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Asset Management
CY2017 - CY2022

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Distribution Valves Strategy

CY2017 – CY2022

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Originated By

Title	Name	Signature	Date
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Approved	General Manager, Gas Networks	for Mark Beech		19/12/2016

Executive Summary

This document outlines the maintenance and replacement strategy for the Distribution Valves on the Multinet Gas network. It aims to achieve a high levels of safety and reliability for the Distribution Valves through preventive & corrective maintenance activities coupled with planned replacement works.

Multinet Gas will complete the following programs to maintain alignment with its Gas Network Objectives and remain compliant with its regulatory obligations under the Gas Distribution System Code and AS 4645.

- High Pressure 2 (HP2) Syphon Removal Program;
- District Regulator Isolation Valves Rectification Program; and
- Miscellaneous Valve Replacement / Rectification works.

Typical expenditure levels are relatively low, averaging $157k per annum over the forecast period (to 2022).

Table 0-1 provides the financial summary of the capital expenditure which is to be incurred in the calendar year period 2017 to 2022. Table 0-1 includes a breakdown of direct, overheads and real cost escalators for the purpose of reconciliation with that of the overview documentations which support our forthcoming Access Arrangement submission (2018-22).

Table 0-1: Summary of Capital Expenditure ($'000)

Program	CY2017	CY2018	CY2019	CY2020	CY2021	CY2022
High Pressure 2 (HP2) Syphon Removal Program	$60	$60	$ 60	$ 60	$ 60	$60
District Regulator Isolation Valves Rectification Program	-	$150	$150	-	-	-
Miscellaneous Valve Replacement / Rectification Works	$180	$20	$20	$20	$20	$20
Total Direct Expenditure	**$240**	**$230**	**$230**	**$80**	**$80**	**$80**
Overhead	$14	$14	$14	$5	$5	$5
Subtotal	**$254**	**$244**	**$244**	**$85**	**$85**	**$85**
Real cost escalation	-	$1	$1	$1	$1	$1
Total Expenditure	**$254**	**$245**	**$245**	**$85**	**$86**	**$86**

Table of Contents

1. Document Overview

1.1. Objectives

This document articulates Multinet Gas' approach to the management of its existing valves on the gas distribution system.

It has the following objectives:

- Articulate the key areas of focus in relation to asset management, risk, investment, cost and service standard outcomes for the "Distribution Valve" asset group;
- Show alignment of asset management practices with Gas Network Objectives;
- Establish and maintain distribution valves for the purpose of safe, reliable and flexible gas network operation;
- Maintain and enhance gas network operation to be able to manage gas flow and effect isolations in an optimal manner for a timely and least disruptive response when needed;
- Improve manageability of "incident" related outages. This strategy endeavours to eliminate any detrimental effects on the gas infrastructure, the environment and the public by reducing both risk and gas supply outage times during its operation;
- Control flow and pressure and/or isolate gas mains to provide a suitable and safe working condition for planned gas infrastructure works;
- Create the necessary gas isolation boundaries for SCADA control and management of networks designed to operate independently of one another; and
- Direct gas flows and contain areas supplied along and from large mains to optimise infrastructure utilisation.

The document is intended for use by:

- Multinet Gas staff (and it's contractors); and
- Regulators – Technical, Safety and Economic.

1.2. Scope

This strategy covers the management of Multinet Gas' existing Gas Distribution valve assets. Gas Distribution valves, for the purposes of this strategy, are those defined as operating at pressures up to 1,050 kPa (Class 125 and Class 150)

This document defines the strategy to maintain public and personnel safety, integrity and security of supply in relation to Multinet Gas' valve assets through compliance with regulation, technical, safety standards.

This strategy relates only to Multinet Gas' capital requirements in relation to distribution valves and excludes operational expenditure requirements.

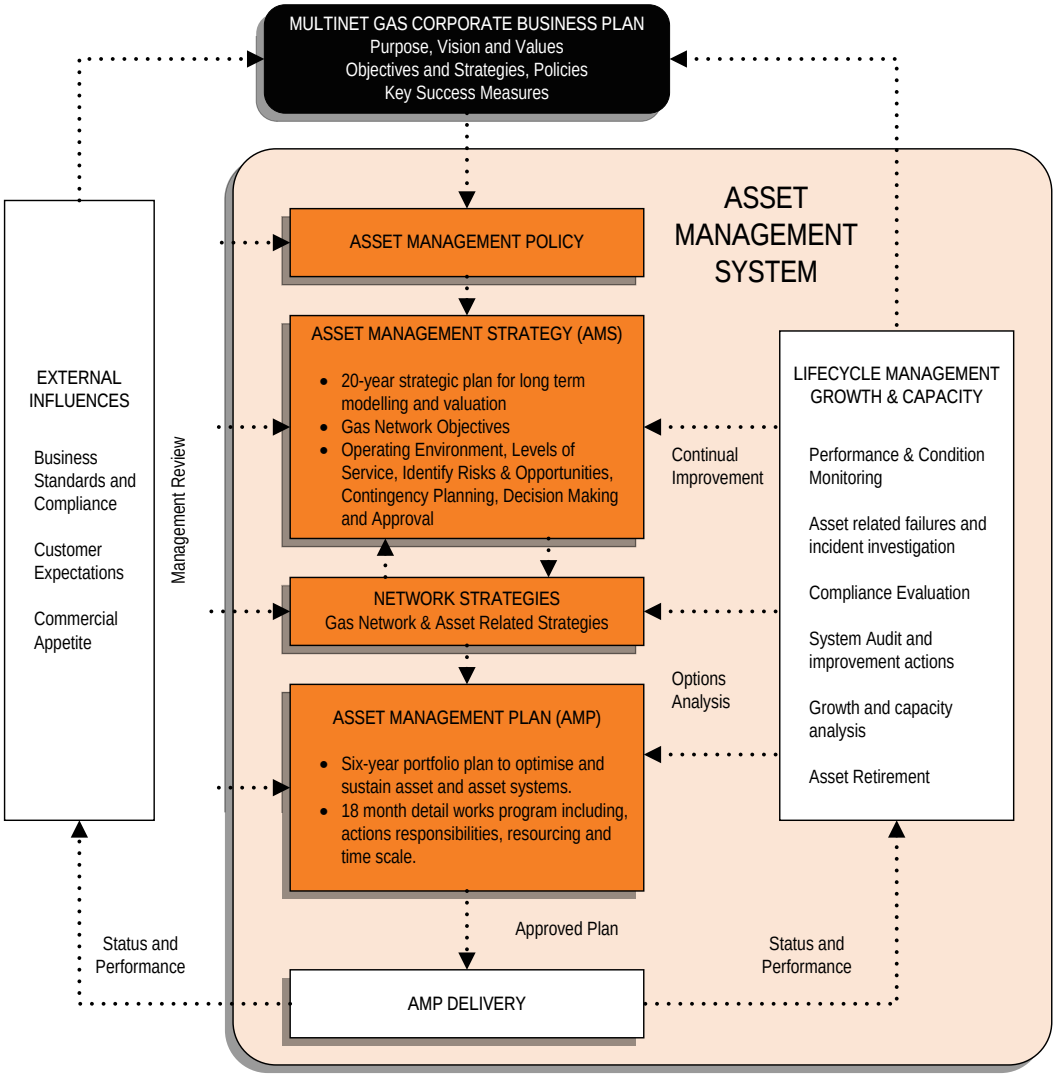
The strategy does not cover:

- Transmission valve assets operating above 1050kPa – Refer Pipeline Integrity Management Plan (MG-PL-0001)
- Consumer service valves – Refer Distribution Services Strategy (MG-SP-0010)

1.3. Relationship with other Key Asset Management Documents

The Distribution Valves Strategy is one of a number of key asset management related documents developed and published by Multinet Gas in relation to its gas network. As indicated in Figure 1-1 figure below, detailed network strategies – including the Distribution Valves Strategy - informs both the Asset Management Strategy (AMS) and Asset Management Plan (AMP) of the required capital programs needed to achieve the long-term objectives of the gas distribution network.

Figure 1-1: Asset Management Framework



1.4. Phasing and Financial Disclosure

All programs defined within this strategy are defined in calendar years consistent with reporting requirements of the Australian Energy Regulator (AER) and where applicable the Gas Distribution System Code (Version 11).

Where required for conversion to financial year (July to June), dollars and volumes can be estimated using a 50:50 expenditure split.

All financial figures quoted within this document - unless otherwise specifically stated - have the following characteristics:

- Real Expenditure / Cost (reference year = 2017);
- Direct Expenditure only (i.e. excludes overheads and finance costs);
- In units of $1,000 (i.e. '000); and
- All years are denoted in Calendar Year format.

Total values shown in tables and referred to in the text of this document may not reconcile due to rounding.

Conversion factors used in the escalation of historic expenditure to real 2017 equivalent expenditure is provided in Table 1-1. Cumulative conversion factors have been provided by Multinet Gas' Regulatory department.

Table 1-1: CPI Conversion Factors

	2012	2013	2014	2015	2016	2017
CPI Index - $2017	1.09619	1.07465	1.05192	1.02819	1.01296	1.00000

1.5. Data Sources

The following data sources have been drawn upon in development of the Distribution Valves Strategy:

- SAP: ERP tool used for data collection, analysis and maintenance management of MG assets

1.6. References

- AS 4645 series - Gas Distribution Networks;
- Multinet Gas - System Operations Manual;
- Distribution Mains Strategy MG-SP-0009;
- Multinet Gas Engineering Standard – EP-DD-4004 – Valves In Systems Operating At Less Than 1050kPa;
- Multinet Gas Engineering Standard – EG-DD-4102 – Design and Construction of Large Diameter PE Pipe for High Pressure Systems;
- Multinet Gas Engineering Standard – EP-DD-4033 – Additional Service Isolation Valves (ASIV's); and
- Network Planning – Important Valve Listing TP HP MP August 2015.

1.7. Document Review

This document shall be reviewed every two (2) years or earlier if required. The next review is due on or before 31 December 2018.

2. Asset Overview

2.1. Introduction

Valves are categorised to reflect their use and importance in assisting with optimal gas flow management and to provide pressure control or network isolation in response to adverse supply incidents.

Valve location, selection and installation within systems operating at less than 1050 kPa is covered by Multinet Gas Engineering Standard EP-DD-4004 – Valves in Systems Operating at less than 1050kPa.

A distribution valve list held by Network Planning constitutes the complete list of important valves on the network. They're sometimes (generically) referred to as "critical valves". The "critical valve" list is extracted from SAP which is the central master repository for all valve information. Table 2-1 provides an overview of the critical valve quantities by network pressure.

Table 2-1: Network Critical Valves

Pressure	High Pressure	Medium Pressure	Total
SCADA Network Isolation Valve (SNIV)	62	1	63
Network Isolation Valve (NIV)	76	5	81
Total	**138**	**6**	**144**

The status of a valve at any given time is managed and communicated by Field Operations to Network Planning and the Network Control Centre (NCC).

2.1.1. Valve Categories

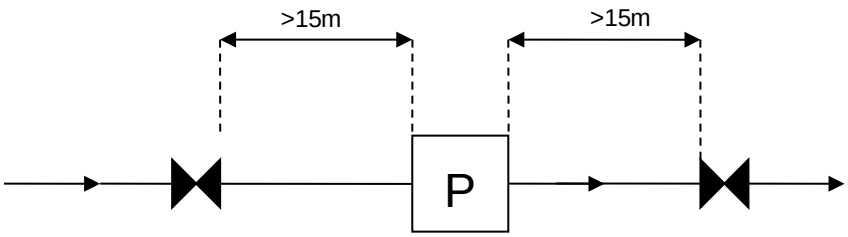
- **SCADA Network Isolation Valve (SNIV)** – a means of deliberate isolation. A valve between networks in which one or both networks is either SCADA monitored at regulators and/or network fringes, or SCADA controlled. Assumed SHUT. These valves are contained in the 'Important Valve Listing'.
- **Network Isolation Valve (NIV)** – a means of deliberate isolation. A valve within "normally integrated" pipe work or between networks operating at different fixed pressures where neither network is SCADA monitored at regulators and/or network fringes, or SCADA controlled. These valves are contained in the 'Important Valve Listing'.
- **Supply Regulator Isolation Valves** – Buried or above ground Field (<1,050kPa inlet) and District Regulator inlet/outlet valves used for the purposes of isolating supply regulator sites from a safe distance. This requirement is stipulated in Multinet Gas Engineering Standard EP-DD-4004 and states that an isolation valve to be located not less 15m away from a supply regulator installation as shown in Figure 2-1. These valves allow the supply to be isolated in the event of a total failure of the pressure regulation equipment and are maintained as part of regulator maintenance.
- **Steel to Large Diameter Polyethylene (PE) Valves** – These valves were installed as a means to isolate PE in the case of rapid crack propagation (RCP) or third party damage. Approx. 25m of steel was placed between the valve and PE. This practice has been modified. Refer to Multinet Gas Engineering Standard EG-DD-4102. Only the valves that are still required under the fore mentioned standard are considered to be in this category.
- **Additional Service Isolation Valves (ASIV)** – Refer to Multinet Gas Standard EP-DD-4033 for application of ASIV's.

Note:

Polyethylene valves are only used for pressures less than 1,050 kPa and are either SDR9.9 or SDR11.

For valves that exceed Class 150 refer to Multinet Gas' Pipeline Integrity Management Plan (MG-PL-0001).

Figure 2-1: Supply regulator with isolation valve



2.1.2. General

Some of the existing valves have not been maintained over recent times (last 10 years) and therefore could be buried below current pavement surface. Most of existing valves were installed to facilitate construction of the system rather than for their current or proposed use. All "system critical" valves are required to be accessible, operable and maintained to provide one or all of flow, pressure and isolation use.

A large number of the valves listed as "critical" have been located to be made accessible and operable as well as tested before they are classified as "fit for operation" and subsequently maintained at appropriate time intervals.

Within Multinet's high pressure steel system there are approximately 35 John Valves. The John Valve Company is no longer operating and documents proving the MAOP of the valves are impossible to acquire and the markings on the valves are not usually legible. There is no current proactive program to remove these valves, however, whenever a John Valve is encountered the data on the valve is collected. The data pertaining to the location and condition of these valves is being collated which will then be used to develop a replacement strategy.

2.2. Asset Age Profile

Given the limited information available on distribution valves and in particular their age, an asset age profile is currently not available. However in general the age of valves can be assumed to that of the main it is connected to.

2.3. Asset Performance

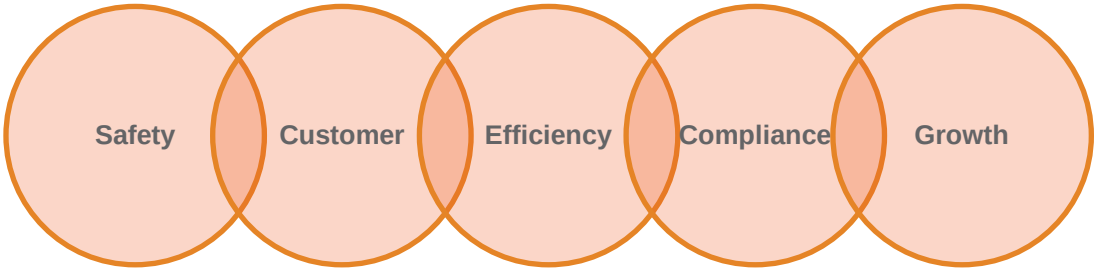
Asset performance is measured by maintenance faults and failure causes. In the case of network valves they do not tend to exhibit a useful life or end-of-life failures due to low operational cycles. Their replacement is typically driven by their inability to be operated or as part of an associated mains replacement program.

3. Asset Management Drivers

3.1. Network Objectives

Multinet Gas has established five (5) network objectives that govern how the network is operated and maintained. This is reflected mostly in regulatory obligations and in some cases prudent and responsible behaviour, justifiable on economic grounds. Achievement of these objectives ensures the sustained and reliable operation of the gas distribution network.

Figure 3-1: Gas Network Objectives



The alignment between network objectives and the Distribution Valves strategy is detailed below.

3.1.1. Safety – Achieve Zero Harm, while maintaining current levels of network safety.

This strategy aims to achieve a high level of reliability and personnel / public safety through inspection, preventive and corrective maintenance, and asset replacement. All planned maintenance activities on distribution valves are underpinned by the need to ensure safety for the field personnel who carry out all maintenance activity on the equipment and the general public.

The Dandenong Rd valve removal project (to be carried out as part of the Miscellaneous Valve Replacement / Rectification program) is driven by the need to ensure public safety and maintain asset integrity.

3.1.2. Customer – Effortless Customer Experience

This strategy aims to achieve a high level of customer satisfaction and experience by providing a reliable means of gas supply to the customer. The planned maintenance activities are designed to cause minimum or no interruption of supply to the customer to ensure that the maintenance does not cause a hindrance or financial loss to the customer.

3.1.3. Efficiency – Sustainable and prudent network investment

The maintenance strategies outlined in this document are aimed at improving the efficiency of the distribution valves installed in the Multinet Gas network. The High Pressure 2 (HP2) syphon removal program is to be carried out in conjunction with other necessitated pipeline alteration projects to obtain cost efficiencies where possible.

3.1.4. Compliance – Maintain regulatory and technical compliance

This strategy aims to achieve a high level of regulatory and technical compliance by ensuring that all maintenance and replacement activities are carried out to meet the requirements of Multinet Gas' Safety Case, AS 4645 and the Gas Distribution System Code. The District Regulator Isolation Valves Rectification Program aims to rectify the sites where distribution mains have been connected downstream of the isolation valve. The consequence is either the

regulator can no longer be isolated due to the presence of the distribution main or when the regulator is “isolated”, the areas downstream of the distribution main experience inadequate or total loss of supply. This rectification program aims to achieve overall compliance with AS 4645 and Multinet Gas Engineering Standards.

3.1.5. Growth – Seek opportunities for new growth

This strategy also aims to cater for future network growth as new customers are added on to the network. Valves are also installed in the network to expand the SCADA boundaries to cater for the extra load growth. As Network Planning analyse each year’s ‘winter testing’ results, changes to SCADA boundaries will be a likely outcome which will necessitate projects to install or modify certain valves to expand the SCADA boundaries.

Refer to Multinet Gas’ Capital Growth Plan (MG-PL-0002) and SCADA Strategy (MG-SP-0002).

3.2. Risk Management

The major risks associated with Distribution Valves are:

- The valve is not accessible when required;
- The valve is not operating when required; or
- The valve leaks.

Any of the above outcomes could result in heightened safety and financial risks.

In the case of the inaccessible valves, they need to be located, excavated and made accessible when required for use. In the case of inoperability, whether due to a valve operating but failing to seal, or a valve jamming in a fixed position, these valves need to be repaired in situ or replaced if necessary.

The consequences of inaccessibility or inoperability are extended response times with an associated greater likelihood of “poor” or “no gas” supply outcomes. Any potential delay also increases the risks to both the public and the Multinet Gas. These risks include personal and property damages, as well as consequential financial damages and company image impacts on the business.

3.3. Lifecycle Management

3.3.1. General

Due to the limited knowledge of the existing distribution valves with respect to age and operation in the high and medium pressure system as well as the fact that some may have buried access covers, a program for identification and operation has been implemented.

Suitably located valves, either new or existing, are maintained once per year to ensure their operability and accessibility. Records of the valve position and valve details are kept within Multinet’s SAP asset recording system.

3.3.2. Inspection

Accessibility inspections are carried out as a scheduled activity for network isolation valves and incorporated into existing supply and large consumer regulator maintenance programs. The frequency of accessibility checks varies based on higher level (i.e. regulator) scheduled maintenance.

Multinet Gas maintenance activities are scheduled to conform to the requirements of AS 4645.

3.3.3. Preventive Maintenance

The valves listed in Section 2.1.1 will receive a preventative maintenance check once per year. The following represents typical valve maintenance activities undertaken during such visits.

- Operate the valve;
- Lube as required;
- Check for any leakage to atmosphere;
- Where possible, check the physical condition of the valve; and
- Valve records are to be verified and updated in conjunction with the valve maintenance program.

3.3.4. Corrective Maintenance - Faults and Defects

A small number of network valve faults are expected each year. These will mainly be in the form of leakage from the valve gland. Historically, these are either detected and repaired by the maintenance crew or reported by the public as a gas escape.

3.3.5. Replacement

The need to replace valves on a life cycle basis would occur where an existing valve (still deemed necessary):

- Is faulty (non-operational, leaking etc.) and cannot be repaired; or
- The main in which the valve is installed is replaced/renewed.

The number of operations of a valve is generally low, and as such the valves do not tend to wear out.

An infrequent number of distribution valve replacements are expected in the forecast period.

4. Capital Program – 2017 to 2022

4.1. Overview

Multinet Gas completes the following annual programs to maintain its alignment with Network Objectives (refer section 3.1) and to remain compliant with its regulatory obligations under the Gas Distribution System Code and AS 4645.

- High Pressure 2 Syphon Investigation and Removal Program;
- District Regulator Isolation Valves Rectification Program; and
- Miscellaneous Valve Replacement / Rectification works.

Typical expenditure levels are relatively low, averaging $157k per annum over the forecast period (to 2022).

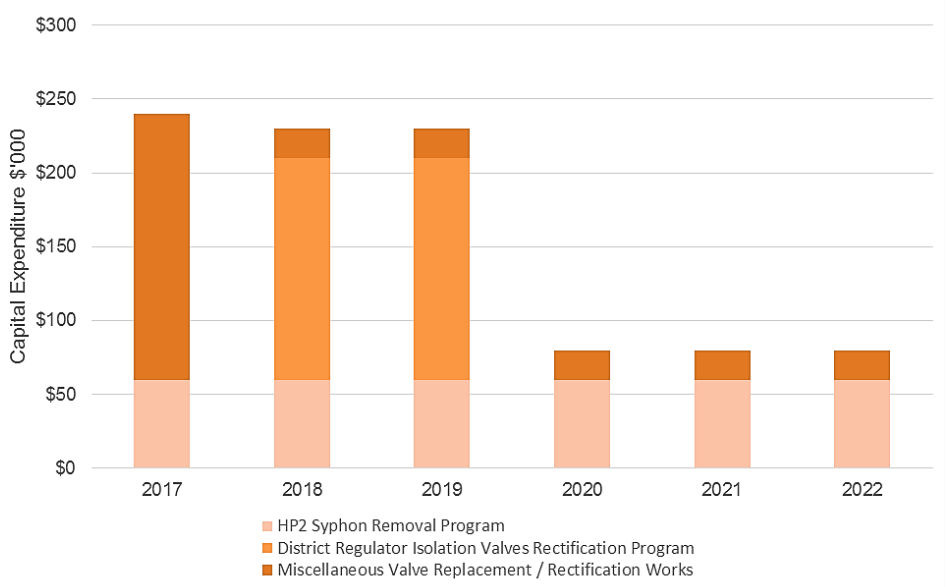
Capital Expenditure is expected to remain constant at around $230k per annum until 2019 and only minor capital works are expected in the future for infrequent valve replacement post 2019.

Capex allocation is captured within the AER regulatory accounts 'Other' category (RJA sub-category).

Table 4-1: Capital Expenditure Summary

Ref	Program	2017	2018	2019	2020	2021	2022
4.2	High Pressure 2 Syphon Removal Program	$60	$60	$60	$60	$60	$60
4.3	District Regulator Isolation Valves Rectification Program	-	$150	$150	-	-	-
4.4	Miscellaneous Valve Replacement / Rectification Works	$180	$20	$20	$20	$20	$20
	Total Expenditure	**$240**	**$230**	**$230**	**$80**	**$80**	**$80**

Figure 4-1: Capital Expenditure Summary



4.2. HP2 Syphons Investigation and Removal Program

4.2.1. Introduction

The High Pressure 2 (HP2) system has a total of 104 syphons installed.

Historically, syphons were installed to extract liquid from HP pipelines prior to the introduction of natural gas. These facilities are now redundant and are generally located in low risk areas. In some cases, however, stress on the fitting increases if roads are built above the syphon (reduced cover), increasing the likelihood of leaks.

HP2 syphons come in two types;

- Riser pipe which collects liquid materials from the lowest point in the pipeline. The riser has two valves which when cracked open will discharge the liquid into a carrier vessel for subsequent removal.
- Pot welded to the underside of the pipe which has had a coupon removed, a riser pipe collects liquid materials from the pot which is installed at the lowest point on the specific section of the pipeline.

HP2 pipelines and their respective syphon types are shown in Table 4-2.

Table 4-2: Syphons on HP2 Pipelines

Pipeline	Number of Syphons	Type of Syphon
T02 Dandenong to Highett	28	Riser Type
T03 Highett to Southbank	29	Pot Type
T06 Dandenong – Clow St – Hutton St	No Syphons	No Syphons
T17 Dandenong to West Melbourne	47	Riser Type
Total	**104**	

4.2.2. Scope

The 104 syphons listed in Table 4-2 are to be covered under the scope of this program.

4.2.3. Business Drivers and Strategic Alignment

The primary drivers for this program are to achieve alignment with gas network objectives of:

- Safety;
- Efficiency; and
- Regulatory compliance.

A Safety Management Study (SMS) workshop was conducted in 2014 where the risks associated with the integrity of the syphon and the potential for accidental damage were considered. Participants agreed that the risk level from failure of the syphon (i.e. a broken gasket or corrosion) was low, however damage to the syphon from civil works was Intermediate. Inclusion of this program as an additional control was unable to reduce the risk evaluation from Intermediate, which then required ALARP to be demonstrated.

The following action resulted from the SMS workshop:

- Multinet Gas is to determine the locations of remaining syphons and provide appropriate signage and notation on the Route Plan Drawings.

These syphons are currently not recorded on the GIS system and it is planned to do further investigations based on their indicated location as shown on the route plans. Based on their successful identification, the data on these syphons will then need to be entered into the GIS system. This will provide Multinet with better data on these syphons for future analysis.

The risk assessment process to permit the up-rating of the HP2 system to 1,050kPa also had two recommendations regarding syphons:

- Identify the most likely syphons to be defective and perform inspection to ascertain integrity of each type and to ensure ALARP is being met; and
- Be prepared to replace any syphon where necessary.

The main concern about these syphons is their likelihood of getting damaged due to third party works and the lack of available repair methods. Depending on where a leak occurs, a cut out is the only option as hot welding may not be safe on the aged steel of the syphon where the wall thickness cannot be guaranteed. For this reason and the obsolete nature of syphons on the de-licensed HP2 pipelines, a program to remove them from service over future years is planned.

4.2.4. Works Program

Multinet Gas is to prioritise the removal syphons based on location risk factors, depth of cover, maintenance history and ability to obtain cost synergies from multiple removals at one time. It is planned to make allowance for the removal of [redacted] syphons per annum based on the outcomes of the risk assessment for each site.

Unit costs used in forecasting future expenditure estimates have been based on the historical costs previously incurred in completing similar projects.

The summarised works program is shown in Table 4-3, and includes the expenditure and volumes associated with the program.

Table 4-3: HP2 Syphons Investigation and Removal Program - Capital Expenditure & Volumes

Program		2017	2018	2019	2020	2021	2022
HP2 Syphon Removal Program	Units	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Unit/Rate	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Total Expenditure		**$60**	**$60**	**$60**	**$60**	**$60**	**$60**

4.3. District Regulator Isolation Valves Rectification Program

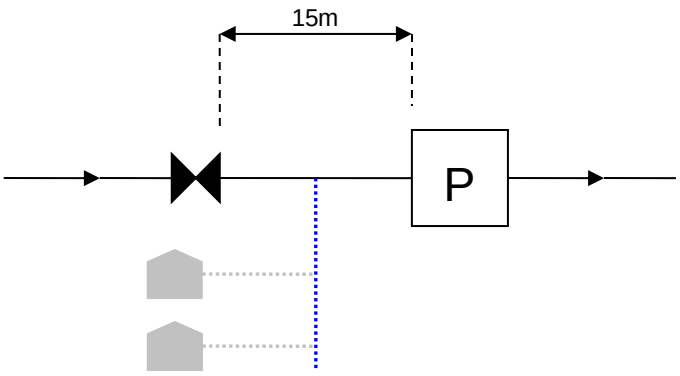
4.3.1. Introduction

A number of District Regulators are known to have ineffective isolation valve locations. In such cases, pipe work and/or valve construction, or valve relocation is required to meet this strategy's objectives for correct operation and safety.

There are at least three locations, where distribution mains have been connected to the regulator inlet main, downstream of the isolation valve as shown in Figure 4-2.

The consequences of this are that the upon regulator isolation the presence of the distribution main (shown in **blue**) and consumer supply (shown in **grey**) will experience a total loss of supply.

Figure 4-2: Distribution main connected downstream of an isolation valve



4.3.2. Scope

Isolation Valve violations have been identified at the locations stated in Table 4-4.

Table 4-4: Isolation Valve Violation Locations

Location	Regulator No.	Rectification Year
Spencer Road, Camberwell (L07)	P1-435	2018
Stevenson Street, Kew (L07)	P1-889	Decommissioned as part of Mains Replacement scheduled 2022 (Kew, 3101)[1]
Bowen Crescent, Melbourne (L08)	P1-260	2019

This program aims to carry out the rectification works for the above mentioned locations to ensure that these locations are compliant with current network design philosophy and Multinet Gas Engineering Standard – EP-DD-4033.

4.3.3. Business Drivers and Strategic Alignment

The primary drivers for this program are to achieve alignment with gas network objectives of:

- Safety; and
- Regulatory compliance.

The primary function of the valves installed on the distribution system is to provide the ability to isolate sections of the network in the event of a gas leak or a failure of the pressure regulation equipment. The locations mentioned in Table 4-4 have a configuration which does not permit isolation of the supply regulator without losing supply to the customers who are connected downstream of the isolation valve. This arrangement is not compliant with current Multinet Gas Engineering standard.

The rectification program will ensure that the pipework configuration (at sites identified in Table 4-4) complies with current engineering standards.

[1] Refer to Distribution Mains Strategy MG-SP-0009

4.3.4. Works Program

Multinet Gas is to rectify supply isolation valving at two regulator locations in 2018 and 2019.

Unit costs used in forecasting future expenditure estimates for the rectification works have been based on the historical costs previously incurred in completing similar projects.

The summarised works program is shown in Table 4-5, and includes the expenditure and volumes associated with the program.

Table 4-5: District Regulator Isolation Valves Rectification Program - Capital Expenditure

Program	2017	2018	2019	2020	2021	2022
Spencer Road, Camberwell (L07) – P1-435	-	$150	-	-	-	-
Bowen Crescent, Melbourne (L08) – P1-260	-	-	$150	-	-	-
Total Expenditure	**-**	**$150**	**$150**	**-**	**-**	**-**

4.4. Miscellaneous Valve Replacement / Rectification works

4.4.1. Introduction

The miscellaneous works program for network valves covers the refurbishment and / or replacement of distribution valves and associated pipework. As valves on the network vary with regards to age, type, function and utilisation, these works are determined on a case-by-case basis; are usually undertaken as a project and where possible aligned with scheduled maintenance activities.

Works are carried out to achieve alignment with network objectives and maintain security of supply to the network.

4.4.2. Scope

Know Project(s): The Dandenong Rd Valve Pit Removal project is planned to be carried out in 2017 to remove line valve T17LV-04 (installed on the HP2 / Delicensed Dandenong to West Melbourne pipeline) and replace it with like for like sized steel main. This line valve is located in a pit just before the right hand turning lane on the outbound section near the intersection of Burke Rd and Dandenong Rd (opposite Monash University). The Gatic lid cover for this pit has structurally failed twice in the past 10 years and is now posing a hazard for the motorists and our gas assets beneath it. The concrete pit walls and the supporting beams are also in poor condition and hence the line valve installed inside this pit is proposed to be cut out and the section is to be replaced with a like for like sized steel main and bury the pipework upon completion of works.

Unknown future projects: Apart from this project, capital expenditure allocated to miscellaneous works are typically low and hence an annual allowance of $20k has been made from 2018 onwards.

4.4.3. Business Drivers and Strategic Alignment

The primary drivers for refurbishment or replacement activities of distribution valves are to achieve alignment with the below network objectives:

- Safety; and
- Regulatory compliance.

4.4.4. Works Program

Multinet Gas plans to conduct the Dandenong Rd Valve Pit Removal in 2017 which costs based on service provider pricing. Costs used in forecasting future expenditure estimates for the rectification works post 2017 are an allowance based on unforeseen works.

The summarised works program is shown in Table 4-6, and includes the expenditure associated with the program.

Table 4-6: Miscellaneous Valve Replacement / Rectification works - Capital Expenditure & Volumes

Program	2017	2018	2019	2020	2021	2022
Miscellaneous Valve Replacement / Rectification Works	$180	$20	$20	$20	$20	$20
Total Expenditure	**$180**	**$20**	**$20**	**$20**	**$20**	**$20**

5. Appendix

5.1. Glossary & Definitions

Term	Meaning
AER	Australian Energy Regulator
ALARP	As Low As Reasonably Practical. AS 4645.1 describes the actions that need to be taken for a risk to be described as ALARP and defines it as “the cost of further risk reduction measures is grossly disproportionate to the benefit gained from the reduced risk that would result.”
Class	Standard pipe class ratings are based on ASME B16.5. Usual industry practice is to classify steel flanges and valves in accordance with the pressure-temperature rating system.
District Regulator	A District Regulator can supply gas to a reticulation system at an outlet pressure of up to 7 kPa.
ESV	Energy Safe Victoria
Field Regulator	A Field Regulator can supply gas at an outlet pressure greater than 7 kPa and is not supplied from a Class 600 Pipeline.
GFC	Gas and Fuel Corporation
GIS	Geospatial Information System
HP	High Pressure (Pressure Range: 140 to 515 kPa)
HP2	High Pressure 2 (Pressure Range: 515 to 1050 kPa)
kPa	Kilopascal (kPa) is a unit of pressure measurement
LP	Low Pressure (Pressure Range: Up to 7 kPa)
MP	Medium Pressure (Pressure Range: 35 to 210 kPa)
MG	Multinet Gas
SAP	Systems Applications and Products is an Enterprise Resource Planning tool which is used at Multinet Gas for recording asset data and maintenance management.
SCADA	Supervisory Control And Data Acquisition

5.2. List of Tables

5.3. List of Figures