGNMENT POINT AT THE FENCE BOUNDARY AS DETAILED IN DRG B1-MS-MIC-A-002.
5. COORDINATES GDA ARE MGA ZONE 54 (GDA 94).

SYM	REVISION	PROJECT ENGINEER	DATE	DRAWN	DATE	CHECKED	DATE	PROJECT MANAGER	DATE
6	ISSUED FOR CONSTRUCTION. TBL 1 WP1 AMG CORRECTED			ASP	29.11.12	MG	30/10/12	RK	03/12/12
5	ISSUED FOR CONSTRUCTION			ASP	12.11.12	MDG	12.11.12	RK	30.10.12
4	DPS CONNECTION POINT ADDED. TBL 1 REF DRG UPDATED.			ASP	30.10.12	MDG	30.10.12	RK	30.10.12
3	TITLE UPDATED. DRG NUMBER CHANGED FROM 040 TO 041			ASP	26.10.12			MDG	26.10.12
2	SERVICES ADDED, ALIGNMENT UPDATED			ASP	20.10.12			MDG	24.10.12
1	ISSUED FOR REVIEW			R.F.	1.8.12				

CLIENT

APA Group

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DIAMANTINA POWER STATION GAS LATERAL

MCMS & DPSG LATERAL GENERAL PLOT PLAN

SCALE 1:2000 | DRAWING NUMBER BI-MS-MIC-P-041 | REVISION 6

13.1.5 Key Design Features of the Pipeline

The pipeline dimensions are in accordance with the requirements of the design standards. The key design features of the pipeline are:

MIM Lateral	**DN150**
Substance conveyed	Natural Gas
Length of pipeline	6.2 km
Outside diameter	168.3 mm for 6,115m and 88.9 mm for 86m
Wall Thickness	6.4 mm, 4.8 mm for the 168.3 mm section and 5.5 mm for the 88.9mm section
Pipe specification	API 5L X42
X41 Lateral	**DN150 and DN300**
Substance conveyed	Natural Gas
Length of pipeline	243 m
Outside diameter	• 168.3 mm for 173 m • 323.9 mm for 70 m (downstream of X41 Meter Station)
Wall Thickness	• 7.11 mm (DN150) • 6.4 mm (DN300)
Pipe specification	API 5L X42
DPS Lateral	**DN300**
Substance conveyed	Natural Gas
Length of pipeline	460m
Outside diameter	323.9 mm
Wall Thickness	6.4 mm
Pipe specification	API 5L X70 and Grade B

The Alignment Sheets for the pipelines indicate minimum specified depth of cover, sections where heavy wall pipe has been used, and in hazardous areas where special arrangements using concrete covering of the pipeline has been utilised.

The pipelines have an external coating, and a galvanic anode cathodic protection system applied to mitigate corrosion. All above ground pipe work and steelwork is painted with a high quality corrosion resistant paint system.

The specifications for the mainline valves (ball valves) are, manufactured and tested in accordance with API 6D.

Flanges and fittings are specified to meet the required design pressure of the relevant section. Due to this requirement flanges are Class 900, 600 and 300.

Further design and construction features that enhance the security of the Pipeline are:

- Designed to and bettering of code requirements in the selection of the material and the standards of fabrication;
- Provision of a minimum depth of cover ranging from 750mm in rural areas, roadways 1200mm;
- Increase in wall thickness and/or depth of cover where the Pipeline passes specific land features or roads;
- Protection against external corrosion for underground and above ground facilities using cathodic protection and coatings;
- Lightning protection by use of surge protectors at above ground facilities and buried Insulation joints;
- Manually operable valves;
- Remotely operable valves for emergency shutdown
- Above ground posts and buried survey marks to mark the easement;
- Warning signs;
- Security fencing around above ground facilities; and
- Telemetered signals from sensing points at each end of the pipeline.

The more important of these features are described in greater details below.

13.1.6 Maximum Allowable Operating Pressure

The MAOP is the maximum pressure at which a pipeline or section of a pipeline may be operated, following hydrostatic testing in accordance with the AS2885.1 standard.

The MOP is the operating pressure limit (lower than the MAOP) imposed by the Licensee from time to time for pipeline safety or process reasons.

	MIM Lateral DN150	**X41 Lateral DN150**	**DPS Lateral DN300**
Substance conveyed	Natural Gas	Natural Gas	Natural Gas
Maximum Allowable Operating Pressure	5,100 kPag for the laterals outlet skid and 1,960 kPag for the remainder of the pipeline.	5,100 kPag upstream of the X41 Meter Station and 1,960 kPag downstream of the X41 Meter Station	4640 kPag for the lateral

13.1.7 Above Ground facilities

Consideration of the requirements of the standards and of Safety / Risk factors determined that no intermediate valves were required.

KP	Site Name	Telemetered	Site Type
MITL 0	Mica Creek Meter Station	Yes	MS, PR
MITL 4.2	X41 Meter Station Lateral Offtake	No	OT
MITL 6.2	Pendine Street pressure reduction skid	Yes	PR
XL 0.2	X41 Meter Station	Yes	MS, PR
XL 0.25	X41 Power Station Outlet	No	

Legend

MITL Kilometre distance from Mica Creek Meter Station
XL Kilometre distance from X41 Meter Station Lateral Offtake
MS Meter Station
MLV Main Line Valve
PR Pressure Reduction
OT Offtake

13.1.8 Operations and Maintenance Bases

The main operations and maintenance offices and bases for the Pipelines are located at Mt Isa and Brisbane. Emergency equipment is stored at Mt Isa.

13.1.9 Compressor Stations

There is no compression on the pipelines.

13.1.10 Meter Station

The Meter Stations supplied directly from the main pipeline are in the table below.

Station Metering	Type	Measurement Standard	Compressibility Standard	Volume Measurement Uncertainty
Mica Creek	Ultrasonic	AGA 9	AGA 8	+/- 1%
X41 Meter station	Coriolis	AGA 11	AGA 8	+/- 1% (Mass)
DPS	Ultrasonic	AGA 9	AGA 8	+/- 1%
Mt Isa Town Lateral	Turbine	AGA 7	AGA 8	+/- 1%

13.1.11 Corrosion Protection

MIM Lateral

The coating of the pipeline system is an extruded HDPE to AS 1518.

Cathodic protection is provided by a galvanic anode system. Test points are spaced appropriately along the length of the pipeline..

The MIM Lateral is not internally lined.

X41 Lateral

The X41 off take Lateral has a tri-laminate coating.

The field joint coating of welded joints between pipes is coated using a tape coating system. (Polyken tape 943 with Polyken 955 outer wrap) compatible with the primary coating. The pipeline is not internally lined.

Cathodic protection is provided by a galvanic anode system. Test points are spaced appropriately along the length of the pipeline..

DPS Lateral

The coating on the DPS lateral is FBE and it is not internally lined.The field joint coating of welded joints is carried out by ultra-high build Protal 7200 epoxy compatible with the primary coating.

Cathodic protection is provided by a galvanic anode system. Test points are spaced appropriately along the length of the pipeline..

All above ground pipework and steelwork is painted with a high quality corrosion resistant paint system. This applies to all above ground pipework at line valves and scraper stations.

13.2 Operating Parameters

13.2.1 Guidelines

The purpose of these guidelines is to establish a basis for operational decision making by documenting mandatory and desirable operating parameters used in the operation of the Pipelines.

13.2.2 Scope

The section of pipeline covered by Pipeline licence Number 50 is the Mica Creek Meter Station (MCMS) and the portion of the DPS Lateral from the Mica Creek Meter Station to the Mica Creek Meter station property boundary. Pipeline Licence Number 51 covers the MIM Lateral and the offtake to the X41 Meter Station.

Note that Pipeline Licence Number 50 and 51 do not cover any of the pipeline that runs from the Mica Creek Meter Station to the Mica Creek Power Station, nor any of the pipeline that runs from the MCMS boundary fence to the Diamantina Power Station, as these pipeline sections are owned, operated and licensed by others.

13.2.3 Operating Parameters

The operating parameters listed in this document have been developed acknowledging that there are a number of system constraints that affect the operation of the pipeline on any specific day. A number of these constraints are listed below.

13.2.4 System Constraints

- Gas Transportation Agreement (GTA) parameters;

- MAOP;
- System Capacity;
- Daily nomination;
- Gas quality; and
- Outlet pressure, temperature and other gas quality requirements

13.2.5 Operating within System Constraints

- It is worth noting that the GTA's that apply to the MCMS, MIM lateral and DPS Lateral are different to those that apply to the Carpentaria Gas Pipeline (CGP).
- There are two shippers transporting gas through the MCMS and MIM lateral. There is one GTA for the MCMS (known as the Mica Creek Metering Facility Agreement), and another GTA for the MIM lateral (known as the Town Lateral Gas Transportation Agreement). There are two shippers transporting gas through the DPS Lateral. The DPS Lateral is subject to a separate GTA.
- Gas is to be supplied to the receipt point at pressures between 2,000 kPag and 10,200 kPag.
- If the gas is supplied at pressures exceeding 3,000 kPag, then the gas shall be delivered to the outlet of the MCMS at no less than 2,700 kPag. If the gas is supplied at pressures below 3,000 kPag, then the minimum delivery pressure shall be 1,500 kPag.
- Part of the services being performed in the MCMS is a gas "conditioning" service to bring the temperature of the gas into the range of:
    - Maximum temperature: 50°C
    - Minimum temperature: the higher of:
        - 0°C; or
        - 15°C above the moisture (water) dewpoint of gas exiting the facility; or
        - 15°C above the hydrocarbon dewpoint of gas exiting the facility.
- Gas being delivered to MIM via the Town Lateral is to be odorised.
- The water bath heaters on the Mica Creek Meter Station are operated as required to meet the temperature requirements set out above.
- A gas chromatograph monitors the quality and composition of the gas in the MCMS.
- A moisture analyser monitors the water dewpoint of the gas in the MCMS.
- The hydrocarbon dewpoint of the gas is calculated based on the gas composition data provided by the gas chromatograph.
- For the MIM Lateral, the minimum delivery pressure at the delivery point (downstream face of the 168.3 mm Class 150 ball valve that is immediately downstream of the pressure reducing skid located in the MIM mine site) is 850 kPag. Note that if the gas is supplied to the receipt point of the MIM lateral pipeline at pressures in excess of 2,700 kPag, then the gas will be delivered at a pressure higher than this 850 kPag.
- For the DPS Lateral, the minimum pressure, which will be measured at the Mica Creek Meter Station outlet, is 3,000 kPag. Note: the minimum pressure measured at the DPS metering is not measured at the delivery point (the outlet flange of the Mica Creek Metre Station connected to the DPS Lateral).

13.2.6 Operating to maintain Integrity

- The MCMS is designed to accept gas at up to 14,800 kPag, and deliver this gas according to the pressure and temperature constraints described above.
- With the large range of pressures that exist within the MCMS, the station is broken into three sections of different class pipework and vessels. The pipework and vessels up to the first pressure cut regulators are Class 900. From this point through to the second pressure cut regulators (including the water bath heaters) is Class 600. From this point to the outlet of the station (including the metering) is Class 300. The various Emergency Shut Down (ESD) valves within the station are set at pressures according to the class of pipework and vessels they are designed to protect.
- Essential equipment (regulators, water bath heaters and metering) in the MCMS have been duplicated throughout the station. The station has been configured with one set of electronically controlled control valves (normally in operation) with a duplicate set of pneumatically controlled

regulators. This allows the MCMS to continue to operate even if power is lost to the control valves.

- The typical pressure set points used in the MCMS are:

Location	Pressure Set Point
1st pressure cut	6,000 kPag (approx)
2nd pressure cut	3,010 kPag

- The temperature set point for the water bath heater is controlled automatically in accordance with the requirements described in Section 17.2.4 for the delivery point minimum temperature.
- Each section of the MCMS is protected by an automatic system of shut down valves. Generally, these valves will operate to transfer duty from the duty run control valves to the standby run regulator. In the case of the 2nd pressure cut, each of the duty and standby runs consist of an active and monitor control valve/regulator, providing an additional level of control and redundancy.
- The MAOP of the MIM Lateral pipeline is 5,100 kPag. This pipeline is protected by a pressure switch (set to 3,600 kPag) which closes the shut down valves on the 2nd pressure cut..
- The DPS lateral MAOP is 4640 Kpag but is protected by the same shutdown system as the lateral to MCPS set at 3600 kPag as above.

14. APPENDIX E PEAT LATERAL LICENCE NO. 74

14.1 Pipeline System Operation

This section describes the Pipeline and above ground facilities, important features of the design, and measures included in the design that enhances the security of the system. Pipeline Licence No. 74 states that the pipeline licence is for 40 years from the start date.

14.1.1 Design Life

The design life is 40 years and life end date is February 2041.

In accordance with the APA Group pipeline management system and AS 2885.3 requirements, remaining life reviews are required to be carried out at typically 10-year intervals.

14.1.2 Overview of the Pipeline System

The Scotia/Woodroyd to RBP (Peat Lateral) natural gas pipeline system consists of:

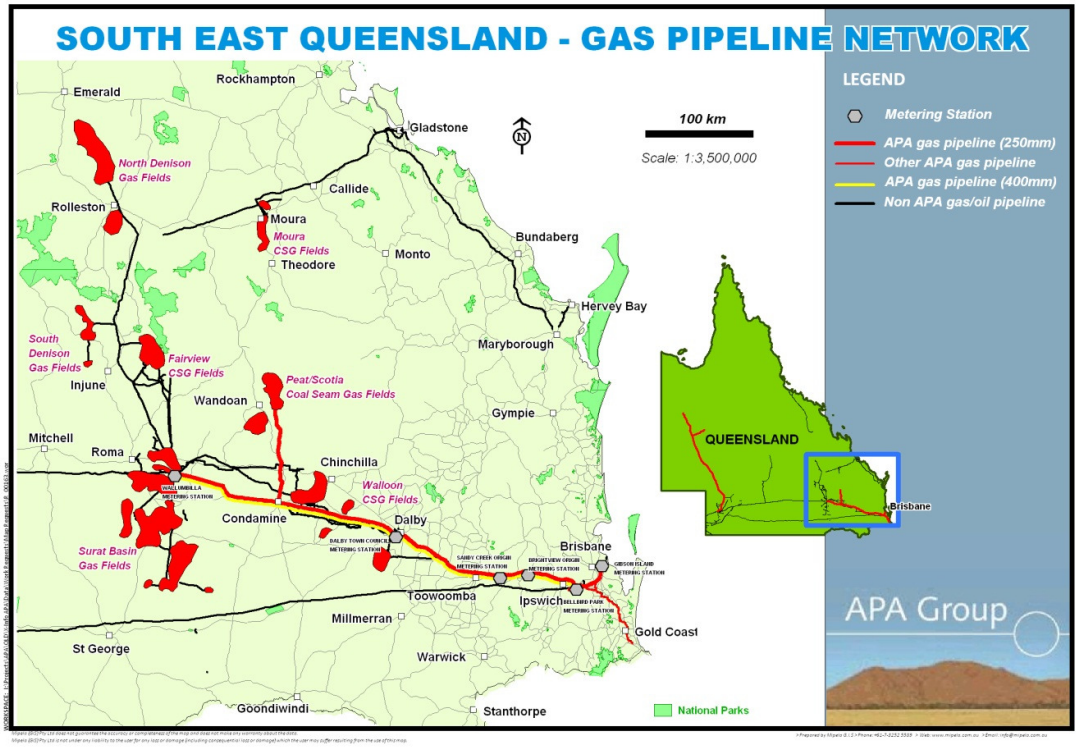
- The Woodroyd to Arubial (RBP) DN250 pipeline 110.7 km long, to transport natural gas from the Peat (Woodroyd) Coal Seam Methane Field Treatment Plant near Wandoan in South Queensland to the Arubial pressure reduction station at the Main Line Valve at RBP MP63.3. This section of the Peat Lateral was commissioned in 2001; and
- The Scotia Extension DN250 pipeline with a length of 10.7 km from the Scotia Coal Seam Methane Field to the Woodroyd pipeline terminal. The Inlet Scraper Station was relocated from Woodroyd to Scotia. The inlet Meter Station at Scotia was commissioned in 2002.

The Peat Lateral runs in a 30 metre wide easement or in road and rail reserves. The lateral has a nominal free flow capacity of approximately 74 TJ/day.

The Peat Lateral has been designed to comply with the requirements of Australian Standard 2885.1-1997. Wall thicknesses in excess of the requirements of this standard have been adopted. The lateral has been designed for a Maximum Allowable Operating Pressure (MAOP) of 10,200 kPag.

The pipeline is currently operated in accordance with AS2885.3. The pipeline is regulated under the Petroleum and Gas (Production and Safety) Act and Regulation 2004, under the instrument of Pipeline Licence (PL) No.74. PL No.74 is not named as a strategic pipeline in Schedule 5 of the Petroleum and Gas (Production and Safety) Regulation 2004.

14.1.3 General Route Map



14.1.4 Key Design Features of the Pipeline

The Pipeline dimensions are in accordance with the requirements of the design standards. The key design features of the Pipeline are:

Design parameter	**DN250**
Substance conveyed	**Natural Gas**
Length of pipeline	121.4 km
Outside diameter	273.1mm
Wall Thickness	4.78-5.7mm
Pipe specification	API 5L X60

The Alignment Sheets, read in conjunction with actual Depth Survey Reports, for this Pipeline indicate minimum specified depth of cover, sections where heavy wall pipe has been used, and in hazardous areas where special arrangements using concrete covering of the pipeline has been utilised.

The Pipeline has an external coating, with galvanic cathodic protection system applied to mitigate corrosion. All above ground pipe work and steelwork is painted with a high quality paint system to resist corrosion. This applies to all above ground pipe work at line valves and scraper stations.

The specifications for the mainline valves (ball valves) are, manufactured and tested in accordance with API 6D.

Further design and construction features that enhance the security of the Pipeline are:

- protection against external corrosion for underground and above ground facilities using cathodic protection and coatings;
- lightning protection by use of surge protectors at above ground facilities and buried Insulation joints;
- remotely, and manually operable line valves;
- scraper stations at regular intervals to facilitate in-line inspection;
- above ground posts and buried survey marks to mark the easement;
- warning signs, aerial markers;
- security fencing around above ground facilities; and
- telemetered signals from sensing points along the Pipeline.

14.1.5 Maximum Allowable Operating Pressure

The MAOP is the maximum pressure at which a pipeline or section of a pipeline may be operated, following hydrostatic testing in accordance with the AS2885.1 (2007) standard.

The MOP is the operating pressure limit (lower than the MAOP) imposed by the Licensee from time to time for pipeline safety or process reasons.

	Peat Lateral DN250
Substance conveyed	Natural Gas
Maximum Allowable Operating Pressure	10200kPag

The more important of these features are described in greater details below.

14.1.6 Above Ground facilities

The main above ground facilities are shown in table below

Chainage from Scotia to Woodroyd (Km) (SW)	**Site Name**	**Site Type**
S-W 0	Scotia	SS / IS
S-W 10.7	Woodroyd	IS
Chainage from Woodroyd to Arubial (Km) (W-A)	**Site Name**	**Site Type**
W-A 0	Woodroyd	IS
W-A 51.96	L-Tree Creek / Walshs Road	MLV
W-A 110.685	Arubial	SS/ PRS

** The Peat Lateral pipeline from the Scotia and Peat gas field is subject to a separate licence and Safety and Operating Plan.*

Legend
IS Inlet Station
MS Meter Station
CS Compressor Station
SS Scraper Station
MLV Main Line Valve
T Telemetered
MP Mile Post
PRS Pressure Reduction Station
S-W Scotia -Woodroyd
W-A Woodroyd- Arubial

14.1.7 Operations and Maintenance Bases

The main operations and maintenance offices and bases for the Pipeline are located at Wallumbilla, Condamine and Brisbane. Emergency equipment is stored at Wallumbilla, Dalby and Brisbane.

14.1.8 Compressor Stations

Not Applicable

14.1.9 Meter Stations

Meter Stations supplied directly to or from the main pipeline are listed in the table below.

Relevant measurement and status data are telemetered back to the IOC at Brisbane.

Station Metering	Type	Measurement Standard	Compressibility Standard	Volume Measurement Uncertainty
Scotia	Orifice	AGA 3	AGA 8	+/- 1%
Woodroyd	Orifice	AGA 3	AGA 8	+/- 1%
Arubial	Orifice	AGA 3	AGA 8	+/- 1%

14.1.10 Corrosion Protection

The coating of the pipeline system is an extruded yellow HDPE to AS 1518 with a minimum thickness of 1.2mm.

The CP test points are on average 3 km apart.

The Scotia/Woodroyd to RBP is not internally lined.

Corrosion of the pipeline is mitigated by the cathodic protection system, utilising sacrificial anodes for all buried metallic structures.

14.2 Operating Parameters

14.2.1 Guidelines

The purpose of these guidelines is to establish a basis for operational decision making by documenting mandatory and desirable operating parameters used in the operation of the Peat Lateral.

14.2.2 Scope

The section of pipeline covered by this licence is from Scotia to Arubial.

14.2.3 Operating Parameters

The operating parameters listed in this document have been developed acknowledging that there are a number of system constraints that affect the operation of the pipeline on any specific day. A number of these constraints are listed below.

14.2.4 System Constraints

- Gas Transportation Agreement (GTA) parameters;
- MAOP;
- System capacity;
- Daily nomination;
- Gas quality; and
- Inlet and outlet pressures and temperature requirements

14.2.5 Operating within system constraints

- The Pipeline is operated as required to exceed the minimum requirements specified in the GTAs for the pipeline.
- The receipt points on this pipeline operate in a notional flow control mode. The amount of gas entering the pipeline at Scotia and Woodroyd is controlled by others, and is generally close to nominations. However, the quantity that flows into the pipeline is not usually precise.
- The delivery point for the pipeline at Arubial is controlled via the IOC. The Arubial station can be put into either flow control or pressure control mode, depending on the needs of the pipeline controller at the time. Generally, Arubial will be in pressure control, and will be used to assist in pressure management within the RBP. In this mode, Arubial can act as a pseudo compressor station for the RBP.
- The line pack in the pipeline goes up and down depending on the needs of the pipeline controller at the time. This line pack is used as a part of the overall combined pipeline system management. At times, gas stored in the pipeline, and at other times the gas is released into the RBP. Note that these activities are performed so as not to impact on the ability of the shippers to receipt their nominated quantity into the pipeline each day.
- The pipeline controller is able to open and close shut down valves at Arubial, Woodroyd and Scotia as required. ESD valves can be operated as necessary to protect the pipeline from excessive pressure. An ESD can be initiated by the pipeline controller. However, the valve cannot be re-opened remotely.
- A gas chromatograph monitors the quality and composition of the gas as it enters the pipelines at both Scotia and Woodroyd.
- A moisture analyser monitors the level of water vapour in the gas that is entering the pipeline at both Scotia and Woodroyd.
- The GTAs that cover the transportation of gas in this pipeline treat this pipeline and the RBP as a single entity. Therefore, there is no minimum pressure set for the Arubial delivery point. The pressure at Arubial varies as required by the control scenarios discussed above.
- The receipt point pressure for Woodroyd can be up to 10,200 kPag. The receipt point pressure for Scotia can be up to 9,600 kPag. Note that if it is required, the Scotia pressure can be increased to 10,200 kPag as well, after 9 months written notice to the shipper. The actual pressure at the receipt point will vary, depending on how the pipeline is being managed at the time.
- Note that the interconnect point between the Peat Lateral and the RBP at Arubial is controlled by the IOC. This “receipt” point for the RBP is controlled as required to move gas from the Peat lateral into the RBP at the appropriate times. By appropriate use of the Arubial station, the amount of compression required on the RBP can be reduced.

14.2.6 Operating to Maintain Integrity

- It is noted that the pipeline is not operated in a manner that is specifically designed to avoid stress corrosion cracking (SCC). As stated above, the pipeline is operated to provide services to the shippers as per their GTAs;

- The pipeline is operated to ensure that the pressure is kept at or below MAOP at all times. Each of the pipeline receipt points have an automatic high pressure override function that will restrict flow into the Pipeline and prevent the pressure exceeding the MAOP and an automatic Emergency Shut Down (ESD) valve that will close if the pressure at that point exceeds the MAOP by more than 5%. A set of alarms in the SCADA system are used to warn the pipeline controller that the pressure limit for the pipeline is approaching so that action can be taken to avoid an over pressure situation;
- It must be at a temperature which is not less than 0oC and not higher than the greater of:
    - 50oC; or
    - the ambient temperature plus 12oC but in any event not to exceed 60oC.
- Other pressure regulation stations and delivery points are protected from over pressure by either relief valves or ESD valves.

15. APPENDIX F KOGAN NORTH CENTRAL GAS PROCESSING FACILITY LICENCE NO. 120

15.1 Facility System Operation

This section describes the plant facilities, important features of the design, and measures included in the design that enhance the safety and security of the system.

15.1.1 Design Life

The above ground facilities were designed for a life of 15 years and life end date is December 2020. Operational requirements post 2020 are not currently known however it is anticipated that the facility will continue to operate.

In accordance with the APA Group pipeline management system and AS 2885.3 requirements, remaining life reviews are required to be carried out at typically 10-year intervals.

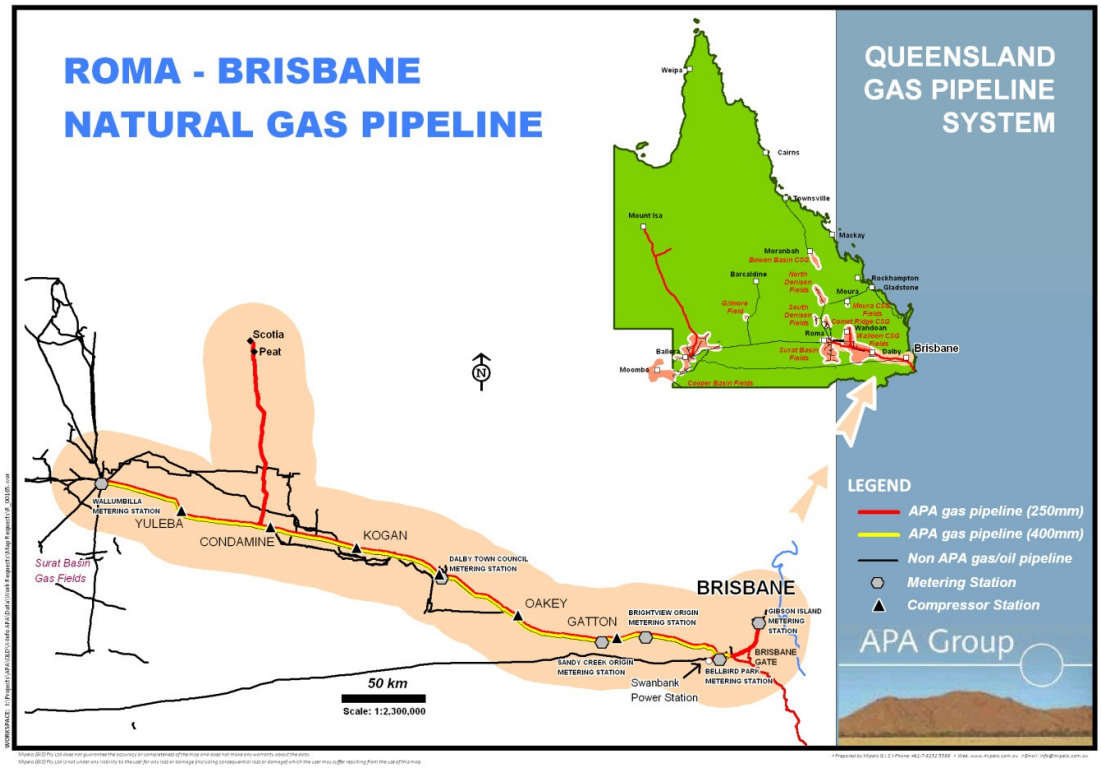
15.1.2 Overview of the Facility System

The KNCGPF is designed to compress and dehydrate raw low pressure coal seam gas for supply into the Roma Brisbane Gas Pipeline (RBP). The facility ties in to the RBP DN400 pipeline at MP 114.6 (KP 184.4) approximately 35 km west of Dalby on the Condamine Highway. The facility consists of:

- Inlet de-watering system, which includes DN600 polyethylene (PE) pipe, ESD valve and water removal system. A plant vent prevents overpressure of the gas field by allowing the gas field to be vented in the event that the plant is shut down for an extended period.
- Produced water handling plant separates water from contaminates and returns water to the field evaporation ponds.
- There are three compressor packages, in a parallel configuration, consisting of Cat V16 gas engines coupled to 4 stage Ariel reciprocating compressors.
- A Compressor Lube Oil Filter Coalescer separator Unit.
- A Sivalls TEG (Triethylene Glycol) Dehydration Unit.
- A TEG Filter Coalescer separator Unit.
- A Custody Transfer Metering skid including series proven Coriolis Meters, Black Start/Fuel Gas Coriolis Meter, Roma to Brisbane Pipeline inlet shut down valve, Gas Chromatograph and Moisture content analyser.
- The gathering system is protected by a back-pressure control valve on the suction manifold which will open to maintain flow from the wells.
- A 40.5 m DN200 lateral pipeline interconnecting with the DN400, Roma to Brisbane Natural Gas Pipeline.
- Grid mains power is the primary power supply with an auto start diesel backup generator.

15.1.3 General Location Map

Kogan North Central Gas Processing Facility is located about midway between Kogan Compressor Station and Dalby Compressor Station on the Roma - Brisbane Pipeline. The facility supplies gas to the DN400 line of the RBP only. The tie in point to the RBP is at MP 114.6.



15.1.4 Key Design Features of the Facility

The processing plant was designed for the delivery of gas into the RBP at a pressure up to but not exceeding 9.6 MPag, as per the sales gas contract.

No provision was made for pigging facilities in the well gas supply line.

The well gas arriving at the KNCGPF is saturated with water. However no provision was provided for slug catching at the inlet to the KNCGPF due to low point drains in the field gathering system ensuring proper dewatering.

The KNCGPF can be divided into two sections with different trains as follows:

- Basic particulate and water removal with compression, in three parallel trains; and
- Lube oil coalescer filtration, dehydration with glycol coalescing filtration and meters in a single train.

15.1.5 Maximum Allowable Operating Pressure

The MAOP is the maximum pressure at which a facility or section of a facility may be operated, following testing in accordance with the AS2885.1 (2007) standard.
The MOP is the operating pressure limit (lower than the MAOP) imposed by the Licensee from time to time for facility safety or process reasons.

	KNCGPF
Substance conveyed	CSG/Natural Gas
Maximum Allowable Operating Pressure	9600 kPag

15.1.6 Above Ground facilities

All equipment is above ground with the exception of the inlet and outlet piping, electrical supply and water discharge system.

The location of the below ground equipment is shown on drawings located on the shared drive within the APA Group network and on site in hard copy format. The on site drawings are regularly checked to ensure currency.

15.1.7 Operations and Maintenance Bases

The main operations and maintenance offices and bases for the Plant and Pipeline are located on site at KNCGPF and at Brisbane. Pipeline Emergency equipment is stored on site and supported by equipment located at Dalby and Wallumbilla.

15.1.8 Compressor Stations

The site is a facility to compress low pressure coal seam gas up to sufficient pressure to allow injection into the RBP.

It contains three reciprocating Ariel compressor packages driven by Caterpillar gas engines. The compressors were packaged and supplied by Universal Compression.

15.1.9 Meter Stations

The sales gas metering system meters the sales gas prior to entering the RBP, and in accordance with the Category 3 metering system requirements specified in the Gas Sales Agreement. The meter system is designed for the following conditions:

Dimension	Specification
Flow Rate	17.6 MMscfd – 500000 Sm^3/day
Inlet Pressure	9,600 kPag
Inlet Temperature	50^oC
Max Pressure Drop	35 Kpa (Clean Condition)

The metering system includes:

- 2 x 100% capacity meter runs;
- A common gas chromatograph for measuring heating value, specific gravity, Wobbe Index, inerts, and hydrocarbon components;
- An on-line water dewpoint analyser; and
- A sample point to allow spot checking of the gas quality, for example, periodic checking of the levels of sulphur compounds, and for checking the performance of the dewpoint analyser.

Station Metering	Type	Measurement Standard	Compressibility Standard	Volume Measurement Uncertainty
Kogan North	Coriolis	AGA 11	AGA 8	+/- 1%

15.1.10 Corrosion Protection

Corrosion protection has been provided for pressure vessels and pipework by the application of an external coating. The KNCGPF interconnection to RBP is not internally lined. The pipeline lateral has an external HDPE coating, and a galvanic cathodic protection system applied to mitigate corrosion.

15.2 Operating Parameters

15.2.1 Guidelines

The purpose of these guidelines is to establish a basis for operational decision making by documenting mandatory and desirable operating parameters used in the operation of the Kogan North Central Gas Processing Facility.

15.2.2 Scope

The section of pipeline covered by this licence is from the Station Inlet Line to the Roma to Brisbane Gas Pipeline.

15.2.3 Operating Parameters

The operating parameters listed in this document have been developed acknowledging that there are a number of system constraints that affect the operation of the plant and pipeline on any specific day. A number of these constraints are listed below.

15.2.4 System Constraints

- Gas Transportation Agreement (GTA) parameters;
- MAOP;
- System Capacity;
- Daily nomination;
- Gas quality; and
- Inlet pressure and temperature requirements.

15.2.5 Operating within System Constraints

The receipt points on this pipeline operate in a notional flow control mode. The amount of gas entering the pipeline at Kogan North is controlled by flow rates and pressures delivered from the gathering system and the capabilities of the compressors. A back pressure control valve maintains the station discharge pressure above the DN400 RBP pressure.

Emergency Shut Down valves (ESD) can be operated as necessary to protect the pipeline from excessive pressure. The pipeline controller can initiate an ESD. However, the valve cannot be re-opened remotely.

A gas chromatograph monitors the quality and composition of the gas as it enters the pipeline at Kogan North.

A moisture analyser monitors the level of water vapour in the gas that is entering the pipeline at Kogan North.

The receipt point pressure for Kogan North into the RBP can be up to 9,600 kPag. The actual pressure at the receipt points will vary, depending on how the pipeline is being managed at the time.

15.2.6 Operating to Maintain Integrity

The gas composition limits are set out in the GTA's. A sample of the composition limits has been reproduced in section 6.1.7 of this SAOP for ease of reference.

The Coal Seam Gas (CSG) delivered by the suppliers to the APA Group at the Receipt Point must comply with the CSG Specifications.

If the APA Group (acting reasonably) is aware that any CSG delivered or to be delivered at the Receipt Point does not meet the CSG Specifications, it must immediately notify all Users.

The APA Group may refuse to accept CSG at the Receipt Point that does not meet the CSG Specifications without affecting the User's obligations.

The plant and pipeline is operated to ensure that the pressure is kept at or below MAOP at all times. ESD valves provide an automatic trip if the pressure exceeds MAOP by 5%. Alarms in the IOC are used to warn that the pressure is approaching MAOP so that action can be taken to avoid exceeding the MAOP of 9,600 kPag.

15.3 Specific Features of the Facility

15.3.1 Process Description

Coal seam methane and water enters the KNCGPF through an underground HDPE pipeline. Free water is collected in a gravity-fed "boot" at the end of the HDPE pipeline and piped to a separator system. The compressor package suction lines are fed directly from the HDPE pipeline. Initial treatment of the well gas prior to compression consists of vertical coalescing filters (in compressor packages) to remove particulates and free water (in the form of mist).

Following separation of free water, the gas is compressed to the sales specification using 3 off, 4-stage gas engine driven reciprocating compressors, connected in parallel. Fuel gas for the gas driven compressor engines is from the export gas line of the plant. The compressors discharge to a common manifold system.

The compressors controls on discharge flow rate with high discharge pressure override. On high discharge pressure, the compressors will unload and go into recycle mode. If the discharge pressure continues to increase, the compressor 'high-high' pressure signal will energise the compressor stop signal. This will carry out a stop of the compressors. The actuated valves on the inlet and outlet of the compressor skids will close and the blowdown valve will open. This will isolate the compressor skids.

In the case that the well production is higher than plant throughput, the suction manifold pressure will rise. The gathering system is protected by a back pressure control valve on the suction manifold that will open to maintain flow from the wells. A pressure control valve (PCV) is installed in the individual compressor suction lines to ensure that the compressors can be started when the gathering system pressure is higher than 137 kPag. A pressure safety valve (PSV) is installed to protect the suction line from overpressure.

If the suction pressure drops (due to wellhead failure or pipe rupture etc) during normal operation the compressors will shutdown on low suction pressure.

Normal deliverability would be resumed by manual intervention once the suction pressure has been restored and operators are confident of its stability.

After compression, lube oil filter coalescers are used to remove any lube oil carried over in the gas stream. The discharge lube oil filter coalescer is shared by the three compressors.

The processing plant was designed for the delivery of gas into the RBP at a pressure up to but not exceeding 9600 kPag, as per the sales gas contract.

No provision was made for pigging facilities in the well gas supply line.

The well gas arriving at the KNCGPF is saturated with water. However no provision was provided for slug catching at the inlet to the KNCGPF due to low point drains in the field gathering system ensuring proper dewatering.

The KNCGPF can be divided into two sections with different trains as follows:

Basic particulate and water removal with compression, in three parallel trains

Lube oil coalescer filtration, dehydration with glycol coalescing filtration and meters in a single train.

15.3.2 Compression

Compression Specifications

Three Ariel JGE-4 reciprocating compressors are installed, in parallel, to meet the maximum demand for sales gas. These three units are identical.
The design flow rate of the suction manifold, discharge manifold and discharge line is sufficient for up to four identical compressors. The compressors have been designed for the following conditions:

Dimension	Specification
Suction header pressure (at B/L)	**= 68.947 kPag to 90 kPag**
Suction pressure (max for compressors)	**= 140 kPag**
Discharge pressure (normal)	**= 8,400 kPag**
Discharge pressure (maximum)	**= 10,000 kPag**
Suction temperature range	**= 20 to 60°C, expected op. temperature 25°C**
Discharge temperature (maximum)	**= 50°C after the aftercooler.**

Suction pressure control valves are required to ensure that suction pressures are kept below approximately 138 kPag (20 psig) otherwise the units will shutdown on high inter-stage pressures (due to rod load). The design case is for 68.947 kPag (10 psig).

Suction Pressure (kPag)	Discharge Pressure (kPag)	Manufacturer's Rated Flow at 40°C suction	
		Sm^3/h	
70	**8,400**	**5,406**[1]	**70**
70	**10,000**	**5,203**[1]	**70**

15.3.3 Dehydration

The gas is then dehydrated in a single TEG unit comprising a contactor column, TEG pumps, gas fired regenerator and ancillaries. Fuel gas for the TEG unit is supplied from the TEG Flash Separator and/or the suction header.

A TEG Liquid Coalescer installed downstream of the TEG contactor minimises the carry over of glycol into the sales gas stream.

To maintain a constant pressure in the TEG contactor tower, a back pressure controller is installed upstream of the meter station.

[1] *These are manufacturer theoretical rated flows at 40 deg. C.*

A manual plant recycle system allows gas flow to recirculate around the plant and through the contactor at start-up. This allows the gas dewpoint specification to be achieved before discharge into the sales gas pipeline.

15.3.4 Dehydration Unit

A back pressure control valve is installed at the plant outlet. This allows the dehydration and final filtration to operate at a constant pressure.

The section is designed for a minimum contactor pressure of approximately 7,900 kPag.

The dehydration unit is designed using the following parameters:

Dimension	Specification
Inlet pressure	**= 9,600 kPag**
Inlet temperature	**= 50^{o}C**
Flow rate	**= Future Plant Flow Requirements**
	= 21,119 Sm^3/h (17.9 MMscfd)
Maximum Water Content	**= 65 mg/Sm^3**

15.3.5 TEG Filter Coalescer

This is a vertical coalescer vessel. This is used to remove TEG from the compressed gas and is designed for the following conditions:

Dimension	Specification
Flow rate	**= 17.6 MMscfd – 500000 Sm^3/day**
Inlet pressure	**= 9,600 kPag**
Inlet temperature	**= 50^{o}C**
Maximum pressure drop	**= 35 kPa (clean condition)**

15.3.6 Plant TEG Dehydration System

Planned inspection and maintenance activities for the TEG Unit include:

- Temperature control stability checks;
- Temperature indicating instrumentation checks;
- Over Temperature protection system;
- Glycol Level checks and top ups;
- Instrument Air checks;
- Pilot Flame fuel gas pressure regulation;
- Main Burner fuel gas pressure regulation;
- Burner Igniter; and
- Burner Management System operation check.

15.3.7 Lube Oil Coalescer

The lube oil filter coalescer can be bypassed for maintenance. Compressed gas will be routed through the TEG liquid coalescer and subsequently to the TEG unit. Dehydrated gas will then be routed to the meter skid without passing through a coalescer filter.

The product gas is analysed (for moisture and composition) and metered before entering the RBP.
The lube oil filter coalescer a vertical vessel, which is used to remove lube-oil and oil/water emulsion from the compressed gas, prior to entering the dehydration unit. All compressors share the Coalescer and are designed for the following conditions:

Dimension	Specification
Flow rate	**= 17.6 MMscfd – 500000 Sm^3/day**
Inlet pressure	**= 9,600 kPag**
Inlet temperature	**= 50^oC**
Maximum pressure drop	**= 35 kPa (clean condition)**

The Plant is designed to operate on a continuous basis and produce approximately 12.05 TJ/day.

15.3.8 Inlet Manifold

There is no slug catching facilities. In the field, at each well, a separator is installed. This system is regularly checked (by Arrow Energy) to ensure no liquid slugs are transmitted to the KNCGPF.

The inlet manifold is a 600mm NB section of PE pipe, which incorporates a drain boot at the downstream end to facilitate removal of free water from the well gas. This boot contains level indication equipment.

15.3.9 Cold Vent Systems

Two cold venting systems in the plant vent gas from equipment PSVs, compressor depressurising and emergency shutdowns. The compressor starter motor is driven by air, which is discharged at a remote location.

The field cold vent vents gas from the gathering system, allowing the wells to continue to produce gas while the compressors are shutdown or operating at a sufficiently reduced capacity. The field vent while located in the perimeter fence for the facility is the responsibility of the field operator, Arrow Energy Pty Ltd.

All gas is vented to atmosphere at a safe location, with regard to the predominant wind direction.

15.3.10 Waste Water Production

All liquids produced by the plant enter the Above Ground Separator through the drains and process water lines. The oily water separator allows gravity separation of any contaminants. The water is piped to the below ground drain sump, and can be pumped through pipes to the evaporation pond via a closed drain system.

A concrete bund around the tanks provides spill protection.

Oil is removed from the drain tank by a 'sucker' truck. The drain tank is sized to keep intervals between emptying to a maximum.

An injection point has been provided for an emulsion breaking chemical, in case this is required in the future.

The drain tank is dipped on a daily basis to identify the oil interface. A 'lute' pipe is installed to allow water from the bottom of the tank to drain off to the open drain sump.

Waste water is produced by the following equipment:

- Inlet dewatering manifold;
- Interstage Suction Scrubbers;
- Lube Oil Coalescer;
- TEG Coalescer;
- TEG Unit (water evaporated)
- Equipment wash down and spill containment; and
- Instrument Air Compressors.

15.3.11 Pipeline Lateral

The pipeline lateral connecting into the RBP is in accordance with the requirements of the design standards (AS2885). The key design features of the pipeline are:

Dimension	Specification
Pipeline size	**DN200**
Substance conveyed	**Coal Seam Methane**
DN 400 RBP Tie in point	**MP 114.6 (KP 184.4)**
Length of pipeline	**40.5 m**
Outside diameter	**219.1 mm**
Wall Thickness	**12.70 mm**
Pipe specification	**ASTM A106 Gr.B**
Maximum Allowable Operating Pressure (MAOP)	**9,600 kPag**

The pipeline lateral has an external HDPE coating, and a galvanic cathodic protection system applied to mitigate corrosion. The pipeline lateral is not pigable. All above ground pipe work and steelwork is painted with a high quality corrosion resistant paint system.

The specifications for the valves (ball valves) are, manufactured and tested in accordance with API 6D.

The tie-in into the RBP has been fabricated in accordance with requirements of AS2885.

16. APPENDIX G BERWYNDALE TO WALLUMBILLA PIPELINE LICENCE NUMBER PL 123

16.1 Pipeline System Operation

This section describes the Pipeline and above ground facilities, important features of the design, and measures included in the design that enhances the security of the system. Pipeline Licence No. 123 states that the pipeline licence is for 40 years from the start date.

16.1.1 Design Life

The design life is 40 years and life end date is February 2048.

In accordance with the APA Group pipeline management system and AS 2885.3 requirements, remaining life reviews are required to be carried out at typically 10-year intervals.

16.1.2 Overview of the Pipeline System

The Berwyndale to Wallumilla natural gas pipeline system consists of:

- A 112km, DN400 pipeline from the gas processing facility at Berwyndale approximately 8km east of Miles to a terminal facility located at the Wallumbilla gas hub (approximately 20 km east of Roma).
- A short interconnecting pipeline from the Wallumbilla BWP terminal to the SWQP Wallumbilla meter station, and a remote pipeline blowdown vent stack in between the two Wallumbilla compounds.
- A 0.3km, DN200 interconnect pipeline from the APA BWP Wallumbilla meter station to the AGL Silver Springs Pipeline facility east of the APA compound. The interconnect has a design life of 20 years, with a life end date of July 2031.

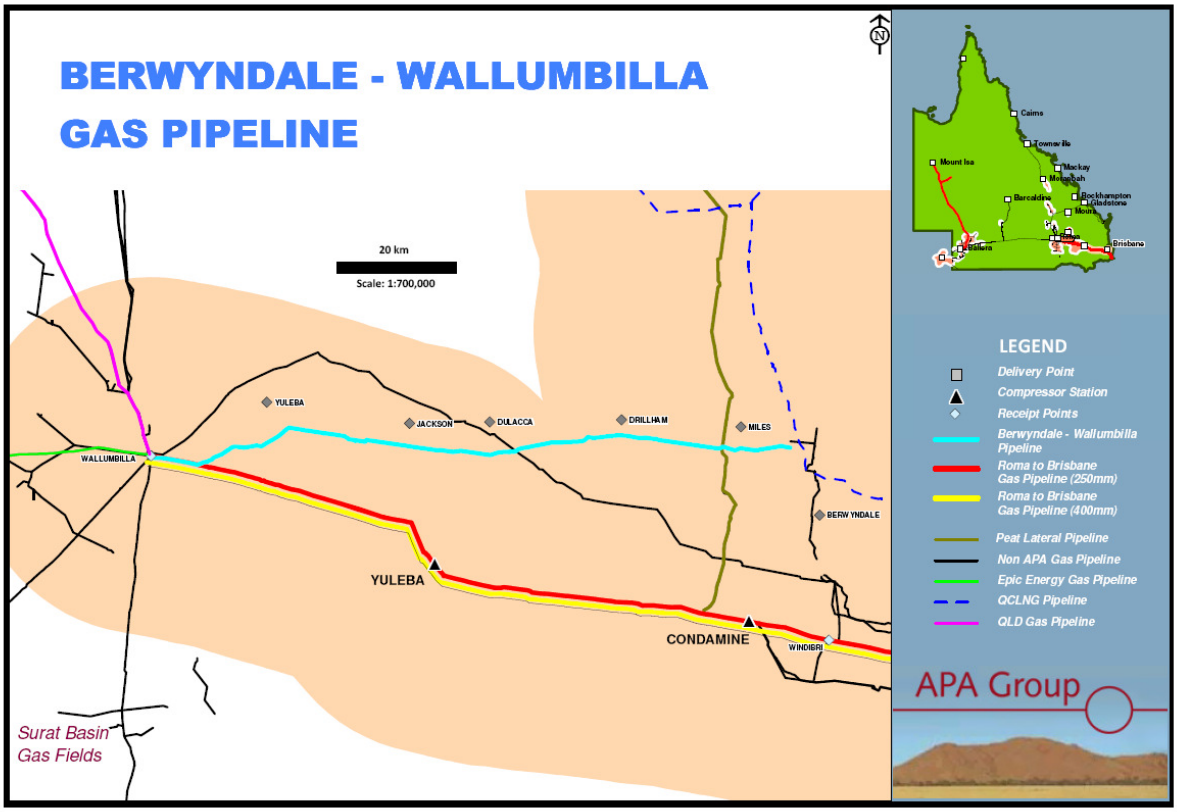
In 2014-15 the BWP was modified to enable bi-directional flow between the APA SWQP Wallumbilla Meter Station and the Berwyndale South facilities. The BWP to AGL Silver Springs interconnect remains unidirectional.

The BWP runs in a 30 metre wide easement or in road and rail reserves. The pipeline has a nominal free flow capacity of approximately 160 TJ/day.The Interconnect runs within APA compound, road reserve, or AGL Energy land and has a nominal design capacity of 35TJ/day.

The pipeline has been designed to comply with the requirements of Australian Standard 2885.1. The pipeline has been designed for a Maximum Allowable Operating Pressure (MAOP) of 15,300 kPag. The BWP to Silver Springs interconnect pipeline has been designed for a MAOP of 9,810 kPag.

The pipeline is currently operated in accordance with AS2885.3. The pipeline is regulated under the Petroleum and Gas (Production and Safety) Act and Regulation 2004, under the instrument of Pipeline Licence (PL) No.123. PL No.123 is not named as a strategic pipeline in Schedule 5 of the Petroleum and Gas (Production and Safety) Regulation 2004.

16.1.3 General Route Map



16.1.4 Key Design Features of the Pipeline

The Pipeline dimensions are in accordance with the requirements of the design standards. Refer to the BWP Structural Integrity Plan and Detailed Design Basis for more detailed information about the design parameters of the pipeline. The key design features of the Pipeline are:

Design parameter	DN400	DN200
Substance conveyed	**Natural Gas/ Coal Seam Gas**	**Natural Gas/ Coal Seam Gas**
Length of pipeline	112.0 km	0.3 km
Outside diameter	406.4mm	219.1mm
Wall Thickness	8.1 mm (majority) 9.61mm (approx. 6.5km)	8.18mm
Pipe specification	API 5L PSL 2 X70 ERW	API 5L PSL 2 X52 ERW
Pipe coating	3LPE (trilaminate)	Dual Layer FBE (600µm)

The Alignment Sheets, read in conjunction with actual Depth Survey Reports, for this Pipeline indicate minimum specified depth of cover, sections where heavy wall pipe has been used, and in hazardous areas where special arrangements using concrete covering of the pipeline has been utilised.

The Pipeline has an external coating, with an impressed current cathodic protection system applied to mitigate corrosion. The interconnect has a galvanic cathodic protection system so as not to cause interference with neighbouring pipelines in the Wallumbilla Hub. All above ground pipe work and steelwork is painted with a high quality paint system to resist corrosion. This applies to all above ground pipe work at line valves, meter and scraper stations.

The specifications for the mainline valves (ball valves) are, manufactured and tested in accordance with API 6D.

Further design and construction features that enhance the security of the Pipeline are:

- protection against external corrosion for underground and above ground facilities using cathodic protection and coatings;
- lightning protection by use of surge protectors at above ground facilities and buried Insulation joints;
- Electrical hazard protection from induced AC voltages;
- remotely, and manually operable line valves, including ESD fuction for interconnect from the AGL control room;
- scraper stations at Berywndale and Wallumbilla to facilitate in-line inspection;
- above ground posts and buried survey marks to mark the easement;
- warning signs, aerial markers;
- security fencing around above ground facilities; and
- telemetered signals from sensing points along the Pipeline.

16.1.5 Maximum Allowable Operating Pressure

The MAOP is the maximum pressure at which a pipeline or section of a pipeline may be operated, following hydrostatic testing in accordance with the AS2885.1 (2007) standard. The MOP is the operating pressure limit (lower than the MAOP) imposed by the Licensee from time to time for pipeline safety or process reasons.

	DN400	DN200
Substance conveyed	Natural Gas	Natural Gas
Maximum Allowable Operating Pressure	15300kPag	9810 kPag

16.1.6 Above Ground facilities

The main above ground facilities are shown in table below

Chainage from Berwyndale to Wallumbilla (Km)	Site Name	Site Type
B-W 0	Berwyndale	SS / IS
B-W 112	Wallumbilla	SS/PRS

Chainage from Wallumbilla to Silver Springs Interconnect (Km)	Site Name	Site Type
W-SSI 0	Wallumbilla	PRS/MS
W-SSI 0.3	AGL	CTP

Legend
CTP Custody Transfer Point
IS Inlet Station
MS Meter Station
SS Scraper Station
MLV Main Line Valve
T Telemetered
PRS Pressure Reduction Station

16.1.7 Operations and Maintenance Bases

The main operations and maintenance offices and bases for the Pipeline are located at Wallumbilla and Brisbane. Emergency equipment is stored at Wallumbilla, Dalby and Gatton.

16.1.8 Compressor Stations

Not Applicable. The BWP has facilities for future compression at the eastern (Berwyndale) terminal facilty but no compression is currently installed on the BWP.

16.1.9 Meter Stations

Metering is in accordance with AGA standards for the metering method and subject to the commercial requirements for gas transportation through the meter. Meter validations are completed by QGC and APA as applicable with APA operations as witness. Meter stations are as follows:

- Berwydale South – metering operated by QGC within the adjacent QGC facilities
- Wallumbilla – metering operated by APA in the SWQP Wallumbilla Meter Station for BWP to SWQP flows

Relevant measurement and status data are telemetered back to the IOC at Brisbane.

Station Metering	Type	Measurement Standard	Compressibility Standard	Volume Measurement Uncertainty
Wallumbilla	Ultrasonic	AGA 9	AGA 8	+/- 1%

16.1.10 Corrosion Protection

All BWP line pipe is externally coated with a factory applied three-layer polyethylene, (3LPE), comprising FBE primer, copolymer adhesive and a high-density polyethylene sheath. The coating was applied and tested in accordance with a project specific coating specification based on Canadian Standard CSA Z245.21, with inclusions recognising the special project conditions.

The minimum thickness of each coating layer for the 3LPE coating was:

- Fusion Bonded Epoxy 0.15 mm
- Co-polymer adhesive 0.20 mm
- High density polyethylene 1.00 mm
- Total system minimum thickness 1.35 mm

For heavy duty applications such as horizontal directional drill, thrust bore and designated high integrity situations the minimum thickness of each coating layer was:

- Fusion Bonded Epoxy 0.15 mm
- Co-polymer adhesive 0.20 mm
- High density polyethylene 4.65 mm
- Total system minimum thickness 5.00 mm

As an alternative heavy duty coating the following system was acceptable:

- Nap Rock Dual Powder System
- Base coat 7-2500 0,40 mm
- Top coat 7-2610 0.70 mm
- Total system minimum thickness 1.10 mm

The coating system materials have a proven track record of in ground performance.

All interconnect line pipe is externally coated with dual layer FBE with a UHB Epoxy joint coating. The coating was applied and tested in accordance with a project specific coating specification based on AS3862.

	Minimum	Nominal
Base Coat (µm)	250	300
Top Coat (µm)	250	300
Total	600	600 (800 maximum)

16.2 Operating Parameters

16.2.1 Guidelines

The purpose of these guidelines is to establish a basis for operational decision making by documenting mandatory and desirable operating parameters used in the operation of the pipeline.

16.2.2 Scope

The section of pipeline covered by this licence is from Berwyndale to Wallumbilla.

16.2.3 Operating Parameters

The operating parameters listed in this document have been developed acknowledging that there are a number of system constraints that affect the operation of the pipeline on any specific day. A number of these constraints are listed below.

16.2.4 System Constraints

- Gas Transportation Agreement (GTA) parameters;
- MAOP;
- System capacity;
- Daily nomination;
- Gas quality; and
- Inlet and outlet pressures and temperature requirements

16.2.5 Operating within system constraints

- The Pipeline is operated as required to exceed the minimum requirements specified in the GTAs for the pipeline.
- The BWP pipeline which runs between QGC's Berwyndale facility and the APA Wallumbilla facility has bidirectional capacity.
- Overpressure protection is provided in accordance with relevant standards.
- The delivery point for the pipeline at Wallumbilla is controlled by APA.
- The line pack in the pipeline goes up and down depending on the needs of the pipeline controller at the time. This line pack is used as a part of the overall combined pipeline system management. At times, gas stored in the pipeline, and at other times the gas is released to the receiver.

Note that these activities are performed so as not to impact on the ability of the shipper to receipt their nominated quantity into the pipeline each day.

- The pipeline controller is able to open and close shut down valves at Berwyndale and Wallumbilla as required. ESD valves can be operated as necessary to protect the pipeline from excessive pressure. An ESD can be initiated by the pipeline controller. However, the valve cannot be re-opened remotely.
- A gas chromatograph monitors the quality and composition of the gas as it enters the pipeline at Berwyndale.
- A moisture analyser monitors the level of water vapour in the gas that is entering the pipeline at Berwyndale.
- The GTA that cover the transportation of gas is a stand alone contract which does not influence any other GTAs. Therefore, there is no minimum pressure set for the Wallumbilla delivery point. The pressure at Wallumbilla varies as required by the control scenarios discussed above.

- In 2014 modifications were made at Wallumbilla Compressor Station to enable bidirectional flow in the Berwyndale to Wallumbilla Pipeline.

16.2.6 Operating to Maintain Integrity

- It is noted that the pipeline is not operated in a manner that is specifically designed to avoid stress corrosion cracking (SCC), however an SCC study has been undertaken. As stated above, the pipeline is operated to provide services to the shipper as per their GTA;
- The pipeline is operated to ensure that the pressure is kept at or below MAOP at all times. The pipeline receipt point has an automatic high pressure override function that will restrict flow into the Pipeline and prevent the pressure exceeding the MAOP and an automatic Emergency Shut Down (ESD) valve that will close if the pressure at that point exceeds the MAOP by more than 5%. A set of alarms in the SCADA system are used to warn the pipeline controller that the pressure limit for the pipeline is approaching so that action can be taken to avoid an over pressure situation;
- No corrosion allowance is made in the pipeline wall thickness. The sales gas is considered non-corrosive.. Water dew point and moisture monitoring is critical to the management of internal corrosion and is in place and measured by QGC. Appropriate measuring data is supplied to the pipeline operator. The gas quality requirements, coupled with monitoring for compliance against the gas quality requirements by QGC, will provide adequate protection against internal corrosion.
- The gas must be operated at a temperature which is not less than 20oC in normal operation and not higher than 60 C in accordance with the design basis for the pipeline.

17. APPENDIX H SOUTH WEST QUEENSLAND PIPELINE SYSTEM LICENCE NUMBERS PL 24, PL129 & PL18 (SOUTH AUSTRALIA)

17.1 Pipeline System Operation

This section describes the Pipeline and above ground facilities, important features of the design, and measures included in the design that enhances the security of the system.

17.1.1 Overview of the Pipeline System

The South West Queensland Pipeline System consists of the SWQP, the QSN Link and the recent duplications of both, denoted SWQE and QSNE ('E' for expansion) that run between Wallumbilla (QLD) and Moomba (SA).

To the extent that these pipelines are located in Queensland they are regulated under the Petroleum and Gas (Production and Safety) Act and Regulation 2004 and under the instrument of Pipeline Licences PPL24 (SWQP/SWQE) and PPL129 (QSN/QSNE Link)

The portion of the QSN/QSNE located in South Australia is regulated under the Petroleum and Geothermal Energy Act 2000, the Petroleum and Geothermal Energy Regulation 2013 and under the Pipeline Licence PL18 issued by the then South Australian Department of Primary Industry and Resources.

PPL 24 (SWQP & SWQPE) is a 755 kilometre looped pipeline that runs from the Wallumbilla Gas Centre to the Ballera Gas Centre. PPL 129 (QSN Link & QSNE) is a 90 kilometre looped pipeline that runs from the Ballera Gas Centre to the Queensland / South Australian border. PPL 18 (QSN Link & QSNE Link) is a 92 kilometre looped pipeline that runs from the Queensland / South Australian border to Moomba.

PL 18 also covers the Moomba Interconnect Pipeline (MIP) from the sweeping bend interface with PL 7 to Moomba Pressure Reduction Station (MPRS).

The SWQP system was modified in 2014/15 to enable bi-directional flow.

The South West Queensland Pipeline consists of:

- Two parallel pipelines both running form Wallumbilla to Ballera and approximately 755km long. The original pipeline was constructed in 1995 and has a DN400 nominal diameter. The looping pipeline was constructed in 2010 and has a DN450 nominal diameter.
- Two compressor stations located at Wallumbilla and Cooladdi.
- Fifteen Main line valves.
- Five delivery stations located at Ballera, Roma, Tarbat, Cheepie and Wallumbilla.
- One inlet station located at Wallumbilla.

The QSN Link consists of:

- Two parallel pipelines both running from Ballera to Moomba and approximately 182km in length (first 90km in QLD). The original pipeline was constructed in 2008 and has a DN400 nominal diameter. The looping pipeline was constructed in 2010 and has a DN450 nominal diameter.
- One delivery/inlet station is located at Moomba. This station can deliver gas into the Moomba Adelaide Pipeline and the Moomba Sydney Pipeline and also receive gas into the dual pipelines, QSN Link and QSNE.
- One inlet station located at Ballera.
- One main line valve station with pressure reduction facilities for western flow, located in SA at KP102 on the QSN/E.

Gas flow in the pipeline is bidirectional.

Compressor Station facilities are in place at the following three locations;

- Wallumbilla Gas Centre: Lot 2 on Crown Plan 899219, Waldegrave County, Combarngo Parish, Iona Bardlomey Road, Wallumbilla, Queensland and
- QCS4: Monamby Station, Cooladdi, Queensland.
- Moomba Compressor Station, Browne Street, Moomba, South Australia

The pipeline system is currently operated in accordance with AS 2885.3.

17.1.2 Design Life

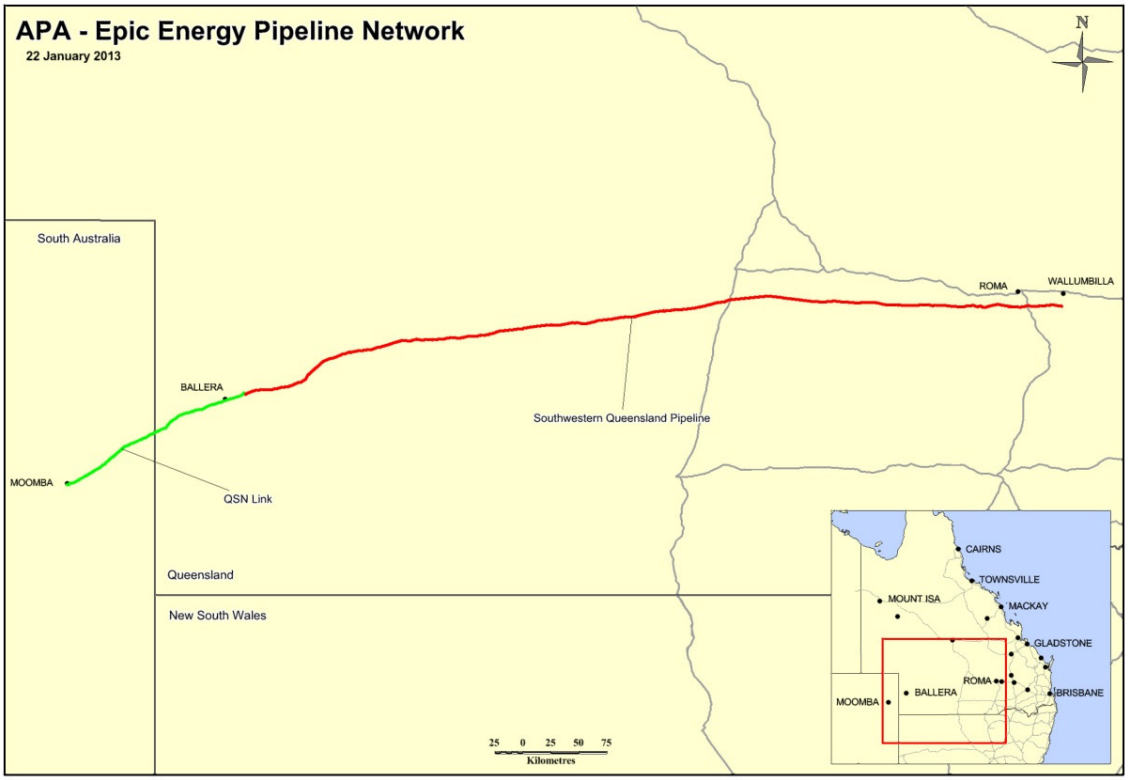
The SWQP design life is 50 years and life end date is 2045.

The QSN Link design life is 50 years and life end date is 2058.

The SWQPE and QSNE design life is 50 years and life end date is 2060.

In accordance with the APA Group pipeline management system and AS 2885.3 requirements, remaining life reviews are required to be carried out at typically 10-year intervals.

17.1.3 Overview of the Pipeline System



17.1.4 Key Design Features of the Pipeline

Design parameter	SWQP DN400	QSN Link DN400	SWQPE/QSNE DN450
Substance conveyed	Natural Gas / Coal Seam Gas	Natural Gas / Coal Seam Gas	Natural Gas / Coal Seam Gas
Length of pipeline	755km	182km (first 90km in QLD)	937km (first 845km in QLD)
Outside diameter	406.4mm	406.4mm	457mm
Wall Thickness	9.4mm (Normal) 13.6mm (Heavy Wall)	8.1mm (Normal) 9.5/9.7mm (Heavy Wall)	8.1mm (Normal) 9.7/10.8mm (Heavy Wall)
Pipe specification	API 5L X52	API 5L X70	API 5L X70
Pipe coating	FBE	3LPE	FBE

The Alignment Sheets, read in conjunction with actual Depth Survey Reports, for this Pipeline indicate minimum specified depth of cover, sections where heavy wall pipe has been used, and in hazardous areas where special arrangements using concrete covering of the pipeline has been utilised.

Further design and construction features that enhance the security of the Pipeline are:

- protection against external corrosion for underground and above ground facilities using cathodic protection and coatings;
- lightning protection by use of surge protectors and dedicated earthing at above ground facilities and insulation joints;
- Electrical hazard protection from induced AC voltages;
- remotely, and manually operable line valves, including ESD functions
- scraper stations at typically 200 km intervals along the pipeline
- above ground posts and buried survey marks to mark the easement;
- warning signs and aerial markers;
- security fencing around above ground facilities; and
- telemetered signals from sensing points along the Pipeline.

17.1.5 Maximum Allowable Operating Pressure

The MAOP is the maximum pressure at which a pipeline or section of a pipeline may be operated, following hydrostatic testing in accordance with the AS2885.1 (2007) standard. The MOP is the operating pressure limit (lower than the MAOP) imposed by the Licensee from time to time for pipeline safety or process reasons.

	SWQP DN400	QSN Link DN400	SWQPE/QSNE DN450
Substance conveyed	Natural Gas / Coal Seam Gas	Natural Gas / Coal Seam Gas	Natural Gas / Coal Seam Gas
Maximum Allowable Operating Pressure	14,920 kPa	15,300 kPa	15,300 kPa

Currently, all pipelines (SWQP, QSN and SWQE/QSNE) are interconnected and operated as one. The current maximum operating pressure (MOP) of the system is therefore 14,920 kPa.

17.1.6 Above Ground Facilities

The SWQP above ground facilities are listed in the table below. Notes on system configuration follow:

- Originally the SWQP had eight scraper stations. In its current configuration, only the even-numbered stations have launcher and receiver facilities. The odd-numbered stations have piggable piping loops installed and now effectively function as MLV sites only.
- The SWQP MLV sites contain MLVs on the SWQP (DN400) only. The SWQE pipeline (DN450) bypasses these sites and has no MLVs other than at the current and former scraper stations.
- The QSN/QSNE midline MLV contains MLVs on both pipelines.
- KPs (kilometre points) are numbered starting from Ballera in both directions. This is a legacy from the staged construction and originally intended flow directions of each stage. All facilities are listed in the table starting from Wallumbilla and ending at Moomba.

Pipeline	KP	Site Name	Telemetered	Site Type	
SWQP/SWQE	755	Wallumbilla Meter / Compressor Station	T	CS/SS	DN100/150/ 250/300/400/ 450
SWQP	725	Branch Connection 3 & Roma Metering Station	T	OT/MS	DN400/150/ 100
SWQP	709.06	MLV8	T	MLV	DN400
SWQP/SWQE	665	MLV/Scraper Station SS7	T	MLV	DN400/450
SWQP	625.54	MLV7	T	MLV	DN400
SWQP/SWQE	573	Scraper Station 6	T	SS	DN400/450
SWQP	532.88	MLV6	T	MLV	DN400
SWQP/SWQE	477	MLV/Scraper Station SS5	T	MLV	DN400/450
SWQP	452.098	Branch Connection 2 (Tarbat)		OT	DN400/150
SWQP	419.467	MLV5	T	MLV	DN400
SWQP/SWQE	383	Compressor Station 4 (QCS4 – Cooladdi)	T	SS/CS	DN400/450
SWQP	335	MLV4	T	MLV	DN400

SWQP	335	Cheepie Metering Station	T	OT/MS	DN80
SWQP/SWQE	289	MLV/Scraper Station SS3	T	MLV	DN400/450
SWQP	226.49	MLV3	T	MLV	DN400
SWQP/SWQE	193	Scraper Station SS2	T	SS	DN400/450
SWQP	151.88	MLV2	T	MLV	DN400/100
SWQP/SWQE	97	MLV/Scraper Station SS1	T	MLV	DN400/450
SWQP	46.34	MLV1	T	MLV	DN400
SWQP/SWQE	0	SWQP Ballera Terminal	T	SS	DN400/80
QSN/QSNE	0	QSN and SWQE/QSNE Ballera Terminal	T	SS	DN400/450
QSN/QSNE	102.7	Midline MLV	T	MLV/PRS	DN400/450
QSN/QSNE	182	Moomba Metering / Compressor Station (MPRS and MCS)	T	SS/MS/CS	DN400/450/650

Legend

MS Meter Station
CS Compressor Station
SS Scraper Station
MLV Main Line Valve
OT Off Take
T Telemetered
KP Kilometre Post

17.1.7 Operations and Maintenance Bases

The main operations and maintenance offices and bases for the Pipeline are located at Wallumbilla and Cooladdi and Moomba. Emergency equipment is stored at Wallumbilla and Moomba.

17.1.8 Compressor Stations

There are currently three compressor stations on the SWQP system, the Wallumbilla Compressor Station at Wallumbilla, the QCS4 (Queensland Compressor Station Four) at Cooladdi and the Moomba Compressor Station at Moomba.

<u>Wallumbilla Compressor Station</u>

WCS1 (3 x Units): 1250kW Waukesha L7044GSIE gas engines with Ariel JGK/4 compressors.
WCS2 (3 x Units): 1700kW Caterpillar G3608LE gas engines with Ariel JGD/4 compressors.
WCS3 (3 x Units): 9860kW[3] Solar Mars 90 gas turbine driven centrifugal compressors

The Wallumbilla facilities also include a large range of station piping and interconnects. Refer to the Scope Schematic and process flow drawings for the latest configuration.

QCS4 Compressor Station

2 x Units: duty/standby, Solar Taurus 60S/C334 EH Turbo Compressor sets.

The station also includes:

- Fuel gas system consisting of an electric immersion heater, filters, dual redundant pressure regulation process.
- ANSI Class 1500 and 900 Station piping with pneumatically actuated safety critical valves
- Station vent and blowdown facilities including vent silencer
- Forced draft air cooled station after cooler
- Duty standby air compressor and dryer packages with single wet and dry receivers
- Electrical power supply from a single Gas Engine Alternator (Electrical Generator) with a 100% standby Diesel Engine Alternator (DEA)
- A station control system incorporating security and SCADA communications interface

Moomba Compressor Station

3 x Units: 9860kW Solar Mars 90 Gas Turbine with Solar C4 compressors.

The station also includes:

- Station inlet filtration through an inlet gas scrubber
- Per unit aftercoolers, anti-surge and cooled recycle functionality
- Fuel gas metering
- 400V power supply from adjacent Moomba Gas Plant
- Diesel Engine Alternator for backup electrical power supply (essential services only)

17.1.9 Meter Stations

Metering is in accordance with AGA standards for the metering method and subject to the commercial requirements for gas transportation through the meter.

Custody transfer flow metering is carried out on the SWQP system at the following locations:

- Wallumbilla (WMS, WCS1, WCS2 and WCS3 facilities)
- Roma offtake / meter station
- Tarbat offtake / meter stations
- Cheepie offtake / meter station
- Ballera meter station

[3] At ISO performance conditions

- Moomba pressure reduction station

Full details of metering facilities at each meter station can be obtained by referring to the separate process flow diagrams (PFDs) ,process and instrumentation diagrams (P&IDs), drawings, specifications and data sheets.

17.1.10 Corrosion Protection

To mitigate corrosion, all buried pipelines are covered with a protective coating, which serves to isolate the external pipeline surfaces from corrosive elements in the surrounding environment. The SWQP has a fusion bonded epoxy (FBE) coating system. The QSN Link has a three-layer polyethylene (3LPE) coating. The SWQE and QSNE pipelines (DN450) have FBE coating.

Corrosion protection of above ground facilities is achieved by application of an approved painting system.

Secondary protection of the pipeline system is provided by an Impressed Current cathodic protection system. Cathodic protection systems are located at scraper station and MLV sites and are telemetered via SCADA.

17.2 Operating Parameters

17.2.1 Guidelines

The purpose of these guidelines is to establish a basis for operational decision making by documenting mandatory and desirable operating parameters used in the operation of the pipeline.

17.2.2 Scope

The South West Queensland Pipeline System including the South West Queensland Pipeline, the QSN link and the looping of both pipelines from Wallumbilla to Moomba.

17.2.3 Operating Parameters

The operating parameters listed in this document have been developed acknowledging that there are a number of system constraints that affect the operation of the pipeline on any specific day. A number of these constraints are listed below.

17.2.4 System Constraints

- Gas Transportation Agreement (GTA) parameters;
- MAOP;
- System capacity;
- Daily nomination;
- Gas quality; and
- Inlet and outlet pressures and temperature requirements

17.2.5 Operating within system constraints

- The Pipeline is operated as required to exceed the minimum requirements specified in the GTAs for the pipeline.
- The pipeline is capable of bidirectional flow. Operation of the pipeline pressure will vary as required to deliver gas nominations and not to exceed the MAOP of the connected systems..
- At all sites where pipe work/vessels can be isolated and higher pressure can leak into that pipe work, or the pressure can increase through thermal conditions, a pressure safety valve has been installed which will relieve the pressure in that pipe work.
- Gas quality and composition is monitored by gas chromatographs and moisture analysers at receipt points.

17.2.6 Operating to Maintain Integrity

The pipeline is operated within the requirements of AS2885 and the Integrity Management Plans for each segment.