Multinet Gas Networks

Attachment 9.12

Transmission Pipelines Strategy

Final Plan 2023/24 – 2027/28

July 2022

Multinet Gas Networks

Transmission Pipelines Strategy

MG-SP-0001 FY2023 – FY2028, Ver 4.0

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1. Executive summary

This document outlines the strategy to maintain the safety, compliance and integrity of gas transmission pipelines on the Multinet Gas Network (MGN). We have identified the following works programs that must be delivered during the next access arrangement (AA) period (2023 to 2028):

- Pipeline modification program – continuing our transmission pipeline modification program to facilitate integrity assessment by inline inspection (ILI, or pigging). The program includes the final stages of [redacted] pipelines in the current period that are nearly complete, and commencing [redacted] new pipeline modification projects over the next five years;
- Miscellaneous works program – minor works required to maintain the integrity of our transmission pipelines (e.g. valve replacements);
- Pigging program – conducting ILI on our ILI compatible pipelines following modification and every 10-15 years thereafter;
- Tool data verification program – conducting transmission pipeline inspections through physical dig ups to verify data collected from each ILI run; and
- Marker post replacement program – assessing and replacing aged pipeline marker posts in order to maintain compliance with AS 2885.

We highlight these works comprise a combination of capital and operating expenditure (capex and opex). The proposed works for the next AA period are summarised in the following sections.

1.1. Financial summary

Table 1-1 summarises the proposed expenditure on these five programs.

Table 1-1: Summary of expenditure, $'000 real 2021

Program	2023/24	2024/25	2025/26	2026/27	2027/28	Total
Pipeline modification	318	5,003	-	3,926	-	9,247
Tool data verification	200	300	-	150	200	850
Miscellaneous capital works	100	100	100	100	100	500
Total capex	**618**	**5,403**	**100**	**4,176**	**300**	**10,597**
Pigging	1,980	1,480	878	-	860	5,198
Marker post replacement	39	39	39	39	39	195
Total opex	**2,019**	**1,519**	**917**	**39**	**899**	**5,393**
Total expenditure	**2,637**	**6,922**	**1,017**	**4,215**	**1,199**	**15,990**

1.1.1. Capital expenditure

1.1.1.1. Pipeline modification program

ILI is standard practice for gas transmission pipelines, and is a widely accepted form of pipeline integrity risk mitigation. Section 6.6.1 of Australian Standard (AS) 2885.3-2012 requires pipeline owners/operator to consider adopting ILI where practicable.

Our long term aim (consistent with AS 2885) is to make all our transmission pipelines piggable, where practicable. This means modifying existing pipelines to enable ILI tools to pass through them, and ensure all new transmission pipelines are designed to be piggable.

We are in the favourable position where the majority of our transmission pipelines are now piggable. We plan to have our entire transmission network piggable in the next ten years. To meet this goal, we plan to complete the final minor works on three pipelines we commenced in the current period (T76, T21 and T07), and commence another two modification projects. We have, and will continue to look to prioritise those that require modifications based on risk, ILI suitability, deliverability, and cost.

The proposed projects are shown in Table 1-2.

Table 1-2: Summary of pipeline modification program, $'000 real 2021

Pipeline	2023/24	2024/25	2025/26	2026/27	2027/28	Total
T76 Rowville to Ferntree Gully (PL142)						
T21 Dandenong to Edithvale (PL33)						
T07 Murrumbeena to Highett (PL56-4)						
T26 Ringwood to Vermont (PL28)						
T29/T45 Dandenong to Hallam Valley Rd (PL47)						
Total capex	**318**	**5,003**	**-**	**3,926**	**-**	**9,247**

Modifying our transmission pipelines for ILI will:

- enable a targeted program to address areas of corrosion, dents and gouges and apply a tailored correction/maintenance program resulting in a more efficient, more proactive and safer network;
- allow us to safely extend the useful life of the assets beyond their technical design lives (50-80 years);
- improve our ability to detect and address issues on our transmission pipelines before they escalate into uncontrolled gas escapes; and
- enable the creation of a transmission pipeline data baseline, which can be used to assess ongoing structural integrity and inform investment decisions on asset management activities.

1.1.1.2. Tool data verification program

Following each pig run, we conduct verification activities to ensure our intelligent pigging tool is producing data consistent with the actual condition of the pipeline. This program involves physical inspection via dig ups along the length of each pipeline. Depending on the outcome of the assessment, a suitable repair method will be chosen to ensure pipeline integrity.

A verification of each of the pipelines we will pig is included in Table 1-3.

Table 1-3: Summary of tool data verification program, $'000 real 2021

Pipeline	2023/24	2024/25	2025/26	2026/27	2027/28	Total
T76 Rowville to Ferntree Gully (PL142)	[redacted]					
T21 Dandenong to Edithvale (PL33)	[redacted]					
T07 Murrumbeena to Highett (PL56-4)	[redacted]					
Lilydale pipelines (PL276), which include: • Yarra Glen to Lilydale City Gate (CL 600) • Lilydale City Gate to Lilydale (CL 300)	[redacted]					
T26 Ringwood – Vermont (PL28)	[redacted]					
T29/T45 Dandenong – Hallam Valley Rd (PL47)					[redacted]	
Total capex	**200**	**300**	**-**	**150**	**200**	**850**

1.1.1.3. Miscellaneous capital works program

This program provides a capex allowance for ancillary transmission works such as transmission valve replacements over the forthcoming period. It is not practical to foresee all required transmission pipelines works that will be required over the next five years. However, we have a number of smaller projects such that we already have planned over the short term, and based on history, expect a similar volume over the latter part of the AA period. We have therefore made a small allowance mid period onwards to conduct these works.

Table 1-4 lists the known projects which are intended to be carried out under the miscellaneous works program as well as a similar sized allowance in the latter years.

Table 1-4 Summary of miscellaneous capital works program, $'000 real 2021

Project	2023/24	2024/25	2025/26	2026/27	2027/28	Total
Inlet isolation valve replacement at Murrumbeena Crescent						
Gembrook city gate heater reduced bore valve replacement						
Maroondah Hwy inlet isolation valve replacement						
Wonthaggi NE Precinct Rectification costs						
Miscellaneous works allowance						
Total capex	**100**	**100**	**100**	**100**	**100**	**500**

1.1.2. Operating expenditure

1.1.2.1. Pigging program

We are required to pig each of our piggable pipelines every 10-15 years in line with our Pipeline Integrity Management Plan (PIMP) and standard industry practice. We also conduct an initial pig run upon completion of pipeline modifications.

In the next AA period, we must pig:

- the five newly modified pipelines (T76, T21, T07, T26, and T29 / T45); and
- the Yarra Glen to Lilydale City Gate and Lilydale City Gate to Lilydale pipelines at their 10-year inspection birthday.

The proposed scheduling of the pigging program is shown in Table 1-5.

Table 1-5: Summary of pigging program, $'000 real 2021

Pipeline	2023/24	2024/25	2025/26	2026/27	2027/28	Total
T76 Rowville – Ferntree Gully (PL142)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
T21 Dandenong – Edithvale (PL33)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
T07 Murrumbeena – Highett (PL56-4)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Lilydale pipelines (PL276), which include: • Yarra Glen to Lilydale City Gate (CL 600) • Lilydale City Gate to Lilydale (CL 300)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
T26 Ringwood – Vermont (PL28)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
T29/T45 Dandenong – Hallam Valley Rd (PL47)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Total opex	**1,980**	**1,480**	**878**	**-**	**860**	**5,198**

1.1.2.2. Marker post replacement program

Pipeline marker posts highlight the presence of gas transmission pipelines to public and personnel operating in the close proximity of our assets. This program covers replacement of the marker plates and posts that are in poor condition and/or not meeting current signage requirements.

A summary of the expenditure for this program is provided in Table 1-6. The program was estimated utilising historical expenditure incurred for these assets.

Table 1-6: Summary of marker post replacement program, $'000 real 2021

Program		2023/24	2024/25	2025/26	2026/27	2027/28	Total
Plate replacement	Units	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Expenditure	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Total replacement	Units	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Expenditure	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Total opex		**39**	**39**	**39**	**39**	**39**	**195**

1.2. Efficiency of the proposed solutions

Maintenance of our transmission pipelines is critical to the operation of MGN's network. Our transmission pipelines are primarily located in suburban or industrial areas, which are typically heavily developed[1] and/or near to population centres. As a result, the consequences of a metropolitan transmission pipeline failure are more severe than failures in sparsely populated areas.

One of the key risks associated with our transmission pipelines is corrosion, which can weaken the pipe wall and cause an integrity failure. To mitigate the risk of a transmission pipeline integrity failure, the pipelines are coated and subject to a cathodic protection (CP) system, which uses a low voltage electrical current to inhibit corrosion. Some of our transmission pipelines are also coated to inhibit corrosion.

Coatings and CP are the primary forms of preventing pipeline corrosion. It is therefore important to be able to continually measure and monitor the effectiveness of these systems and have sufficient information to be able to demonstrate the structural integrity of the steel pipelines.

Demonstrating structural integrity is a requirement of AS 2885.3-2012 (clause 6.5). There are two principal methods currently used by natural gas network owners/operators to monitor (and ultimately demonstrate) the structural integrity of a pipeline:

1. Measure the pipeline coating for faults with a Direct Current Voltage Gradient (DCVG) survey and conduct direct examination (dig ups) at faults to inspect for pipeline steel deterioration; and
2. Measure the thickness and condition of the pipeline steel by in line inspection (ILI or pigging) and verify the results by direct examination.

Both these methods are accepted industry practice and are used by gas distribution network businesses with transmission pipeline assets to maintain the structural integrity of assets in a prudent and efficient manner.

This strategy considers options to achieve ILI-compatibility on all our transmission pipelines. As highlighted, it is good industry practice and has become a standard pipeline integrity management activity by pipeline owners/operators to use ILI over DCVG surveys to assess the integrity of transmission and transmission pressure pipelines in Australia. Section 6.6.1 of AS 2885.3-2012 states:

> *The Licensee shall consider the use of an inline inspection tool capable of detecting the flaws that may exist in a pipeline.*

We therefore assessed two options: completing our program in the next AA period, and completing the program over the next 10 years.

We submit that maintaining the proposed pipeline modification, inspection and rectification program at a steady rate, and making all our transmission pipelines ILI compatible over the next ten years reflects prudent asset management and makes the most efficient use of resources.

[1] Developed areas typically have sealed ground surfaces and opportunity for significant volumes of gas to collect below ground or below a building in the event of an uncontrolled gas escape.

We consider the proposed transmission pipeline integrity program satisfies the requirements of the following National Gas Rules:

- **NGR 79(1)** – the proposed solution is consistent with good industry practice, several practicable options have been considered, and market rates have been tested to achieve the lowest sustainable cost of providing this service.
- **NGR 79(2)** – proposed capex is justifiable under NGR 79(2)(c)(ii), as it is necessary to maintain the integrity of services.
- **NGR 74** – the forecast costs are based on the latest market rate testing and project options consider the asset management requirements as per the latest Asset Management Strategy. The estimate has therefore been arrived at on a reasonable basis and represents the best estimate possible in the circumstances.

2. Document overview

2.1. Purpose

This document articulates Multinet Gas Network's (MGN) approach to the management of its transmission pipelines and their associated components.

It has the following objectives:

- identify the capital works program for 2023/24 to 2027/28;
- present cost estimates for the works program;
- provide justification and evidence that demonstrates the proposed program is prudent and efficient (as per requirements of NGR 79);
- demonstrate that the program cost and volume estimate have been arrived at on a reasonable basis (as per requirements of NGR 74); and
- provide a record of the proposed works program to help inform program delivery and asset management during the period (2023/24 to 2027/28).

The document is for use by:

- MGN staff (and its contractors); and
- regulators – technical, safety and economic.

2.2. Scope

This strategy covers the management of MGN's transmission pipelines and their associated components. In particular, this strategy covers licensed pipeline assets with a Maximum Allowable Operating Pressure (MAOP) above 1,050 kPa.

This document defines the strategy to maintain public and personnel safety, integrity and security of supply in relation to MGN's transmission pipeline assets through compliance with regulation, technical, and safety standards.

This strategy relates only to MGN's capital requirements in relation to transmission pipelines and excludes operational expenditure requirements.

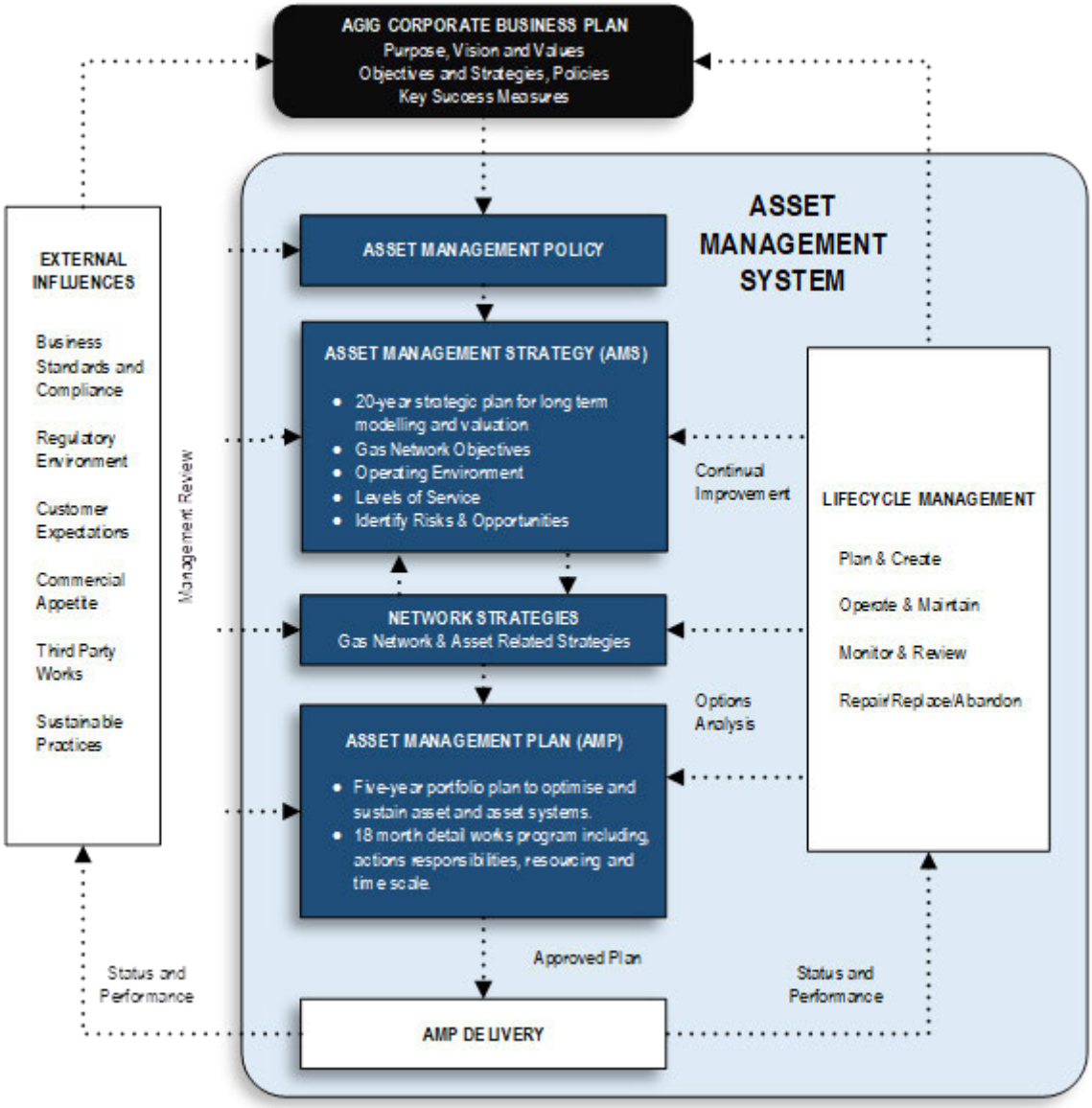
The strategy does not cover:

- transmission pipeline operational and integrity management – refer to the Pipeline Integrity Management Plan (MG-PL-0001) (PIMP); and
- pipelines operating less than 1,050 kPa (known as High Pressure 2) – refer to the Distribution Mains and Services Strategy (MG-SP-0009).

2.3. Relationship with other key asset management documents

The Transmission Pipelines Strategy is one of a number of key asset management documents developed and published by MGN in relation to its gas network. As indicated in Figure 2-1, detailed asset strategies, including the Transmission Pipelines Strategy, informs both the Asset Management Strategy (AMS) and Asset Management Plan (AMP) of the programs needed to achieve the long-term objectives of the gas transmission and distribution networks.

Figure 2-1: Asset Management Framework



2.4. Financial figures used in this document

All financial figures quoted within this document, unless otherwise specifically stated, are:

- real unescalated expenditure / cost (reference year = June 2021);
- direct expenditure only (i.e. excludes overheads and finance costs); and
- in units of $1,000 (i.e. ,000).

2.5. Data sources

The following data sources have been drawn upon to develop the Transmission Pipelines Strategy:

- SAP – the primary asset management database.

It should be highlighted that data anomalies (e.g. missing data, outliers, and unexpected variances) may be encountered upon examination of a data sets and the gathering of statistics and other relevant information for the purposes of analysis. Where encountered and relevant they will be noted within the body of the document.

2.6. References

- Gas Safety Case
- Gas Distribution System Code Ver. 15.0
- AS 4645 – Gas Distribution Network Management
- AS 2885 Series – Pipelines Gas and Liquid Petroleum
- Pipelines Act 2005
- Pipelines Regulations 2007
- Pipeline Integrity Management Plan (PIMP)

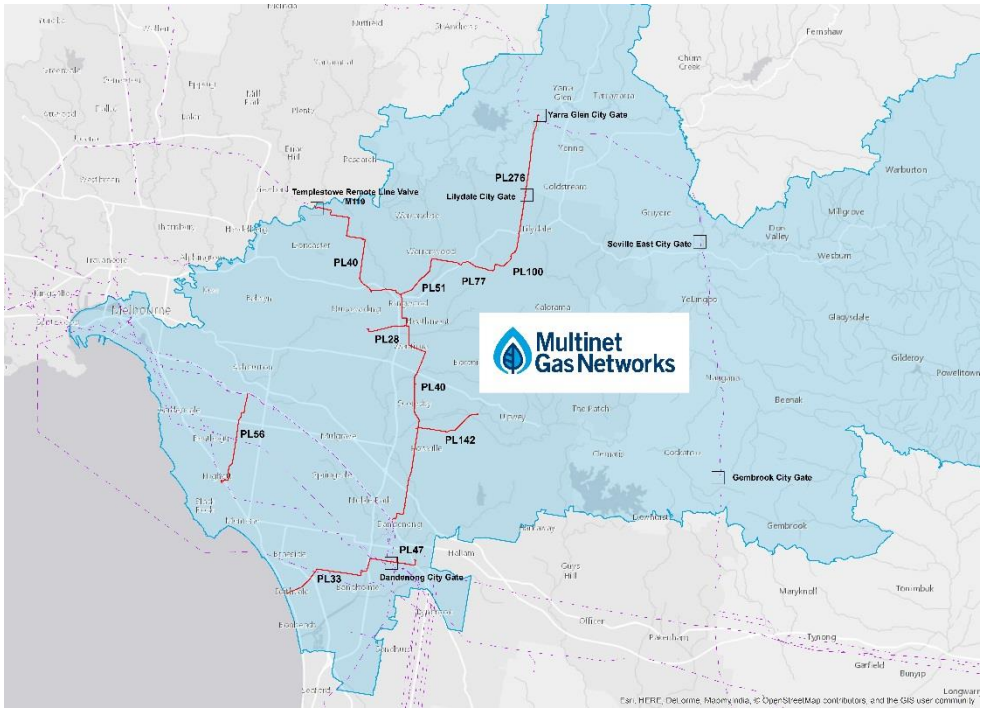
3. Asset overview

3.1. Introduction

MGN operates and maintains the licensed transmission pipelines as per the requirements of AS 2885. We have 15 licenses covering around 163 km of transmission pipelines that form part of MGN's 'Metropolitan Melbourne Territory' and the 'Non-contiguous South Gippsland Network'. Maps of the two networks are provided in Figure 3-1 and Figure 3-2, and further detail is provided in Appendix A.

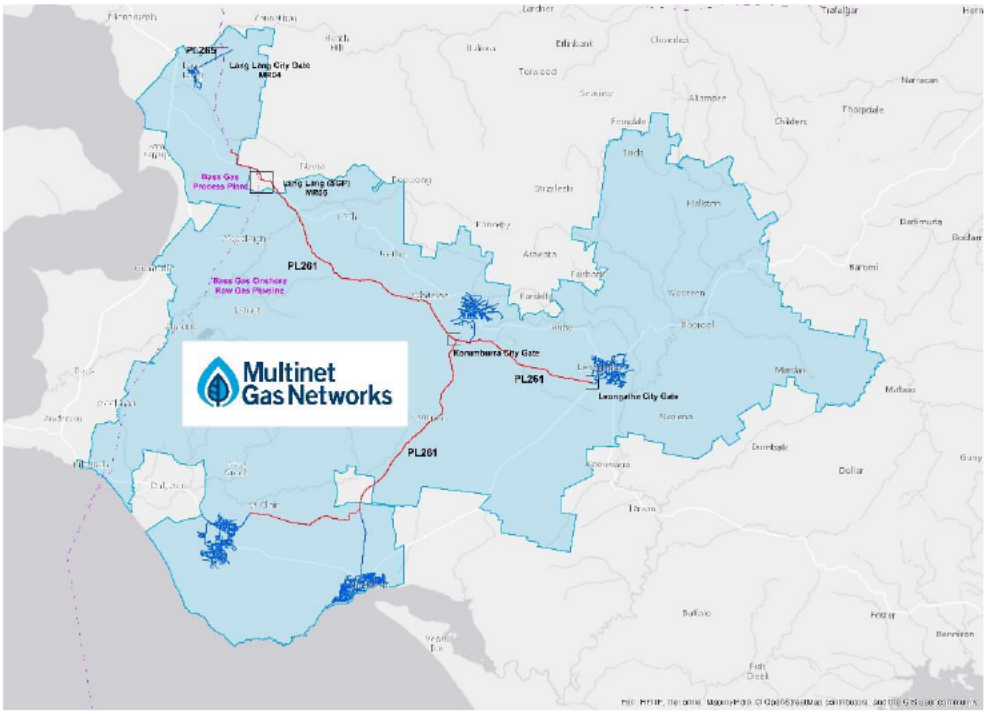
The metropolitan Melbourne transmission pipeline network transports gas from APA GasNet's gas transmission system known as the Declared Transmission System (DTS), to the MGN distribution network shown in Figure 3-1.

Figure 3-1: Map of metropolitan Melbourne transmission pipeline network



The South Gippsland Natural Gas Pipeline (SGP) is owned by MGN and supplies a MGN network that is classified as non-DTS and is fed from Bass Gas. This pipeline provides natural gas to the townships of Lang Lang, Korumburra, Leongatha, Inverloch and Wonthaggi. The commercial agreements regarding the gas transportation, gas quality and host retailer are separate to the rest of the MGN network in the metropolitan area.

Figure 3-2: Map of SGP



The transmission pipeline networks are segregated into two classifications, those operating above 1,050 kPa and those operating below 1,050 kPa as shown in Table 3-1.

Table 3-1: Kilometres of pipeline operating at transmission pressures

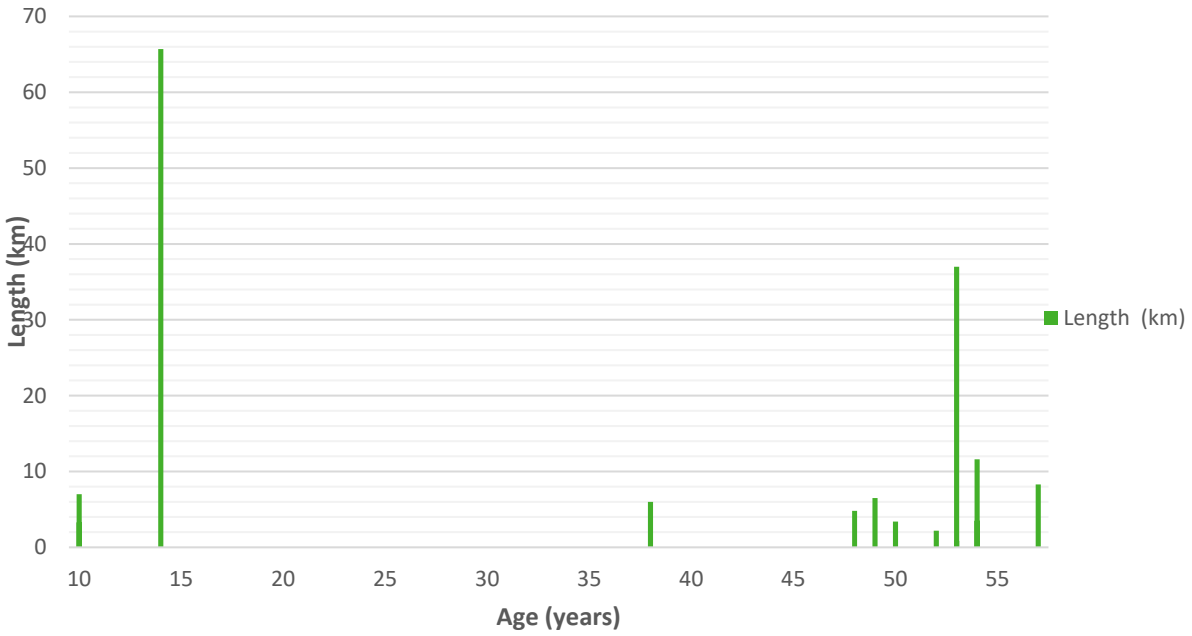
Transmission pipelines	Metropolitan	South Gippsland	Total
Operating above 1,050kPa	97.5 km[2]	38.9 km	**136.4 km**
Operating below 1,050kPa		26.9 km	**28.3 km**
Total	**97.5 km**	**65.8 km**	**163.3 km**

[2] Some data anomalies exist in SAP due to counting lengths of pipeline offtakes.

3.2. Asset age profile

Our transmission pipelines date back more than 57 years. Figure 3-3 provides an age profile by age in years and length in kilometres based on year of installation.

Figure 3-3: Age profile for transmission pipelines



3.3. Asset performance

Please refer to the PIMP for further details of the performance of our transmission pipeline assets.

4. Asset management drivers

4.1. Network vision

The MGN vision informs the way we manage and invest in our assets.

Figure 4-1: Network vision and objectives

When developing our work program and asset management strategies for the MGN network, we consider how the work we conduct and investments we make will help achieve the three key vision objectives outlined in the figure above.

These vision objectives and how they relate to the transmission pipeline work program is summarised in the following sections.

4.1.1. Delivering for customers

Our aim is to continue to deliver customers the service they want and value. This includes keeping people safe from harm, maintaining a reliable gas supply, and providing quality customer service.

The MGN network is located in densely populated areas. This means we have a duty of care to make certain our assets are functioning properly, and that we can detect and prevent any potential safety issues.

Maintaining and investing in our transmission pipeline assets is critical to continue to supply our customers. The transmission pipeline network is the supply backbone for all customers on the gas network. Modifying our highest priority pipelines to allow for ILI will improve our public safety and network integrity management capabilities, minimising the likelihood of uncontrolled gas escapes and extended outages.

Not only will the prevention of corrosion on our transmission assets allow us to continue to provide customers with a secure and reliable supply of gas, but it will ensure we operate and maintain our assets in the safest way possible while keeping costs down over the long term.

4.1.2. A good employer

We strive to be a leader in health and safety by ensuring employees and contractors are mindful of the factors affecting their physical and mental health. This is done through strict health and safety procedures, incentive programs and regular workshops and health screenings.

Wherever practicable and prudent to do so, we aim to apply technologies such as ILI, which helps limit our employees' and contractors' exposure to manual and sometimes hazardous network management activities. We also focus on maintaining asset integrity, reducing the risk of leaks and/or failure which carry the potential for harm.

We aim to ensure high employee engagement by keeping employees up to date with relevant town halls and workshops of the entire business. Skills development is also a focus, ensuring both contractors and employees have the relevant skills and requirements for performing their roles.

4.1.3. Sustainably cost efficient

We aim to be sustainably cost efficient in working within benchmarks and still providing benefits to the customer and to shareholders. We intend to ensure natural gas remains a competitive, value-for-money fuel option in line with customer interests and expectations.

The maintenance and replacement strategies outlined in this document are aimed at improving the efficiency of the MGN network – providing the lowest cost of service to network users. We aim to deliver these programs for the lowest practicably sustainable cost, and consider a range of options before committing to a course of action.

We are also mindful of our environmental and social responsibilities, and will test our asset management strategies and work practices against relevant environmental, sustainability and societal obligations.

4.2. Network objectives

We manage the network in line with six asset objectives, which are linked to AGIG's vision and underpin our asset management practices. Achieving these network objectives enables us to provide good customer service, remain a good employer and is sustainably cost efficient.

Table 4-1: Summary of MGN network objectives

Operate and invest in assets to keep the public and MGN's employees safe	MGN will achieve this by: • Investing in and operating the network in line with the Gas Safety Case, zero harm principle and all laws and relevant industry standards; • Managing known risks to as low as reasonably practicable (ALARP); and • Meeting emergency response Key Performance Indicators (KPIs) (call centre, high priority leaks).
Maintain continuity of supply to MGN's customers	MGN will achieve this by: • Meeting network availability KPIs; • Maintaining operating pressures through monitoring and augmenting MGN's network; and • Addressing leaks in line with MGN's leak management plan.

Improve MGN's customers' service experience in line with their expectations	MGN will do this by: • Maintaining accuracy of metering assets within relevant industry standards; • Delivering valued services to customers at the lowest sustainable price; and • Meeting customer KPIs (reliability/outages, safety, complaints, and overall customer satisfaction).
Balance network performance and costs to deliver affordable services	MGN will do this by: • Optimising overall asset lifecycle management costs; • Maintaining operating efficiency without compromising safety and reliability; • Developing investment plans that consider stakeholder expectations; and • Leveraging people, data and technology to deliver continuous improvement.
Promote gas usage to ensure the networks remain sustainable	MGN will achieve this by: • Connecting new greenfield expansion projects in a timely manner; • Enabling new urban infill connections; • Engaging with key stakeholders to develop adequate network solutions for future supply options; • Increasing long term competitiveness of networks through higher asset utilisation; and • Promoting use of gas.
Embrace innovation and work towards net-zero emissions	MGN will achieve this by: • Considering alternative innovative, sustainable and/or lower long-term cost solutions; • Pursuing research and development opportunities where they facilitate us to meet MGN's vision and objectives; and • Supporting the decarbonisation of MGN's gas supplies and the move to smarter gas networks.

4.3. Regulatory requirements

4.3.1. Technical obligations

This strategy aims to achieve a high level of compliance with AS 2885 in particular by implementing a program to make our existing transmission pipelines piggable. ILI is considered good industry practice and has become a standard pipeline integrity management activity used by pipeline owners/operators. Section 6.6.1 of AS 2885.3-2012 states:

> *The Licensee shall consider the use of an inline inspection tool capable of detecting the flaws that may exist in a pipeline.*

In accordance with this, MGN requires all new transmission pipelines are designed to accommodate intelligent pigging. By rectifying these older pipelines to make them piggable, MGN will achieve compliance to AS 2885 requirements.

The marker post replacement program also aims to achieve compliance to AS 2885 as it is a requirement of this standard that all markers for transmission pipelines are clearly visible above ground, legible and carry relevant contact details.

4.3.2. Consistency with the National Gas Objective and the National Gas Rules

In developing these forecasts, we have had regard to the National Gas Objective (NGO) and Rule 79/91 and Rule 74 of the National Gas Rules (NGR). With regard to all projects, and as a prudent asset manager/network business, we give careful consideration to whether capex is conforming from a number of perspectives before committing to capital investment.

National Gas Objective

This strategy furthers the NGO by promoting efficient investment in, and efficient operation and use of, natural gas services for the long term interests of consumers of natural gas with respect to price, quality, safety, reliability and security of supply of natural gas.

National Gas Rules

We consider the proposed transmission pipeline programs satisfy the requirements of the following rules:

- **NGR 79(1)** – the proposed solution is consistent with good industry practice, several practicable options have been considered, and market rates have been tested to achieve the lowest sustainable cost of providing this service.
- **NGR 79(2)** – proposed capex is justifiable under NGR 79(2)(c)(ii), as it is necessary to maintain the integrity of services.
- **NGR 74** – the forecast costs are based on the latest market rate testing and project options consider the asset management requirements as per the latest Asset Management Strategy. The estimate has therefore been arrived at on a reasonable basis and represents the best estimate possible in the circumstances.

4.4. Risk management

Risk management is a constant cycle of identification, analysis, treatment, monitoring, reporting and then back to identification (as illustrated in Figure 4-2). When considering risk and determining the appropriate mitigation activities, we seek to balance the risk outcome with our delivery capabilities and cost implications. Consistent with stakeholder expectations, safety and reliability of supply are our highest priorities.

Figure 4-2 Risk management principles

Our risk assessment approach focuses on understanding the potential severity of failure events associated with each asset and the likelihood that the event will occur. Based on these two key inputs, the risk assessment and derived risk rating then guides the actions required to reduce or manage the risk to an acceptable level.

MGN's risk management framework is based on:

- AS/NZS ISO 31000 Risk Management – Principles and Guidelines;
- AS 2885 Pipelines-Gas and Liquid Petroleum; and
- AS/NZS 4645 Gas Distribution Network Management.

The Gas Act 1997 and Gas Regulations 2012, through their incorporation of AS/NZS 4645 and the Work Health and Safety Act 2012, place a regulatory obligation and requirement on MGN to reduce risks rated high or extreme to low or negligible as soon as possible (immediately if extreme). If it is not possible to reduce the risk to low or negligible, then we must reduce the risk to as low as reasonably practicable (ALARP).

When assessing risk for the purpose of investment decisions, rather than analysing all conceivable risks associated with an asset, we look at credible, primary risk events to test the level of investment required. Where a credible risk event has an overall risk rating of intermediate or higher, we will undertake investment to reduce the risk.

Six consequence categories are considered for each type of risk:

1. **People** – injuries or illness of a temporary or permanent nature, or death, to employees and contractors or members of the public.
2. **Environment** (including heritage) – impact on the surroundings in which the asset operates, including natural, built and Aboriginal cultural heritage, soil, water, vegetation, fauna, air and their interrelationships
3. **Supply –** disruption in the daily operations and/or the provision of services/supply, impacting customers
4. **Compliance** – the impact from non-compliance with operating licences, legal, regulatory, contractual obligations, debt financing covenants or reporting / disclosure requirements
5. **Reputation** – impact on stakeholders' opinion of MGN, including personnel, customers, investors, security holders, regulators and the community
6. **Financial** – financial impact on MGN, measured on a cumulative basis

Note that risk is not the sole determinant of what investment is required. Many other factors such as growth, cost, efficiency, sustainability and the future of the network are also considered when

we develop engineering solutions. The risk management framework provides a valuable tool to manage our assets, and prioritise our works program, however it is not designed to provide a binary (yes/no) trigger for investment.

As prudent asset managers, we apply our experience and discretion to manage and invest in our distribution networks in the best interests of existing and potential customers.

4.5. Lifecycle management

Lifecycle management is broken up into four components:

1 Plan and create

2 Operate and maintain

3 Monitor and review

4 Repair, replace, abandon

These are discussed in the following sections.

4.5.1. Plan and create

Planning and creation considers current and future customer growth and load demands, asset performance and service needs, and secures the necessary approvals for expenditure. It includes the creation of new assets to:

- extend the network;
- provide new network, metering and SCADA facilities; and
- augment/upgrade/replace existing assets.

For transmission pipelines, the focus is on identifying the most prudent time to replace these assets and to identify what new assets or modifications must be made to transmission pipelines to make them compatible with ILI.

4.5.2. Operate and maintain

Operation and maintenance involves three principal sub-processes. These are described below. The PIMP provides further details on these activities.

Surveillance and monitoring (inspections)

Surveillance and monitoring activities includes:

- corrosion protection surveys (includes scheduled coating defect surveys);
- ILI activities;
- scheduled leakage survey;
- scheduled heater inspections;
- pipeline surveillance and patrolling;
- crossing inspections; and
- telemetry monitoring (pressures, temperatures, alarms).

Preventative maintenance

Preventative maintenance includes:

- scheduled valve maintenance;
- scheduled regulator stations and city gate maintenance;
- scheduled SCADA maintenance; and
- CP equipment maintenance.

Corrective maintenance - faults and defects

Corrective maintenance includes:

- valve repairs;
- coating defect repairs; and
- marker sign repairs.

4.5.3. Monitor and review

Monitoring

Monitoring of assets includes the following:

- capacity to meet customer demands for gas, delivered at required flow rates and pressures;
- to highlight existing and emerging issues related to normal aging over time, accelerated aging or new risk issues;
- continuous collection of operational data, trend monitoring for emerging issues and amendment to operational procedures or capital program recommendations post risk analysis; and
- auditing to ensure activities and processes comply with required industry standards. The results of both internal and external auditing are reported to management.

Audits

Key internal audits include the following:

- supervisor monitoring audits;
- verification audits to verify that audits of task related activities provide credible and consistent results; and
- technical facility audits, the findings of which are reported to management through detailed reports.
- MGN audits as required to provide confidence that contractors are operating with due diligence and in compliance with requirements.

Key external audits include the following:

- regulatory audits conducted by regulators as a means of ensuring that activities performed conform to legislative requirements; and
- Safety Management Plan audits typically conducted by external auditors on particular aspects of safety or operating plans.

Reviews

Reviews include:

- review of real time data;
- review of field reports and assessments;
- review of asset performance, condition and integrity KPIs. These are reviewed on a monthly basis in the monthly operating and management report and annually through, amongst others, the Distribution System Performance Review (DSPR); and
- review of quarterly and annual regulatory reports.

4.5.4. Repair, replace, abandon

From time to time, based on assessment, there is a requirement to undertake significant repair, replacement, alteration or abandonment of a transmission asset.

In addition, due to third party driven activity, pipelines from time are subject to requiring minor or major alignment alterations. These works are typically externally funded and timing is subject to their timeframes and associated regulatory approvals. Such works may be identified in this document should there be significant certainty on timing, where they are material and where there may be an element of capital funding by MGN.

4.6. Network adaptation – renewable gas

In line with MGN's objective to support energy sector decarbonisation, our asset management practices consider the introduction of hydrogen into MGN's network. Where practicable, when replacing gas distribution network equipment and components, we purchase parts that are compatible with hydrogen and renewable gas, taking a prudent and incremental approach to making the network 'hydrogen ready'.

This incremental approach allows us to facilitate the energy policy direction to decarbonise Australia's energy sector, and to do so in an efficient manner. Gas transmission and distribution pipelines are among Australia's most important energy transportation systems. It is vital these high value assets keep pace with the energy transition happening right across the country, and we ensure the gas networks are ready to transport renewable gas.

5. Expenditure program – 2023/24 to 2027/28

5.1. Program overview

The transmission pipeline integrity works program for 2023/24 to 2027/28 has five components:

1. Pipeline modification program
2. Tool data verification program
3. Miscellaneous capital works program
4. Pigging program
5. Market post replacement program

Table 5-1 summarises the proposed expenditure on these five programs. The capex allocation is captured within the AER regulatory accounts' 'Other' category.

Table 5-1: Expenditure summary, $'000 real 2021

Program	2023/24	2024/25	2025/26	2026/27	2027/28	Total
Pipeline modification	318	5,003	-	3,926	-	9,247
Tool data verification	200	300	-	150	200	850
Miscellaneous capital works	100	100	100	100	100	500
Total capex	**618**	**5,403**	**100**	**4,176**	**300**	**10,597**
Pigging	1,980	1,480	878	-	860	5,198
Marker post replacement	39	39	39	39	39	195
Total opex	**2,019**	**1,519**	**917**	**39**	**899**	**5,393**
Total expenditure	**2,637**	**6,922**	**1,017**	**4,215**	**1,199**	**15,989.5**

We consider that the proposed transmission pipeline programs are the minimum required to efficiently manage the asset class and mitigate the risk associated with pipeline failure.

The adequate maintenance of our transmission pipelines is critical to the operation of MGN's network. Our transmission pipelines are primarily located in suburban or industrial areas, which are typically heavily developed[3] and/or near to population centres. As a result, the consequences of a metropolitan transmission pipeline failure are more severe than failures in sparsely populated areas.

One of the key risks associated with our transmission pipelines is corrosion, which can weaken the pipe wall and cause an integrity failure. To mitigate the risk of a transmission pipeline integrity

[3] Developed areas typically have sealed ground surfaces and opportunity for significant volumes of gas to collect below ground or below a building in the event of an uncontrolled gas escape.

failure, the pipelines are coated and subject to a CP system, which uses a low voltage electrical current to inhibit corrosion.

Coatings and CP are the primary forms of preventing pipeline corrosion. It is therefore important to be able to continually measure and monitor the effectiveness of these systems and have sufficient information to be able to demonstrate the structural integrity of the steel pipelines.

Demonstrating structural integrity is a requirement of AS 2885.3-2012 (clause 6.5). There are two principal methods currently used by natural gas network owners/operators to monitor (and ultimately demonstrate) the structural integrity of a pipeline:

1. Measure the pipeline coating for faults with a Direct Current Voltage Gradient (DCVG) survey and conduct direct examination (dig ups) at faults to inspect for pipeline steel deterioration; and
2. Measure the thickness and condition of the pipeline steel by in line inspection (ILI or pigging) and verify the results by direct examination.

Both these methods are accepted industry practice and are used by gas distribution network businesses with TP pipeline assets to maintain the structural integrity of assets in a prudent and efficient manner.

This strategy considers options to achieve ILI-compatibility on all our transmission pipelines. As highlighted, it is good industry practice and has become a standard pipeline integrity management activity by pipeline owners/operators to use ILI over DCVG surveys to assess the integrity of transmission and transmission pressure pipelines in Australia. Section 6.6.1 of AS 2885.3-2012 states:

> *The Licensee shall consider the use of an inline inspection tool capable of detecting the flaws that may exist in a pipeline.*

We therefore assessed two options: completing our program in the next AA period, and completing the program over the next 10 years.

We submit that maintaining the proposed pipeline modification, inspection and rectification program at a steady rate, and making all our transmission pipelines ILI compatible over the next 10 years reflects prudent asset management and makes the most efficient use of resources.

Unit rates are based on the latest market-tested prices, updated to reflect recent price increases in copper, electronics, labour and materials experienced across Australia in the wake of the COVID-19 pandemic. Forecasts costs reflect recent vendor estimates where available.

The delivery program is smoothed over the period, and reflects a prudent and deliverable rate of replacement. Asset replacement is prioritised by risk, with the riskiest/poorest condition assets being targeted for replacement first.

5.2. Customer and stakeholder engagement

MGN is committed to operating the network in a manner that is consistent with the long-term interests of our customers. To facilitate this, we conduct regular stakeholder engagement to understand and respond to the priorities of our customers and stakeholders. Feedback from stakeholders is built into our asset management considerations and is an important input when developing and reviewing our expenditure programs.

Our customers have told us their top three priorities are price/affordability, reliability of supply, and maintaining public safety. The asset management activities outlined in this strategy are primarily associated with maintaining reliability of supply at the lowest practicable cost.

Our customers rely on a continuous gas supply to be able to heat their homes and operate their businesses. Any disruption to supply can adversely impact residential customers, and carry significant financial consequences for our industrial and commercial customers. With this in mind, our transmission pipeline strategy is designed to minimise the risk of disruption to customer supply by maintaining the integrity of our transmission network in a prudent manner, in accordance with good industry practice and in accordance with our regulatory obligations.

5.3. Delivery capacity

The program of works has been designed to continue utilising the same resource base at the same ongoing level of productivity. We have access to a portfolio of contractors who have demonstrated they can manage the scheduled works, and forward looking deliverability has been considered in light of our current and previous ILI programs.

5.4. Estimating efficient costs

The costs derived for these programs have been estimated based on historical costs incurred in completing similar projects. In order to achieve efficiency in the preliminary pigging feasibility investigation process, the three pipelines (PL 28, PL47 and PL 51/77/100) in the modification program were bundled together as an RFQ package and had been sent out for competitive tender by the market. The feasibility study provided MGN with the assessment for each pipeline and the detail of rectifications involved to make these pipelines piggable. The estimate has been developed by CNC Project Management Consultants and the following categories have been considered in the cost estimate.

- engineering services;
- materials;
- construction labour;
- construction plant;
- hot tap services and materials;
- pigging services,
- commissioning; and
- project closeout.

CNC has also used data from other similar projects they have undertaken across the gas transmission industry in Australia. A contingency in the range of [redacted] is applied to the cost estimate provided by CNC.

Feasibility reports and cost estimates are provided CNC Project Management Pigging Plan Report.

The pipelines which are planned to be pigged as part of the pigging program will also be sent out to the market for competitive tender individually (on a per pipeline basis) to achieve a detailed breakdown of costs involved and to also optimise use of system operations and engineering resources.

The forecast cost breakdown is shown in the following tables.

Table 5-2: Forecast capex – Transmission pipelines, $'000 real 2021

	2023/24	2024/25	2025/26	2026/27	2027/28	Total
Labour	371	3,242	60	2,506	180	6,358
Materials	247	2,161	40	1,670	120	4,239
Total capex	**618**	**5,403**	**100**	**4176**	**300**	**10,597**

Table 5-3: Forecast opex – Transmission pipelines, $'000 real 2021

	2023/24	2024/25	2025/26	2026/27	2027/28	Total
Labour	1,211	911	550	23	539	3,236
Materials	808	608	367	16	360	2,157
Total opex	**2,019**	**1,519**	**917**	**39**	**899**	**5,393**

5.5. Pipeline modification program

5.5.1. Program summary

Generally, older pipelines were not designed with intelligent pigging in mind because intelligent pigging was an emerging technology available from the late 1980s in Australia. Issues that restrict intelligent pigging in the pre-1980s pipelines include absence of pig bars on branch tees, short radius and back-to-back bends, reduced bore valves, plug valves and no provision for connection of pig launchers/receivers. Pipeline alterations such as removing short radius bends, installing new tees with pig bars and retrofitting pigging connections and valving are among the steps required to modify a pipeline to accommodate intelligent pigging. However, this work is costly, not without risk and requires extensive pre-planning, approvals and lead time.

MGN has a number of pipelines designed and constructed such that they cannot be pigged without alterations. Modifications to make an existing pipeline piggable include (at a minimum):

- installation of pig launchers and receivers;
- replacement of tight radius bends with swept bends to permit a pig to pass;
- removal of reduced bore valves; and
- valve configuration at each end of the pipeline to allow a pig launcher and receiver.

We have prioritised our remaining transmission pipelines for modification based on asset fault risk, ILI-suitability, geographical location and deliverability. We decided to bundle like-works in the next AA period, with the ability to re-use pig traps across these projects[4], and have also smoothed delivery by deferring the more complex and potentially costly works on the T40 system to the following period. This will achieve the fastest risk reduction and most efficient program we consider is deliverable.

[4] For example, we plan to re-use the same DN 150 pig-traps which were built for the South Gippsland Pipeline for the DN 150 pipelines yet to be pigged and re-use the DN 300 pig traps for the T07 and PL276 pipelines.

From past experience with these modification projects, a minimum of two years is required for engineering and approval processes is required. We have staged our three new modification projects with this in mind. We have also planned the subsequent pigging and tool verification activities for each within an achievable and deliverable timeframe.

Our overall plan to make our transmission network piggable in the next ten years is shown in Table 5-4.

Table 5-4: Future pipeline modification program

Licence #	Size (mm)	Pipeline #	Name	Length (km)	Commissioned	Planned completion
142	150	T76	Rowville to Ferntree Gully	6.0	1984	[redacted]
33	150	T21	Dandenong to Edithvale	11.6	1968	[redacted]
56	300	T07	Murrumbeena to Highett	8.3	1965	[redacted]
28	200	T26	Ringwood to Vermont	3.5	1968	[redacted]
47	150		PL 47 which includes:			[redacted]
		T29	• Dandenong to Insulation Solutions Amatek Ltd	0.85	1969	
		T45	• Dandenong to Hallam Valley Rd	2.2	1970	
	250	T40	The T40 system, which includes:			[redacted]
51			• Ringwood to Croydon	6.5	1973	
77			• Croydon to Mooroolbark	3.4	1972	
100			• Mooroolbark to Lilydale	4.8	1974	

Table 5-5 shows the forecast cost required for complete the remaining minor works on the three pipelines we have completed in the current AA period, and the two new modification projects to be commenced in the next AA period.

Table 5-5: Pipeline modification program, $'000 real 2021

Pipeline	2023/24	2024/25	2025/26	2026/27	2027/28	Total
T76 Rowville to Ferntree Gully (PL142)	[redacted]					
T21 Dandenong to Edithvale (PL33)	[redacted]					
T07 Murrumbeena to Highett (PL56-4)	[redacted]					
T26 Ringwood to Vermont Pipeline (PL28)	[redacted]	[redacted]				[redacted]
T29/T45 Dandenong to Hallam Valley Rd (PL47)	[redacted]			[redacted]		[redacted]
Total expenditure	**318**	**5,003**	**-**	**3,926**	**-**	**9,247**

5.5.2. Recommended option

A summary of the options considered for the transmission pipeline modification program is provided in 0.

The recommended option is to:

- undertake the remaining minor works on the three pipelines we have completed in the current AA period (T76, T21 and T07);
- commence two new modification projects in the next five years (including works on T26, T29/T45); and
- defer the modification of the T40 System to the next AA period.

This option is the most prudent option because it will:

- allow MGN to take any further proactive measures to ensure the asset is healthy throughout its lifespan and potentially increase the lifespan of the asset;
- improve the accuracy of the inspection and therefore maintenance of our assets, thereby minimising the risk of the transmission pipeline failing, allowing us to reduce the risk to ALARP and maintain the safety and reliability of services to customers;
- improve our compliance with safety and reliability standards (AS 2885, GDS Code etc.), good industry practice, and our Asset Management Strategy;
- provide the most cost effective option that reduces risks to an acceptable level;
- provides a deliverable solution as it is a continuation of current productivity levels; and
- provide the most cost effective option consistent with our vision of deliver for customers and will support lower overall costs of delivering services which is sustainably cost efficient and in the long term interests of customers.

5.6. Tool data verification program

5.6.1. Program summary

The primary purpose of this program is to verify the ILI tool data sensitivity by conducting a physical dig-up and conduct an engineering assessment of any defects or anomalies present at the location. [redacted]. Depending on the findings of each dig-up, further dig-ups may also be scheduled if needed to gain confidence with ILI data.

Depending on the outcome of the assessment, a suitable repair method will also be chosen to ensure pipeline integrity. The results from the verification dig ups help finalise the engineering assessments, provide information for the Remaining Life Reviews and Safety Management Studies conducted for the pipelines. All these activities are a license requirement to ensure the safe ongoing operation of the transmission pipelines.

The program is consistent with MGN's historical approach to verifying ILI data. It is also a requirement of AS 2885.3:2012, Section 9.2 that post-assessment of a direct examination method (i.e. ILI) should be conducted to support the engineering assessments of the pipeline and determine the need for any review of inspections intervals.

This program will commence after the ILI of the pipelines has been successfully conducted. The schedule and forecast operating expenditure is shown in the following table.

Table 5-6: Tool data verification program, $'000 real 2021

Pipeline	2023/24	2024/25	2025/26	2026/27	2027/28	Total
T76 Rowville to Ferntree Gully (PL142)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
T21 Dandenong to Edithvale (PL33)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
T07 Murrumbeena to Highett (PL56-4)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Lilydale pipeline (PL276), which includes: • Yarra Glen to Lilydale City Gate (CL 600) • Lilydale City Gate to Lilydale (CL 300)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
T26 Ringwood to Vermont (PL28)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
T29/T45 Dandenong to Hallam Valley Rd (PL47)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Total expenditure	**200**	**300**	**-**	**150**	**200**	**850**

5.6.2. Recommended option

A summary of options considered for the tool data verification program is provided in 0.

The option to conduct verification dig ups for the newly piggable transmission pipelines, and the Lilydale pipelines due for their 10-15 year inspection is the most prudent option because:

- the program provides the opportunity to conduct the post-assessment (after ILI) as per the technical requirements of AS 2885 and our PIMP;
- the verification dig-ups validate tool data and ensures we have an accurate representation of pipeline condition;
- the program reduces risk of pipeline integrity issues being undetected to ALARP;
- it is forecast based on the average historical unit cost;
- is consistent with MGN's vision; and
- is deliverable, as evidenced by the historical delivery of similar programs in prior AA periods.

5.7. Miscellaneous capital works program

5.7.1. Program summary

This program would typically cover for minor capital expenditure identified as part of any ongoing inspections which would necessitate any replacements or refurbishments outside of a planned replacement program. We apply the program when maintenance is unsafe or inefficient over the longer term. Leaks, corrosion, and poor performance identified as part of ongoing maintenance issues identify deteriorating assets and maintenance/repairs may be ineffective, leaving replacement as the preferred solution.

It is not practical to foresee all required ancillary works aver the period, however we have already identified the required works for the first 2.5 years of the upcoming period. The future years allow us to prudently respond to unforeseen issues with, for example, critical transmission valves.

The list provided in Table 5-7 is not exhaustive and seeks an annual allowance of [redacted] to provide for transmission ancillary capital works that are not carried out as part of dedicated replacement programs.

Table 5-7: Miscellaneous capital works program, $'000 real 2021

Project	2023/24	2024/25	2025/26	2026/27	2027/28	Total
Inlet isolation valve replacement at Murrumbeena Crescent	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Gembrook City Gate Heater reduced bore valve replacement	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Maroondah Hwy Inlet isolation valve replacement	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Wonthaggi NE Precinct rectification		[redacted]				[redacted]
Miscellaneous works allowance			[redacted]	[redacted]	[redacted]	[redacted]
Total expenditure	**100**	**100**	**100**	**100**	**100**	**500**

The program has been built on prior experience in managing transmission assets. We consider history is the best indicator of the future for reactive replacement, noting that only the costs actually incurred for reactive replacements will be added to the capital base and recovered via regulated revenue. As evidence that the budget is a reasonable forecast the first two years already have projects identified from inspection processes. The future years are yet to be determined, however the $100,000 per annum allows for works to be completed as and when the work is inevitably required.

5.7.2. Recommended option

As this is a reactive works program, there are no alternative options. This option is the most prudent option because it will:

- allows for timely risk reduction by replacing failed assets;
- reduces ongoing maintenance costs by replacing assets with a significant number of faults, that are not a part of other programs;
- will promote lower long term costs of delivering services for customers;
- is forecast based on the average historical unit cost;
- is consistent with MGN's vision; and
- is deliverable, as evidenced by the historical number of sites remediated in the current AA period.

5.8. Pigging

5.8.1. Program summary

To ascertain transmission pipeline integrity and condition, internal inspection utilising an intelligent ILI tool provides a thorough analysis of pipeline defects and locations and identifies features such as:

- general corrosion;
- pitting corrosion;
- circumferential gouging;
- axial gouging;
- mill defects;
- proximity of ferrous metal; and
- dents.

The solution involves conducting ILI on the newly modified pipelines in the next AA period, as well as the Yarra Glen to Lilydale City Gate and Lilydale City Gate to Lilydale pipelines, which were built in 2012 and are piggable, and therefore due for their mandatory 10-15 year inspection. Costs vary for each physical pigging project due to such things as the various types of tools used, the specification of the pipeline, number of pigs runs required, pipeline pig trap locations (urban/rural) and government approvals. Table 5-8 shows the forecast operating expenditure required for ILI of the six pipelines to be completed in the next AA period.

Table 5-8: Pigging program, $'000 real 2021

Pipeline	2023/24	2024/25	2025/26	2026/27	2027/28	Total
T76 Rowville – Ferntree Gully (PL142)						
T21 Dandenong – Edithvale (PL33)						
T07 Murrumbeena – Highett (PL56-4)						
Lilydale pipelines (PL276), which include: • Yarra Glen to Lilydale City Gate (CL 600) • Lilydale City Gate to Lilydale (CL 300)						
T26 Ringwood – Vermont (PL28)						
T29/T45 Dandenong – Hallam Valley Rd (PL47)						
Total opex	**1,980**	**1,480**	**878**	**-** **-**	**860**	**5,198**

5.8.2. Recommended option

A summary of options considered for the pigging program is provided in 0. The recommended option is the most prudent option because it will:

- allow MGN to take any further proactive measures to ensure the asset is healthy throughout its lifespan and potentially increase the lifespan of the asset;
- improve the accuracy of the inspection and therefore maintenance of our assets, thereby minimising the risk of the transmission pipeline failing, allowing us to reduce the risk to ALARP and maintain the safety and reliability of services to customers;
- improve our compliance with safety and reliability standards (AS 2885, GDS code etc.), good industry practice, and our Asset Management Strategy;
- provide the most cost effective option that reduces risks to an acceptable level;
- provide a deliverable solution; and
- provide the most cost effective option consistent with our vision of deliver for customers and will support lower overall costs of delivering services which is sustainably cost efficient and in the long term interests of customers.

5.9. Marker post replacement program

5.9.1. Program summary

Pipeline marker posts highlight the presence of gas transmission pipelines to public and personnel operating in the close proximity of the asset. Marking of transmission pipelines is undertaken in accordance with AS 2885.1. The location of markers for new pipelines is driven by the outcomes of the Safety Management Study process undertaken during the pipeline design phase and taking into account the requirements of AS 2885.1.

Replacement of transmission pipeline markers and posts is primarily due to them getting damaged, vandalised or becoming illegible. The proposed program will include the replacement of 160 marker plates and 40 marker posts annually that are in a poor condition and not meeting current signage requirements.

A summary of the operating expenditure for this program is listed in Table 5-9. The program was estimated utilising historical expenditure incurred on replacing these assets.

Table 5-9: Marker post replacement program, $'000 real 2021

Program		2023/24	2024/25	2025/26	2026/27	2027/28	Total
Plate replacement	Units	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Expenditure	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Total replacement	Units	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Expenditure	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Total expenditure		**39**	**39**	**39**	**39**	**39**	**195**

5.9.2. Recommended option

As this is a reactive program of works, there are no alternative options considered.

- This option is the most prudent option because it:
- manages the risk of non-compliance with safety standards and reduces the risk of public and employee safety incidents by providing better awareness to the general public by having clear and legible signage;
- enables MGN to achieve the technical compliance requirements of AS 2885.3:2012;
- is forecast based on the:
    - average historical unit cost; and
    - average number of replacements per year;
- is consistent with MGN's vision; and
- is deliverable, as evidenced by the historical number of sites remediated in the current AA period.

Appendix A Transmission pipeline description

A.1 MAOP 10,200kPa (South Gippsland Towns)

[redacted]

A.2 MAOP 6,980kPa (Lilydale Pipeline)

[redacted]

A.3 MAOP 2760 kPa

[redacted]

[redacted]

A.4 Transmission pipeline description

Table Appendix 1: MGN transmission pipelines

Pipeline Lic. No	Pipeline Number	Location	MAOP (kPa)	Diameter (mm)	Length (km)	Year Commissioned
[redacted]						

Pipeline Lic. No	Pipeline Number	Location	MAOP (kPa)	Diameter (mm)	Length (km)	Year Commissioned
[redacted]		[redacted]	[redacted]	[redacted]		[redacted]
[redacted]		[redacted]	[redacted]	[redacted]		[redacted]
[redacted]		[redacted]	[redacted]	[redacted]		[redacted]
		[redacted]			[redacted]	
		[redacted]			[redacted]	

Appendix B Transmission pipeline integrity – options analysis

B.1 Options considered

We considered the following options to continue to maintain our transmission pipeline assets:

- Option 1 – Continue the transmission pipeline integrity program, making all our transmission pipelines piggable over the next 10 years
- Option 2 – Accelerate the pipeline modification program to complete it in the next five years
- Option 3 – Do not continue the pipeline modification program

For a detailed risk and cost assessment of this program please refer to CNC Project Management Pigging Plan Report.

B.1.1 Option 1 - Continue the transmission pipeline integrity program

This is the preferred option as outlined with the main body of this strategy.

Cost assessment

Table Appendix 2: Option 1 – Continued pipeline modification program 2023/24 to 2027/28, $'000 real 2021

Program	2023/24	2024/25	2025/26	2026/27	2027/28	Total
Pipeline modification	[redacted]					9,247
Tool data verification	[redacted]					850
Miscellaneous capital works	[redacted]					500
Total capex	[redacted]					**10,597**
Pigging	[redacted]					5,198
Marker post replacement	39	39	39	39	39	195
Total opex	[redacted]					**5,393**
Total expenditure	**2,637**	**6,922**	**1,017**	**4,215**	**1,199**	**15,989.5**

This estimate is based on our historical experience and current material and labour rates and is supported by independent cost verification reports.

A more detailed breakdown of cost components is provided in the CNC Project Management Pigging Plan Report.

Risk assessment

The primary risk event identified for transmission pipelines is that undetected and untreated corrosion results in an uncontrolled gas escape that causes fires or multiple public injuries, followed by significant enforcement action, major fines and/or restrictions.

The untreated risk[5] rating is shown in the following table.

Table Appendix 3: Transmission pipelines – untreated risk

MGN Operational Risk Matrix							
	People	Supply	Environment	Reputation	Financial	Compliance	Risk
Likelihood	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	High
Consequence	Severe	Severe	Minor	Severe	Minor	Major	
Risk Level	Intermediate	Intermediate	Low	Intermediate	Low	High	

Given the proximity of these transmission pipelines to developed and densely populated areas, there is the potential for a safety incident with severe consequences in certain circumstances. Given that pigging is industry standard practice and that it reasonable to complete the proposed projects, this leads to the potential for major compliance and severe reputational consequences.

Option 1 reduces the frequency from unlikely to remote for the risk categories as shown in the below table. This gives us a reduced overall risk level of intermediate when compared to the untreated overall risk outcome of high. This is a highly desirable outcome as it would provide us with an industry standard level of asset integrity management by having the majority of the pipelines ready for ILI. The risk isn't further reduced as some pipelines in the overall 10-year program remain unpiggable. However, we are taking reasonable steps to mitigate the risk, and therefore the risk is assessed as intermediate, which is considered ALARP.

Table Appendix 4: Transmission pipelines – Option 1

MGN Operational Risk Matrix							
	People	Supply	Environment	Reputation	Financial	Compliance	Risk
Likelihood	Remote	Remote	Remote	Remote	Remote	Remote	Intermediate (ALARP)
Consequence	Severe	Severe	Minor	Severe	Minor	Major	
Risk Level	Low	Low	Negligible	Low	Negligible	Intermediate	

Alignment with vision objectives

The following table shows how Option 1 aligns with our vision objectives.

Table Appendix 5: Alignment with vision – Option 1

Vision objective	Alignment
Delivering for Customers – Public Safety	Y
Delivering for Customers – Reliability	Y
Delivering for Customers – Customer Service	Y
A Good Employer – Health and Safety	Y
A Good Employer – Employee Engagement	-
A Good Employer – Skills Development	Y
Sustainably Cost Efficient – Working within Industry Benchmarks	Y
Sustainably Cost Efficient – Delivering Profitable Growth	-

[5] Untreated risk is the risk level assuming there are no risk controls currently in place. Also known as the 'absolute risk'.

Vision objective	Alignment
Sustainably Cost Efficient – Environmentally and Socially Responsible	Y

Option 1 would align with our objectives of *Delivering for Customers*, as it would address the key aspect of ensuring public safety. The public has a general expectation of MGN to maintain the pipelines at a high standard of safety. By proceeding with Option 1, it will enable the pipelines to be piggable and provide us the opportunity to rectify any pipeline defects prior to them escalating into a potential loss of containment event endangering public safety. It also enables us to provide high levels of reliability that the general public has come to expect of the gas industry.

Option 1 would also drive skills development as there is a high level of technical knowledge involved in the delivery of transmission projects. This skills development will be across the MGN business and at the service provider level and will be consistent with being *A Good Employer*.

Option 1 will also see us working within industry benchmarks as ILI is industry standard practice for these types of assets, we have estimated the costs via competitive tender process for the feasibility studies and will also approach the market for conducting ILI post rectification. Option 1 also considers the deliverability of the transmission program and the capital works program overall. This option therefore aligns with our objective to be *Sustainably Cost Efficient*.

B.1.2 Option 2 – Accelerate the pipeline modification program

This option includes all activities in Option 1 as well as modifying the T40 system (PL51, 77 and 100). This option would mean all transmission pipelines on the MGN network will be piggable by the end of the next AA period.

Cost assessment

The estimated direct cost of this option is $17.69 million (real 2021) in capex and $7.20 million in opex. This estimate is based on our historical experience and current material and labour rates and is supported by independent cost verification reports.

Table Appendix 6: Option 2 – Accelerated pipeline modification program 2023/24 to 2027/28, $'000 real 2021

Program	2023/24	2024/25	2025/26	2026/27	2027/28	Total
Pipeline modification	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	17,193
Tool data verification	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	950
Miscellaneous capital works	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	500
Total capex	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	**18,193**
Pigging	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	6,058
Marker post replacement	39	39	39	39	39	195
Total opex	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	**6,253**
Total expenditure	**2,637**	**6,922**	**5,093**	**5,122**	**5,122**	**24,896**

A more detailed breakdown of cost components is provided in the CNC Project Management Pigging Plan Report.

Risk assessment

This option reduces the overall untreated risk from high to low. The residual risk outcomes are shown below. The primary risk is compliance related, and by completing all reasonable and industry standard asset integrity measures, Option 2 reduces the likelihood of enforcement action, major fines and/or restrictions from remote to hypothetical.

Table Appendix 7: Transmission pipelines – Option 2

MGN Operational Risk Matrix							
Likelihood	Hypothetical	Hypothetical	Hypothetical	Hypothetical	Hypothetical	Hypothetical	Low
Consequence	Severe	Severe	Minor	Severe	Minor	Major	
Risk Level	Negligible	Negligible	Negligible	Negligible	Negligible	Low	

Alignment with vision objectives

The following table shows how Option 2 aligns with our vision objectives.

Table Appendix 8: Alignment with vision – Option 2

Vision objective	Alignment
Delivering for Customers – Public Safety	Y
Delivering for Customers – Reliability	Y
Delivering for Customers – Customer Service	Y
A Good Employer – Health and Safety	Y
A Good Employer – Employee Engagement	-
A Good Employer – Skills Development	Y
Sustainably Cost Efficient – Working within Industry Benchmarks	N
Sustainably Cost Efficient – Delivering Profitable Growth	-
Sustainably Cost Efficient – Environmentally and Socially Responsible	Y

Option 2 aligns with our objective of *Delivering for Customers*, as it would address the safety and reliability risks associated with undetected corrosion on all of our transmission pipelines. Modifying our transmission pipelines to allow ILI will improve our public safety and network integrity management capabilities, minimising the likelihood of uncontrolled gas escapes and extended outages.

However, this option only partially aligns with our objective of being *Sustainably Cost Efficient*, as it offers a solution that will provide foresight into the future costs of ILI projects, ultimately allow us to deliver the long term program more efficiently. However, the deliverability risk and cost impact associated with the accelerated program would not align with this objective.

B.1.3 Option 3 – Cease the alteration and pigging program

This option involves ceasing the alteration and pigging program following the completion of the minor works for projects in their completion phase.

Cost assessment

The estimated direct cost of this option is $0.82 million in capex and $4.20 million in opex. This estimate is based on our historical experience and current material and labour rates and is supported by independent cost verification reports.

Table Appendix 9: Option 3 – Cease alternation and pigging program 2023/24 to 2027/28, $'000 real 2021

Program	2023/24	2024/25	2025/26	2026/27	2027/28	Total
Pipeline modification	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	318
Tool data verification	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	500
Miscellaneous works	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	500
Total capex	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	**1,318**
Pigging	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	3,460
Marker post replacement	39	39	39	39	39	195
Total opex	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	**3,655**
Total expenditure	**2,637**	**1,919**	**139**	**139**	**139**	**4,973**

A more detailed breakdown of cost components is provided in the CNC Project Management Pigging Plan Report.

Risk assessment

Pursuing this option will result in an overall risk outcome of high, consistent with the untreated risk. This is because MGN failing to make its TP pipelines piggable (where practicable to do so) is inconsistent with our compliance obligations. A loss of containment event will bring a higher level of scrutiny and concern from the technical regulator. Even though we would have a low impact from a people and supply perspective. This is not a desirable outcome and is not consistent with the requirements of our risk management framework.

This option is not consistent with the requirements of our risk management framework, does not meet the test of a prudent asset manager and results in an increased operational risk over time if there is no action taken now.

Table Appendix 10: Risk assessment – Option 3

MGN Operational Risk Matrix							
	People	Supply	Environment	Reputation	Financial	Compliance	Risk
Likelihood	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	High
Consequence	Severe	Severe	Minor	Severe	Minor	Major	
Risk Level	Intermediate	Intermediate	Low	Intermediate	Low	High	

Alignment with vision objectives

The following table shows how Option 3 aligns with our vision objectives.

Table Appendix 11: Alignment with vision – Option 3

Vision objective	Alignment
Delivering for Customers – Public Safety	N
Delivering for Customers – Reliability	N
Delivering for Customers – Customer Service	N
A Good Employer – Health and Safety	N
A Good Employer – Employee Engagement	-
A Good Employer – Skills Development	N
Sustainably Cost Efficient – Working within Industry Benchmarks	N
Sustainably Cost Efficient – Delivering Profitable Growth	-
Sustainably Cost Efficient – Environmentally and Socially Responsible	N

Option 3 would not align with our objective of *Delivering for Customers* as it would simply not allow MGN to operate at a higher level of asset integrity. A loss of containment event has the possibility of causing a potential supply interruption to customer and this has a negative impact on the system reliability and customer service.

[redacted]

Glossary and definitions

The table below is a comprehensive list of asset management terminology and acronyms commonly used at AGIG. Note not all these terms may appear in this document.

Term	Meaning
AA	Access arrangement
ACIF	Australian Construction Industry Forum
AEMO	Australian Energy Market Operator: Responsible for the administration and operation of the wholesale national electricity market in accordance with the National Electricity Code.
AER	Australian Energy Regulator: Responsible for the economic regulation of energy networks.
AGIG	Australian Gas Infrastructure Group
AGN	Australian Gas Networks
AHC	Australian Hydrogen Centre
ALARP	As low as reasonably practicable
AMP	Asset Management Plan
AMS	Asset Management Strategy
ARS	Ancillary Reference Service - Standard services offered by Multinet Gas at fixed charges
AS/NZ	Australian/New Zealand Standards
AUS EX	Australian Program for the Certification of Equipment for Explosive Atmospheres
Available testing	Testing of a non-faulty meter returned from the field less than 10 years old from purchase or repair tested in a meter testing facility before being re-installed in the field to complete its in-service life.
Capex	Capital expenditure
Cathodic protection	Prevention of corrosion by application of direct electric current to the surface of a metal.
Cathodic protection unit (CPU)	A device providing cathodic protection current, powered from an external energy source. Such energy sources include mains power, solar, etc. Cathodic protection units require permits and registration in accord with the Electricity Safety (Cathodic Protection) Regulations 2009
Cathodically protected	An electrically isolated area within the distribution system, of size convenient and practicable for assessing and maintaining the effectiveness of corrosion protection

Term	Meaning
(Distribution) area	
CI	Cast iron
Coating quality survey	A survey conducted by traversing directly above a coated main along its length using equipment and techniques designed to identify any defects in the coating. Methods in common use include "Pearson" and Direct Current Voltage Gradient (DCVG)
Coil (Electromagnetic coil) Survey	An electromagnetic tracing technique for locating points of failed insulation or electrical contact to other metallic structures.
Corrosion	The deterioration of metal caused by its electrochemical reaction with its environment
CP	Cathodic Protection
CPU	Cathodic Protection Units
CTM	Custody Transfer Meter. A large capacity meter installed at every injection point from the DTS to MGN's network.
Current AA period	Jan 2018 to June 2023
Data logger	Interval metering equipment that counts pulses from the mechanical meter index and records gas volume.
Direct Current Voltage Gradient (DCVG) Survey	A type of coating quality assessment survey conducted by traversing above the pipeline using equipment that applies pulsating DC electrical signals to identify coating defects.
Drainage Bond	An electrical connection via cable from a point in the distribution system to tram or train substations to prevent adverse effects from stray currents. These installations include equipment to control the direction and magnitude of current flowing.
DTS	Declared Transmission System
EDMI	Meter manufacture and supplier to MGN
EFT	Economic Feasibility Test
Electrical isolation	The electrical separation of structures to be protected from other structures and/or electrical systems. This is achieved by the installation of insulating flanges, monolithic insulating joints and insulating couplings
ESV	Energy Safe Victoria. A government body responsible for the safety and technical regulation of energy networks in Victoria.
FIRB	Foreign Investment Review Board

Term	Meaning
FLE	Field Life Extension. Alternative name for Sample Testing Program/in-service compliance testing of diaphragm meters <30m3/hr.
Flow corrector	Interval metering equipment which can correct gas flow to energy with the help of live pressure and temperature values.
FY	Financial year
Galvanic (Sacrificial) anode	A block of metal which provides protection by preferentially sacrificing itself instead of allowing the steel to corrode.
Gas meter	Mechanical device (usually) used to measure the volumetric flow rate of gas that passes the device. The volume of energy that passes through the meter is dependent on both gas pressure and temperature when the volume is measured
GDSC	Gas Distribution System Code
GFC	Gas and Fuel Corporation
GFCV	The Gas and Fuel Corporation of Victoria
GIS	Geographic Information System
GJ	Giga Joule, 1 Giga Joule = 1,000,000 Joules
GPC	Group Pressure Control
GPRS	General Packet Radio Services
GSC	Gas Safety Case
GSM	Global System for Mobile Communications
HDPE	High density polyethylene
HP	High pressure (140 to 515 kPa)
HP2	High pressure 2 (600 to 1050 kPa)
I&C	Industrial and Commercial
IEC EX	International Electrotechnical Commission System for certification to Standards Relating to Equipment for Use in Explosive Atmospheres
ILI	In line inspection
Interval meter site	Installation which is large enough (with respect to gas usage) to warrant the use of hourly metering data via a data logger of flow corrector.
IO	Input output

Term	Meaning
kPa	KiloPascals
L&G	Landis & Gyr – Meter manufacture and supplier to MGN
Large meter	Meter with capacity greater than >10 sm^3/hr.
LP	Low pressure (1.4 to 7 kPa)
MAOP	Maximum allowable operating pressure
Meter family	A group of the same meter brand and type installed in the same calendar year.
Meter type	Refers to the technique employed to measure gas flow i.e. Rotary, Turbine, Diaphragm.
MG	Multinet Gas
MGN	Multinet Gas Networks
MHQ	Maximum Hourly Quantity
MIBB	Market Information Bulletin Board
MP	Medium pressure (35 to 210 kPa)
MPE	Maximum Permissible Error
NATA	National Association of Testing Authorities
NCC	Network Control Centre
Next AA period	July 2028 to June 2028
NGL	National Gas Law
NGR	National Gas Rules
NMI	National Measurement Institute
Non-reference Service	Non-standard services offered by MGN provided at fair and reasonable cost.
OEM	Original Equipment Manufacturer
OMSA	Operational and Management Services Agreement between MGN and Service Provider
Opex	Operating expenditure
PE	Polyethylene
PIG	Pipeline Inspection Gauge

Term	Meaning
PMC	Periodic meter change
PVC	Poly vinyl chloride
RAB	Regulated asset base
RF	Radio Frequency
RTU	Remote Telemetry/Terminal Unit
Sample testing program	Annual program whereby sample meters from each meter family population are tested as per AS/NZS 4944 to determine their on-going or extension to their in-service life in the field
SAP	An Enterprise Resource Planning tool which used recording asset data and maintenance management.
SCADA	Supervisory control and data acquisition
SEPP	State Environment Protection Policy
Shared assets	Shared network assets – for example, Mains in the street
SIOS	SCADA Input Output Schematic
sm^3/hr	Standard cubic meters per hour (either Gas or Air).
Small meter	Meter with capacity less than 10 sm^3/hr. Normally used for Residential (domestic) purposes.
SMS	Safety Management Study
Spot potential reading	A measurement of pipe-to-soil potential taken at a given location at a particular point in time. Such readings can be used to assess protection status where potentials do not vary with time. However, in circumstances where potentials fluctuate due to telluric or stray current influences, recordings of potential over a period of time (usually 24 hours) are necessary
Stray current electrolysis	Is the effect of stray currents on buried metallic structures
Tariff D	Tariff D applies to customers using greater than 10,000 GJ a year or more than 10 GJ MHQ.
Tariff L	Tariff L is open to customers who consume more than 1,000 GJ per annum or less than 10,000 GJ per annum and have an MHQ demand of less than 10 GJ per hour.
Tariff V	Applies to customers using less than 10,000 GJ a year and less than 10 GJ MHQ.
Test point	A conveniently located termination point for electrical cables connecting to a buried pipeline. This allows measurement of the pipeline potential, and is the principal method of assessing the effectiveness of corrosion protection. Test points are also required for coating quality surveys and electromagnetic coil surveys to investigate losses in protection

Term	Meaning
Thyristor drainage unit (TDU)	Electrical equipment, usually installed in tram or train substations, to provide sufficient negative voltage for drainage bonds to be effective. The output voltage of TDUs is normally controlled so as to vary in accord with substation load
TJ	Terajoule
TP	Transmission Pressure (Pressure Range: Above 1050 kPa)
UAFG	Unaccounted for gas
UPS	Unprotected steel
Variable conductance drainage bond (VCDB)	Electronic equipment used to control the current in a drainage bond. The output current of VCDBs is normally controlled to maintain a set level of protection on a structure
Victorian Electrolysis Committee (VEC)	The Victorian Electrolysis Committee comprises membership of all parties affected by or causing stray current electrolysis. It is responsible for co-ordination of testing and adjustment required to maintain effective protection from stray currents and to control interference between adjacent cathodic protection systems. It is also responsible for administration of cathodic protection permits and regulations under the authority of Energy Safe Victoria.