# GAS DISTRIBUTION

## ASSET MANAGEMENT PLAN – 2016

Dear Stakeholders

Welcome to the First Gas Limited gas distribution Asset Management Plan (AMP) for 2016. This is our first formal asset management disclosure since we took control of our gas network assets from Vector Limited earlier this year. We have also published an AMP for our gas transmission system.

We have been in a transition period as we transfer operational control of the assets, appoint a management team and put supporting functions in place. This process is well underway, with our team progressing a number of important new initiatives.

Notwithstanding the effort required for this transition, we believe it is important to produce AMPs that clearly communicate the progress we have made to date and our future plans for managing the network. In doing so, we have sought to reflect recent discussions with the industry and our regulators on the information that they would like to see in our AMPs and how our disclosures can most effectively convey information to our stakeholders.

While our AMPs are still a 'work-in-progress' and further improvements will be made over time, we have tried to ensure they are accessible and easy for a wider range of stakeholders to use. We want to produce AMPs that are a valuable resource for our customers, staff, and regulators, and that they clearly set out the issues facing our networks and how we plan to respond. We welcome your feedback on how well our AMPs achieve these goals.

This AMP presents our plans for managing and investing in critical distribution network assets over the next ten years. It focuses on a number of key priorities aimed at ensuring that we provide a secure, reliable, and efficient supply for our customers. In achieving these priorities, we will not compromise on our efforts to ensure the safety of our staff and the general public. Safety is always our foremost priority.

In addition to ensuring safety, significant themes and initiatives in this AMP centre on providing the level of supply security that our customers expect through active risk identification, monitoring and management. In some areas, such as managing integrity risks, this requires us to carry out more work than has historically occurred on our networks. Planned investments, such as our pre-1985 polyethylene pipe replacement programme, also reflect our assessment of the need to respond to identified security risks in a timely way.

I trust you will find our AMP to be an informative and valuable resource. We welcome your feedback on the content of this AMP and look forward to continuing to work with you to build a greater understanding of how our assets are managed for the long-term. Please forward your comments to me (paul.goodeve@firstgas.co.nz).

**Paul Goodeve**

Chief Executive

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# 1. EXECUTIVE SUMMARY

This is the First Gas Limited (First Gas) gas distribution Asset Management Plan (AMP) for 2016. It is our first formal asset management disclosure since we purchased the non-Auckland gas distribution assets off Vector Limited earlier this year.[1]

We have set out to prepare an AMP that builds on the asset management capability and knowledge we acquired when setting up First Gas. We expanded on this capability by bringing in fresh perspectives on how to maximise the value provided by the gas distribution network and ensure it provides a secure and reliable service well into the future.

The AMP covers a ten-year forecast period from 1 October 2016 through to 30 September 2026 (planning period). This aligns with our October to September financial year. The expenditure forecasts presented in this AMP are expressed in constant 2016 prices (unless otherwise stated).

## First Gas is New Zealand's new gas distribution utility

We are a privately-owned utility with a single institutional shareholder – First State Investments. First State Investments is part of the Commonwealth Bank of Australia group and is a leading global infrastructure asset manager. It has approximately $7 billion of equity invested in infrastructure assets across Australia, New Zealand and Europe.

On 20 April 2016, First Gas took control of Vector Limited's gas distribution assets located outside Auckland. As a result of this transaction, we now supply over 60,000 customers with natural gas throughout the North Island of New Zealand.

As we explain further in the introduction to this AMP, we believe a focus on gas brings significant advantages. It better aligns commercial incentives to increase the penetration of gas in New Zealand. There is also an opportunity to add new capabilities to our team to drive growth in the use of gas.

We have around 150 staff based in our corporate headquarters in New Plymouth, with small teams located in Wellington, Palmerston North and Hamilton and our field service provider has approximately 70 staff working for us. Our executive team is headed by our Chief Executive, Paul Goodeve.

## We aim to increase the competitiveness of gas

For most customers, gas is an optional fuel choice. Unlike electricity, which is universally used by households and businesses, reticulated natural gas is not a necessity in New Zealand.[2] This means that gas must be cost-effective and will often need to be actively marketed to compete with other energy options.

One of our goals is to actively promote the use of gas and to maximise the value obtained from our gas networks. We are free from any competing commercial interests in other forms of energy (such as electricity), which provides focus to our efforts to ensure that gas is a competitive fuel source for New Zealand industry, businesses and homes. We strongly believe that gas is an attractive fuel source, and can compete for an even greater share of the energy market than it currently has in New Zealand.

We believe that having more customers, with more diverse needs, will make our business more resilient – and will ultimately lead to more competitive prices for our customers.

[1] We also own gas transmission assets. We have published a separate AMP on our transmission network.

[2] There are exceptions to this, particularly industrial users that rely on gas as a feedstock for their production processes.

## We are transitioning control of the systems from the previous owners

First Gas is a new organisation, but we have inherited asset management knowledge and capability from the previous owner of the distribution network. Since completing the purchase, we have been in a transition period, progressively taking control of asset management activities and related services on the network.

To ensure continued service during the transition period, we have put in place a number of support arrangements. Asset management functions have largely transitioned with relevant personnel transferring directly from Vector Limited to First Gas on 20 April 2016. A focus throughout the transition has been on maintaining maintenance support and key safety functions.

A key milestone for our business occurred at the end of August 2016 when we separated our IT systems from transitional support. Our systems are now being 'bedded in' and we are working to ensure they quickly reach their full potential. Corporate functions such as pricing and regulation will continue to receive transitional support until the end of 2016.

Over the coming months we will continue to assess current asset management approaches, particularly those relating to risk and security. This process is underway and we expect to put in place a number of initiatives following discussions with stakeholders. These initiatives will allow us to better integrate the management of our transmission and distribution assets over the medium-term.

We are a young company with a bold vision for gas distribution in New Zealand. We have drafted this first AMP from the perspective of not yet having all of the answers, but wanting to signal our intended future direction so that stakeholders can make a valuable contribution to our planning processes. We hope that this approach will prove useful for our customers and other parties that are keen to see our gas distribution network operated efficiently and effectively.

## We have developed this AMP to be useful for stakeholders

Notwithstanding the effort required to transition asset ownership we believed it was important to produce this AMP to inform stakeholders on our progress and our evolving plans for the distribution network. In doing so, we have sought to reflect our understanding of the industry and our regulators on what they would like to see in our AMPs.

In drafting this AMP, we have sought to prioritise its usefulness to stakeholders. We have tried to simplify it the document compared to previous versions and have attempted to make it more accessible to general readers. We also recognise that the expenditure forecasts presented in this AMP need to explained clearly, given that they will be used to inform the Commerce Commission for of our planned expenditure over the next regulatory DPP reset period (2017-2022).

## Effective stakeholder engagement underpins our asset management

As a regulated utility managing critical assets, we have a large number of internal and external stakeholders with an active interest in how our assets are managed. Our key stakeholders and their interest are discussed in Chapter 2.

We aim to consult openly and constructively with stakeholders, particularly on reliability of supply issues and our planned investments. This will include informing them on how we intend to manage the gas distribution network. We intend to help stakeholders understand our asset management approach by providing clear descriptions of our assets, key strategies and objectives.

We have begun to engage with stakeholders through a range of discussions and initial feedback suggests that a simple AMP with clear explanations and a focus on risk, security and reliability is appropriate.

We plan to use this and future AMPs to explain our asset management decisions and approach. We intend to provide enough detail to explain our plans and decisions, but also make it a document our customers can easily follow.

## We will prioritise supply security

One of our key focuses in the coming year will be to develop our analysis regarding the replacement of pre-1985 polyethylene pipe. We are doubling previous expenditure in this area and to further understand the risk we intend to conduct our own engineering investigation into this phenomenon and from that analysis confirm our replacement approach.

## We are promoting the growth of gas usage

We believe that increased gas usage is good for our customers (as a direct energy source), good for First Gas (as it increases utilisation) and good for New Zealand (as an efficient competitor to electricity). We intend to actively promote the benefits of gas across out networks and will be a strong advocate for gas as an energy source in the regulatory sphere.

## Service quality indicators cover a range of outcomes

In order to continually monitor our quality of service, we have established a range of key performance indicators (KPI) to drive our focus on continual improvement of customer outcomes. These KPI cover a range of operational areas including: safety, security and reliability, environment, compliance, communication, value and decision making. Overall, we want to be able to demonstrate improved performance and lower levels of risk by carrying out the activities set out in this AMP.

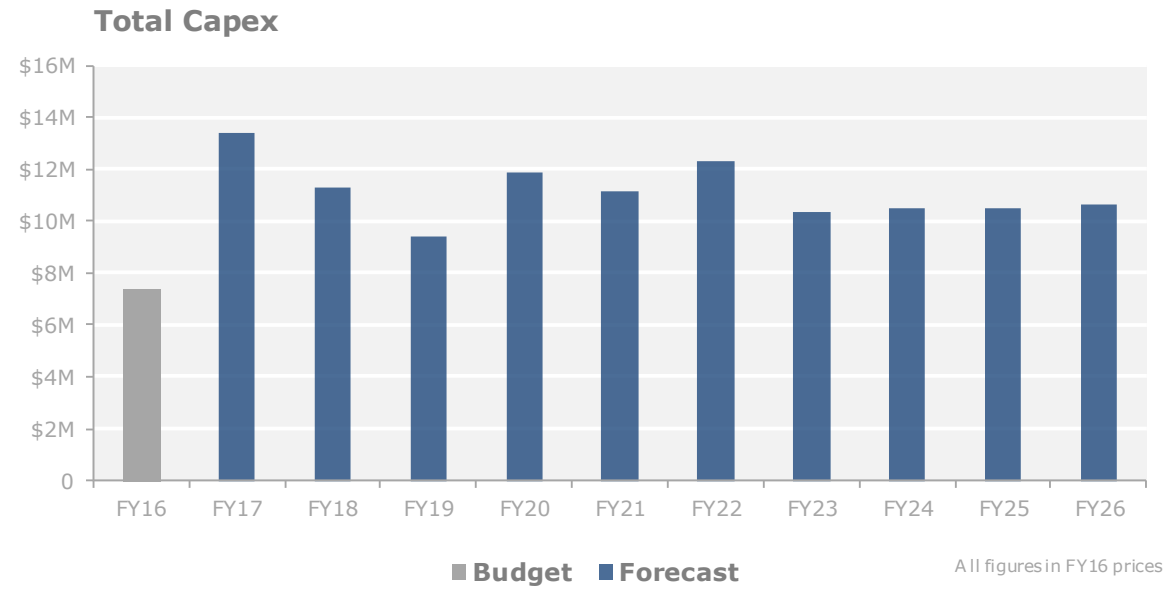
## Planned Capital and Operating Expenditure

This AMP sets out our planned investments in our gas distribution network over the planning period. These investments are required if we are to develop the system to meet demand, renew assets at risk of failure and undertake necessary maintenance. This includes the necessary support functions that allow us to provide a safe, secure and valued service to customers.

**Capital Expenditure**

A breakdown of forecast capital expenditure (Capex) for the planning period is shown below. It shows that 'steady state' Capex for our distribution network is in the region of $10-$11 million per year.

Figure 1: Total Capex Forecast



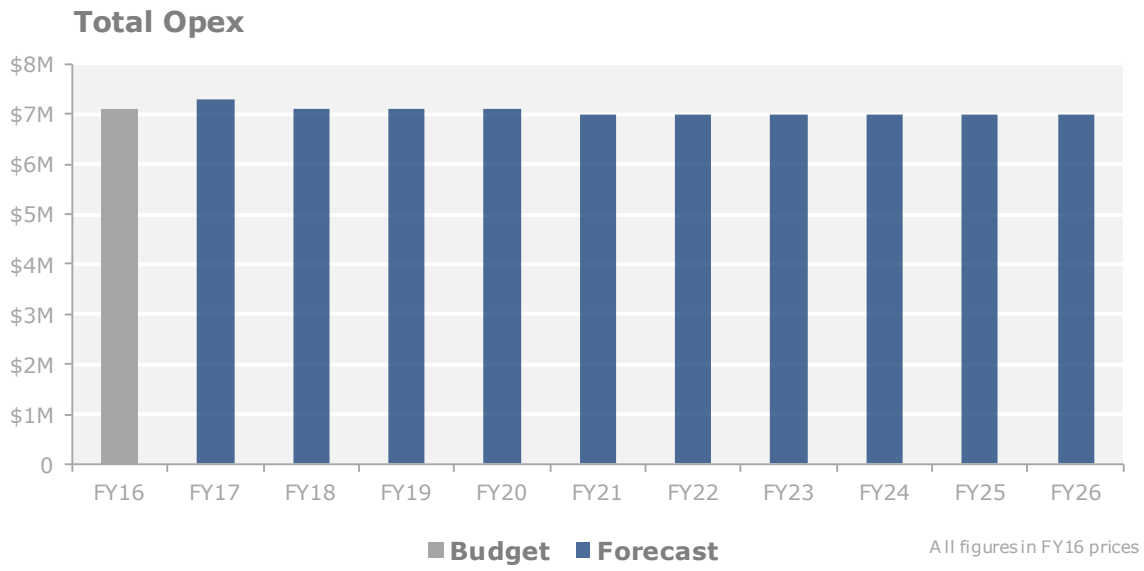
There are a number of Capex investments that are driving this level of investment over the period, these are:

- **Mechanical coupling / small pipe replacement on Hamilton MP4 steel network:** mechanical coupler joints were prevalent on the Hamilton network in the 1970s and early 1980s when the majority of the MP4 steel pipes were installed. These couplers have the potential to cause of leakage due to corrosion (i.e. of the fitting and/or pipe) or movement of the pipe within the coupler. A programme has been implemented to identify and remove mechanical couplers on our network.
- **Hamilton cathodic protection:** following the completion of the initial stages of the Hamilton MP4 cathodic protection (CP) system upgrade programme, a problem with the electrical continuity of some steel service connections within the upgraded areas was identified. Following investigations into the cause of the issue, a five year programme (FY15 to FY19) to restore CP to the remainder of the Hamilton MP4 steel service pipes is now underway.
- **HIJ riser valve replacement:** prior to the introduction of ball valves in the early 1990s, a plug type riser valve was used for residential and small commercial connections. Because of its mechanical design, this type of valve is prone to seizing and gas escapes. A replacement programme is underway.

**Operational Expenditure**

A breakdown of forecast operational expenditure (Opex) is shown in the figure below. Unlike Capex, our Opex is not influenced by significant one off, lumpy projects and is expected to remain broadly in line with current levels of expenditure.

Figure 2: Forecast Total Opex




There are a number of activities that will require increased levels of Opex to ensure we can meet our asset management objectives. However, we will look to find efficiencies in our operations in order to fund these activities without adding cost to our customers. Some examples of these activities are:

- **AS/NZS 4645 compliance:** we are transitioning towards a greater compliance with AS/NZS 4645. This will require a review of all our maintenance standards and practices as we move away from the historical NZS 5258 and is will to require a set of new activities that will be incorporated into our maintenance approach.
- **Quality:** we are intending on increasing the amount of auditing and quality checks that we carry out on our service providers. This auditing will cover health and safety, environmental aspects and compliance with our operations, construction and maintenance standards.

Following a detailed review, we have determined our expenditure requirements over the planning period using a prudent risk-based approach informed by our preventative and corrective action databases. The activities planned are considered appropriate to ensure a safe and reliable supply of gas to our customers.

Removing the impact of major projects, the expenditure forecasts presented in this AMP are broadly consistent with expenditure forecasts found in previous AMPs disclosed by Vector. We note that actual expenditure in recent years has generally been lower than originally forecast and this has likely contributed to the current need to address outstanding issues in a timely manner. Addressing this legacy issue through the increased investment signalled in this AMP will help to ensure that network integrity risks are mitigated to a level acceptable to customers.

## Conclusion

We are committed to ensuring we deliver the secure and cost-effective service our customers require. There is much to be done over the coming years to achieve these outcomes. Completing the operational transition of the systems and ensuring we have sufficient levels of asset management competency and appropriate support systems is an important first step.

We have sought to ensure that stakeholders can be confident that our forecast expenditure is driven by genuine needs and that it is efficient and appropriate. Our forecasts reflect our best estimate of the efficient and prudent costs needed to meet our objectives. They have been developed using the best information available and reasonable assumptions. The work programmes have been tested against potential delivery risks and where appropriate we have sought specialist advice to test our approaches and assumptions.

We need to work closely and openly with our customers and other stakeholders to ensure we understand their needs and that they understand our asset management approach. This AMP represents a key first step in this process, and will form the basis for discussions with stakeholders. We hope that our customers and other stakeholders find it useful in informing their decisions and building their understanding of our network.

# 2. INTRODUCTION

This is the first Asset Management Plan (AMP) for gas distribution released by First Gas Limited (First Gas). We have prepared an AMP that builds on the asset management capability we acquired in setting up First Gas, while reflecting new perspectives on the value and future of the gas distribution network.

This chapter introduces the 2016 AMP for the gas distribution assets owned by First Gas. It sets out the purpose and scope of the AMP, and who should read it. The chapter also provides an overview of our key stakeholders and how we address their needs in our asset management decisions. Finally, it explains the structure of the AMP.

## 2.1. INTRODUCING OUR 2016 AMP

Below we introduce our 2016 AMP by explaining its purpose, the period of time it covers, and a brief description of its scope.

### 2.1.1. PURPOSE OF THE AMP

The purpose of our AMP is to describe the asset management processes that we use to manage our gas distribution network and its assets. This AMP explains how we intend to manage these assets over the next 10 years (the planning period) to achieve our asset management objectives and meet stakeholder expectations.

This is our first AMP disclosure under the Commerce Commission's Information Disclosure regime. This document is somewhat transitional in nature given the fact that First Gas is a new company and has initially been focused on ensuring the hand-over of asset management practices and capability from the previous owner. We are keen to continuously improve our asset management disclosures and welcome feedback on this AMP.

Through this AMP we want to communicate how we will achieve the following important objectives:

- **Safety commitment**: explain that the safety of our staff, service providers and the general public is paramount.
- **Engaged stakeholders**: consult with our stakeholders, particularly on our planned investments, and inform stakeholders about how we intend to manage the gas distribution network. This requires us to provide clear descriptions of our assets, key strategies and objectives.
- **Performance accountability**: provide visibility to stakeholders on how we are performing and provide information on the performance of our network.
- **Informed staff and contractors:** provide guidance and clarity on our asset management approach to staff and service providers to ensure a common understanding and adequate resourcing.
- **Investment planning**: provide visibility of forecasted investment programmes and upcoming medium-term construction works, with a clear rationale as to why planned investments are the best way to meet service requirements.
- **Regulatory compliance:** ensure we meet our Information Disclosure obligations set by the Commerce Commission.

### 2.1.2. Period Covered by the AMP

This AMP covers the ten-year period from 1 October 2016 through to 30 September 2026 (the planning period). First Gas operates on an October to September financial year. All asset management and financial reporting is carried out on this basis.

#### Approval Date

The AMP was approved by our Board of Directors on 28 September 2016.

### 2.1.3. Scope of the AMP

The AMP sets out our planned investments in our gas distribution network during the planning period. It explains how we will develop our network, renew our asset fleets and undertake maintenance to provide a safe, reliable and valued service to customers.

Expenditure forecasts and planned projects over the ten-year planning period are based on analysis of customer, system and asset information and reflect a relatively high degree of accuracy (to the extent reasonably possible) in the descriptions and forecasts. Capex and Opex forecasts are set out in the AMP, and provide important inputs to our annual business plan.

### 2.1.4. Structure of the AMP

Our 2016 AMP has been developed to meet the objectives listed earlier in this chapter. It reflects the transitional nature of our business, so a number of sections reflect material used in Vector's 2015 AMP.

The diagram below sets out the structure of our AMP. Appendix I maps the chapters and appendices to relevant Information Disclosure requirements.

**Figure 3: Structure of our 2016 AMP**

| | |
|---|---|
| Chapter 3 | **Network Overview**<br>Provides an overview of our network and information on our main asset fleets. |
| Chapter 4 | **Asset Management Approach**<br>Explains our approach to managing our gas distribution assets. |
| Chapter 5 | **System Development**<br>Provides an overview of our approach to developing our network and our key investments. |
| Chapter 6 | **Asset Lifecycle Management**<br>Provides an overview of our renewals and network Opex over the AMP planning period. |
| Chapter 7 | **Asset Management Support**<br>Discusses the non-network and functions that support our asset management activities. |
| Chapter 8 | **Expenditure Overview**<br>Provides a summary of our forecasts over the AMP planning period. |

## 2.2. Overview of First Gas

This section introduces our business and provides a brief overview of our gas distribution assets.

### 2.2.1. Corporate and Organisation Structure

First Gas is owned by First State Funds, part of the Commonwealth Bank of Australia's group of companies. First State Funds comprises two infrastructure funds managed by First State Investments. First State Investments (known in Australia as Colonial First State Global Asset Management) is a leading global infrastructure asset manager, with approximately $7 billion of equity invested in infrastructure assets across Australia, New Zealand and Europe.

On 20 April 2016, First Gas took control of Vector Limited's gas distribution assets located outside Auckland (along with Vector's gas transmission assets). Our corporate headquarters are in Bell Block, New Plymouth, with our Commercial and Regulation Team based in Wellington. We also have regional field teams based in Hamilton and Palmerston North.

The creation of First Gas has resulted in a company with a sole focus on gas related assets. We believe that this focus will deliver three distinct advantages for gas industry participants and consumers:

- A strong commercial interest in maximising the competitiveness of gas
- An opportunity to add new capabilities to our team to drive growth in the use of the gas distribution network
- An ability to operate the gas distribution network and manage our assets in ways that better serve the interests of our customers

**A strong commercial interest in maximising the competitiveness of gas**

For many of our customers, gas is a fuel of choice. Unlike electricity, which is universal across New Zealand households and businesses, reticulated natural gas is often considered an option rather than a necessity.[3] This means that gas often needs to be actively marketed to compete with other forms of energy in New Zealand.

First Gas is uniquely placed to promote the use of our gas distribution network. We do not have commercial interests in other forms of energy (such as electricity), and we therefore need to ensure that gas is a competitive fuel source for New Zealand industry, businesses and homes. We also genuinely believe that gas is an attractive fuel source, and can compete for an even greater share of the energy market than it currently has.

Our focus on gas directly affects our approach to asset management through a strong desire to investigate and convert growth opportunities in gas distribution. We believe that having more customers, with more diverse needs, makes our business more resilient – and ultimately leads to more competitive prices for our customers when accessing and using the distribution network.

**An opportunity to add new capabilities to our team to drive further growth**

The creation of First Gas has also provided opportunities to enhance the skills and capabilities of the team that plans and delivers gas distribution services. The most direct way that this opportunity is being seized is through the joint venture that First Gas has entered into with OSD Limited (OSD), known as Gas Services. The joint venture will deliver a range of technical services to First Gas, providing both greater skills and added accountability for performance.

Value from Gas Services is achieved by combining the technical and commercial focus of the OSD service provider culture with the asset specific knowledge and experience within First Gas. Gas

[3] There are important exceptions to this, with some industrial users reliant on gas as a feedstock for their production process. Other users have made significant investments in gas-fired equipment that also limit their ability to choose other energy sources.

Services provides access to a larger management and technical team with experience across multiple assets in multiple jurisdictions. Gas Services can also provide additional resources to better manage resource gaps and peaks in workload.

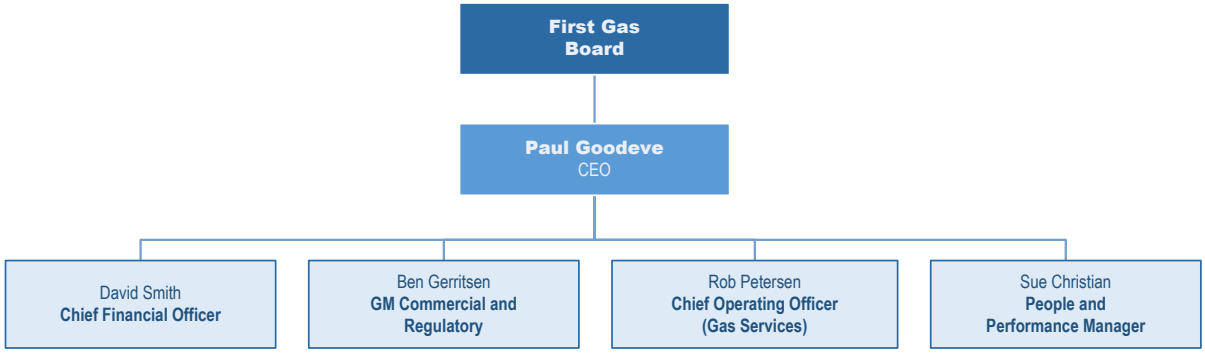
The operating and maintenance services are provided under the management of the Chief Operating Officer (COO) and includes:

- Health, safety and environmental management
- Major project delivery
- Engineering and procurement
- Asset management
- Distribution operations and maintenance services
- Transition programme management, and the transition team

### Organisation Structure

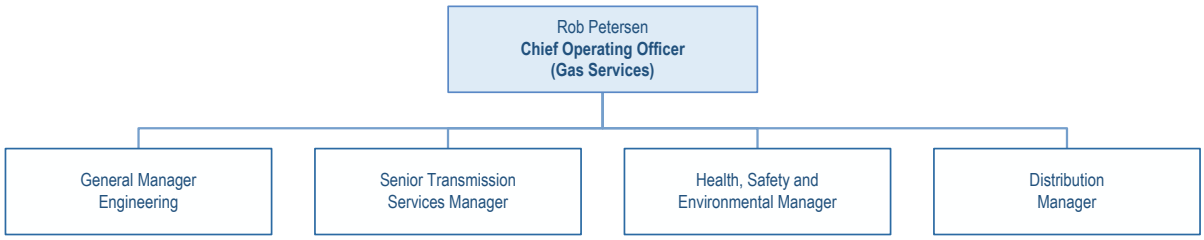
Chief Executive, Paul Goodeve leads the Executive Team and has four direct reports: the COO, the Chief Financial Officer, the General Manager Commercial and Regulation, and the People and Performance Manager. Biographies of our Executive Team are available on our website (www.firstgas.co.nz). Our organisational structure is illustrated below.

Figure 4: Organisation Chart




We have a Gas Services Asset Management Team based in New Plymouth with associated engineering, project management and field delivery teams. These functions all report through to the COO, as shown below.

Figure 5: COO Organisation Chart




Our asset management function sits within the reporting structure to the GM Engineering and includes competency in: asset planning, asset integrity, land management, geo-hazard management, Geographical Information System (GIS) operation and records management. Our contracted distribution field services provider reports through to the Distribution Manager.

## 2.2.2. Transitioning the Management of our Distribution Network

First Gas is a new company, but has inherited systems and capability from the previous owner of the gas distribution assets. We are currently in a transition period while we progressively take control of

all asset management activities and related services on the network. Throughout the transition period, we have made the following arrangements:

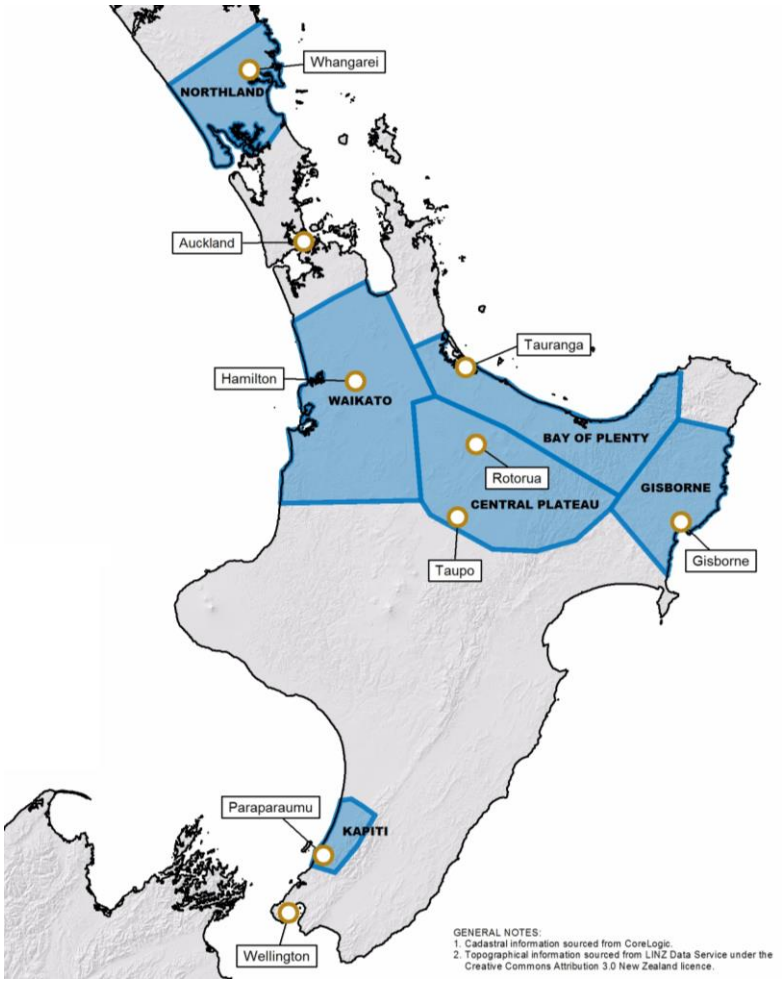
- Asset management functions have largely transitioned through to First Gas with relevant personnel transferring directly from Vector on 20 April 2016. These functions are now being carried out by First Gas.
- Corporate functions such as pricing and regulation are subject to a transition support arrangement with Vector, which will expire at the end of 2016.
- A significant milestone was reached at the end of August 2016 when we physically separated our IT systems from transition support. These new systems are now in the process of 'bedding in' and we are working to ensure they can reach their potential in supplying asset management and operational information. The focus throughout the transition has been on maintaining maintenance support and key safety systems.

We are a young company, with ambitious goals. We have drafted this first AMP from the perspective of not yet having all of the answers, but wanting to signal our intended future direction so that stakeholders can make a valuable contribution to our planning processes.

### 2.2.3. Our Gas Distribution Network

Our network serves the North Island regions of Northland, Waikato, Central Plateau, Bay of Plenty, Gisborne and Kapiti. We have approximately 4,500km of mains pipes servicing 61,500 consumers.

Figure 6: Our Gas Distribution Areas



### Asset Categories

Gas distribution networks are made up of a number of distinct asset types. We use a number of categories to organise our asset base.

- **Distribution pipes**: the network of pipes used to transport gas from the outlet valve of the transmission system, and terminates at the inlet valve on a consumer's gas measurement system (GMS), or gas meter.
- **Pressure Stations**: are used to link two pressure levels in the network through pressure regulators. They are the points of input to a pressure level and are able to maintain a consistent inlet condition to that system.
- **Valves**: are used to isolate the flow of gas within the system when required or to vent gas in the event of an emergency.
- **Corrosion Protection Equipment**: Steel or metallic pipes and equipment installed in the distribution system (either above or below ground) are susceptible to corrosion, and various measures must be employed to ensure the integrity of the asset is maintained.
- **Monitoring Systems:** At various strategic locations throughout our distribution network, monitoring systems are installed to observe and record network data.
- **Special Crossings:** Special crossings are locations where a section of pipe is installed either above or below ground in order to cross over a roadway, river, railway or any area of interest with a differing risk profile from a standard installation.

Further detail on these assets is provided in Chapter 3.

## 2.3. OUR STAKEHOLDERS

As set out above, one of the main objectives of our AMP is to engage our stakeholders in the process of making decisions on our assets. We use the AMP to explain how we plan to manage our gas distribution assets over the planning period.

We intend to provide enough detail to explain our plans and decisions, but also make it a document our stakeholders can easily follow.

### 2.3.1. WHO ARE OUR STAKEHOLDERS?

A large number of internal and external parties have an active interest in how our assets are managed. Our key stakeholders are listed in the following table. Their interests and how we identify and address them is explained in the remainder of this section.

Table 1: Key Stakeholders

| STAKEHOLDER | DESCRIPTION |
|---|---|
| **Consumers** | Our ultimate customers are gas consumers across our network footprint. They include residential, commercial and industrial users that are served through our distribution networks. They want a safe, reliable supply at a reasonable price. |
| **Retailers** | Retailers own the gas that we distribute and have the contracted delivery responsibility with our consumers. They want to understand our security of supply approach across the distribution network, our ability to respond to faults (and to provide them information) and our approach to connecting new customers. |
| **Community** | The communities that host our assets and that may be impacted by the performance of or networks. It is important that we consult effectively with them when planning our activities so we can better understand potential impacts and mitigate these as far as practicable. |

| STAKEHOLDER | DESCRIPTION |
|---|---|
| **Regulators** | Our activities are mainly regulated by three regulatory bodies. The Commerce Commission regulates our distribution service revenues and sets Information Disclosure requirements. The Gas Industry Company sets and monitors compliance with a range of regulations. The Ministry of Business, Innovation and Employment regulates asset integrity and health and safety aspects of our operations. |
| **Our Service Providers** | We outsource operations, fault response, maintenance, capital works, connection services and a number of other roles to a group of 'service providers'. Ensuring sustainable and effective working relationships is important to our overall effectiveness. |
| **Our Staff** | Our staff are key stakeholders in everything we do. Ensuring they have appropriate skills is essential if we are to manage our assets safely and reliably. |
| **Our Shareholders** | Our owners seek financial returns that are commensurate with investment risk. Working with our Board and Executive Team they ensure that we are an effectively managed business with appropriate governance processes. |
| **Other Stakeholders** | Other stakeholders with an interest in our asset management approaches include government ministries, financial institutions, the media and other industry bodies. |

### 2.3.2. IDENTIFYING STAKEHOLDER NEEDS

To be an effective asset manager we need to identify and address the interests of our stakeholders in our decision making. This will help ensure we can offer the right service, with the right quality, at the right price. To do this, we will ascertain our stakeholders' expectations by, amongst other things:

- Meetings and discussion forums;
- Consulting on asset management material, such as this AMP;
- Consumer engagement surveys;
- Consulting with stakeholders involved in the delivery of the asset management requirements;
- Engagement with legislative consultation processes;
- Direct liaison with customers;
- Membership on industry working groups;
- Feedback received via complaints and compliments; and
- Media enquiries and meetings with media representatives.

We then accommodate their expectations in our decision making by, amongst other things:

- Due consideration of the health, safety and environmental impact of our operations;
- Providing a safe and reliable distribution network;
- Seeking to optimise our Capex and Opex with quality of supply expectations;
- Maintaining a sustainable business;
- Communicating all aspects of the asset management framework to stakeholders involved in the delivery of the asset management requirements;
- Compliance with regulatory and legal obligations;
- Network growth and development plans and asset replacement strategies;
- Provision of accurate and timely information; and
- Development of innovative solutions.

We consult with our stakeholders and ensure that clear responsibilities are established inside the company to make sure we properly identify and manage stakeholders' expectations.

## Managing Conflicting Interests

In the operation of any large organisation with numerous stakeholders and diverse interests, situations will inevitably arise where not all interests can be accommodated, or where conflicting interests exist. For example, different customers may place greater or lesser emphasis on price or quality.

From our perspective, situations of conflicting interests are best managed by:

- Clearly identifying and analysing stakeholder conflicts (existing or potential);
- Having a clear set of fundamental principles that help to guide a resolution. We are legally bound to make decisions that are consistent with the distribution operating codes (which include obligations relating to confidentiality) and we need to comply with the Gas Act 1992 and other relevant legislation;
- Seeking solutions that are consistent with the principles found in the codes and in relevant legislation or regulation; and
- Communicating effectively with stakeholders so that all parties know where they stand.

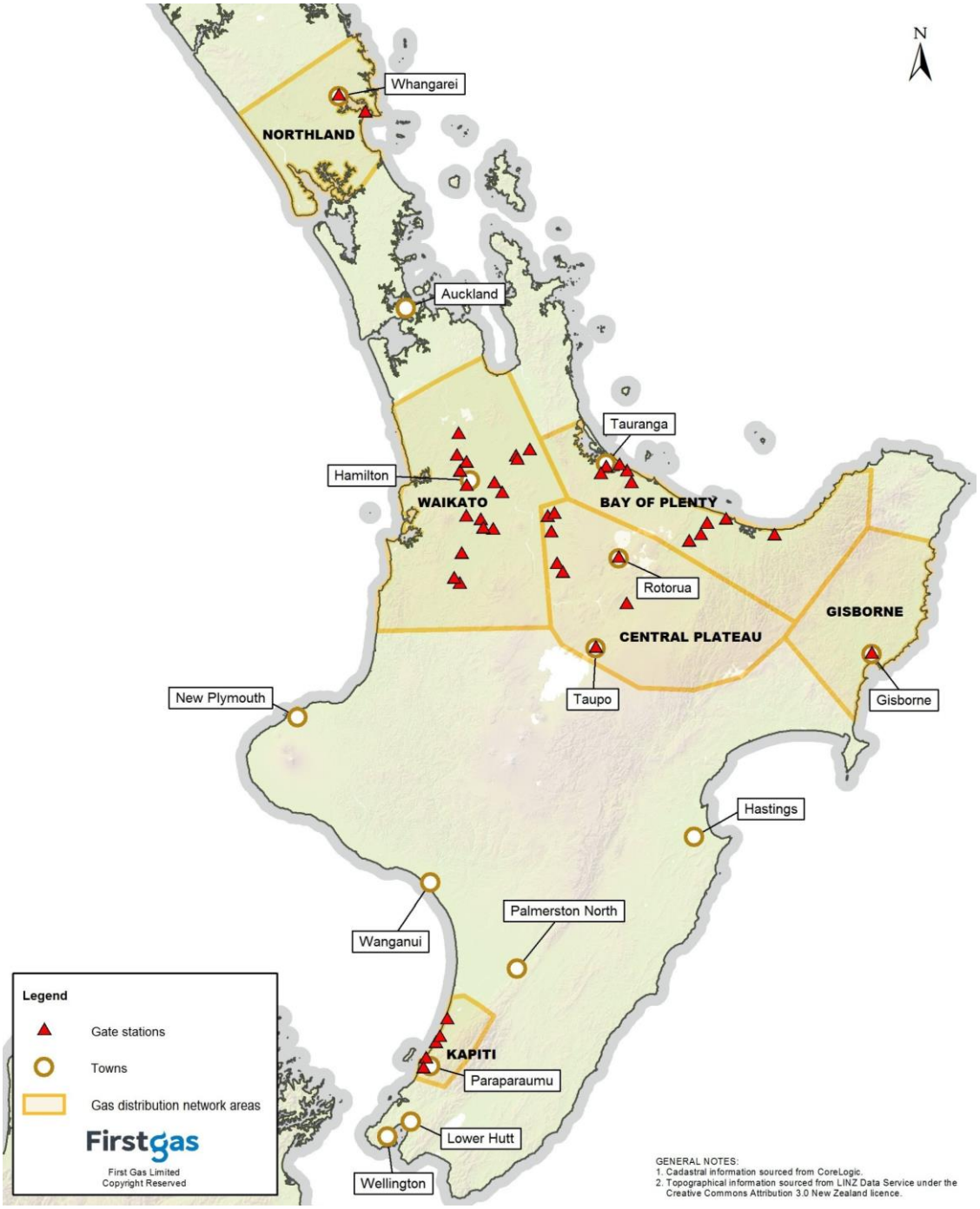
# 3. NETWORK OVERVIEW

This chapter provides an overview of our gas distribution network, including its load characteristics and configuration. It includes descriptions of its main asset types.

## 3.1. OUR GAS DISTRIBUTION AREAS

The map below shows the areas of the North Island where our gas distribution assets are located.

Figure 7: Our Gas Distribution Areas



### 3.1.1. Network Overview

Our network provides gas distribution services to retailers who sell gas to over 60,000 residential, commercial and industrial customers throughout the North Island. We are the third largest gas distributor in New Zealand and supply one in five of the country's gas customers.

Our distribution network covers the regions of Northland, Waikato, Central Plateau, Bay of Plenty, Gisborne and Kapiti. Each of these regions has their own unique capacity and demand requirements, and are connected to the gas transmission system through the First Gas transmission network.[4]

Some key characteristics of these regions and their consumers are:

- **Northland**: predominantly services Whangarei residential consumers, with around 16% commercial/industrial consumers (e g. hospitals, bakeries). One major industrial consumer is located at Marsden Point.
- **Waikato**: majority of the Waikato network services the residential population within Hamilton, servicing approximately 27,000 consumers. Also within the region are several large commercial/industrial consumers, including dairies and poultry farms, along with and several smaller residential settlements.
- **Central Plateau**: predominantly services consumers in Rotorua with 4,000 connection points (ICP), Taupo (2,000 ICP) and Tokoroa (1,000 ICP). The network also services multiple rural centres and multiple medium to large industrial consumers.
- **Bay of Plenty**: predominantly serves residential customers in the Tauranga (4,500 ICP) and Mt Maunganui (4,300 ICP) areas along with other smaller centres and medium to large industrial users. Mt Maunganui has been identified as a potential growth area with major industrial, commercial and urban development expected in the area.
- **Gisborne**: serving the greater Gisborne area, connecting 3,400 consumers. Approximately 10% of these are commercial/industrial gas users.
- **Kapiti**: services approximately 5,300 consumers in the Paraparaumu and Waikanae regions as well as multiple smaller centres further north along the coast.

## 3.2. Key Statistics

The table sets out key statistics for our gas distribution network (as at 30 June 2015).

Table 2: Key statistics for the distribution network

| Statistic | Value |
|---|---|
| **Consumers connected** | 61,499 |
| **System length (km)** | 4,497 |
| **Consumer density (consumer/km)** | 13.7 |
| **District Regulating stations (DRS)** | 129 |
| **DRS density (system km/DRS)** | 34.9 |
| **DRS utilisation (consumers/DRS)** | 477 |
| **Peak load[5] (scmh)** | 49,408 |
| **Gas conveyed (PJ pa)** | 10.2 |

[4] Our transmission assets are separately disclosed in our Gas Transmission AMP

[5] Calculated by adding the coincident load of each system for a calendar year. Measured as standard cubic metres per hour (scmh).

## 3.3. DEMAND ON OUR NETWORK

The capacity of our network is determined by the operating pressure, the size of the pipe and the allowable pressure loss between inlet and outlet. Meshed distribution networks are sized on the same principle, the difference being that pipes are interconnected at several points and can be fed to multiple points rather than running from point to point.

As our distribution network expands and demand grows, the pressure in downstream parts of the network can drop significantly. This has the potential to limit our network capacity, and consequently the delivery of gas to downstream consumers.

Under normal network operating conditions, our quality of supply standard stipulates that the pressure at any point on the network shall be no less than 50% of its nominal pressure, and no more than 10% above its maximum operating pressure. Further details of these standards can be found in Chapter 5.

In order to prevent any excursions from these standards we undertake pressure monitoring surveys and carry out network analysis to identify any areas that are at risk of not meeting our supply standards. This allows us to proactively reinforce networks and ensure operating pressures do not become insufficient.

We break down our distribution network into discrete pressure systems. We position regulator stations strategically around the network to control the pressure of gas entering each discrete pressure system (i.e. intermediate pressure, medium pressure, low pressure systems).

The demand, and subsequent pressure drops, on each of these systems needs to be considered independently. This is due to the meshed nature of the network, and the mix of residential, commercial and industrial consumers.

Demand on our network comes from a combination of consumer types, each with their own requirements and demand profiles.

- **Residential:** consumers typically have peak demand in the morning and evening, bookending the standard work day where consumption is low. Residential consumers typically use gas for hot water, heating or cooking, and use around 20 – 30 GJ of gas per year.
- **Commercial and industrial:** loads are typically consistent for the whole day. These users can range from small restaurants and office buildings, to large scale industries, such as dairy processing. These users can consume anywhere from 30GJ to over 50TJ per year.

Within our network we are able to achieve a measure of load levelling, with commercial and industrial customers providing a consistent load demand in between the residential peaks. We use pressure data collected as part of the monitoring program to identify the load characteristics of our networks. This allows us to model the load profile for different consumer types.

### 3.3.1. PEAK DEMAND AND GAS CONVEYED

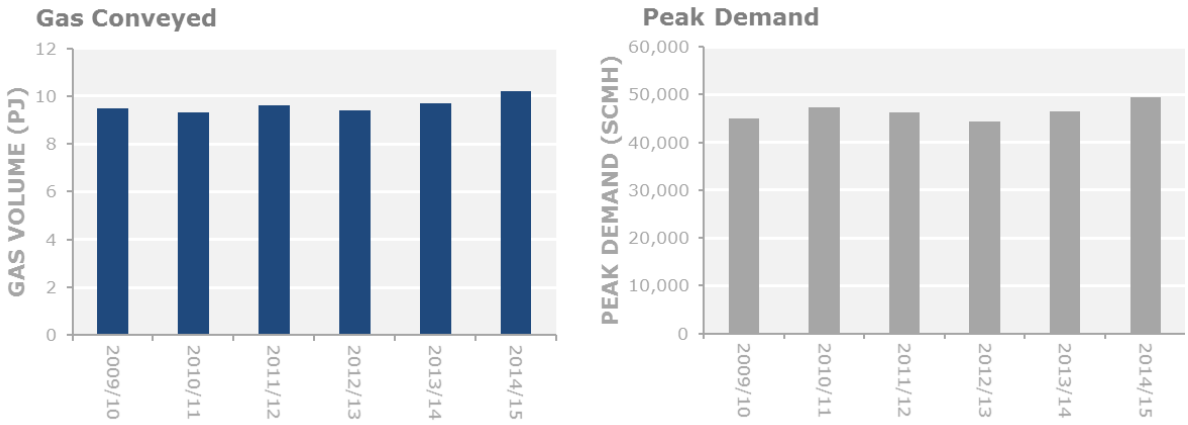
Historical trends show long-term gas demand is mainly influenced by local economic activity, the price and availability of substitute fuels (e.g. electricity, fuel oil etc.), population and household growth, and investment decisions made by large industrial and commercial consumers.

In the short-term, demand is very sensitive to climate. A cold snap, for example, can drive up the demand for gas significantly. Conversely, a warm winter can result in a considerably lower demand.

Historical data, after normalising for year-on-year variances, shows a reasonably steady demand trend. Any unusually high peak demands that occur due to extreme weather conditions ordinarily represent only a small percentage of hours in a year.

The peak demand[6] on our gas distribution network, and the quantity of gas conveyed for the past six years is shown below[7]. This data shows the coincidental peak demands of all gate stations delivering supply to our gas distribution networks. Individual demand forecasts for each of the gate stations on our network are detailed in Appendix E.

Figure 8: Peak Demand and Gas Conveyed




The reasons for the variability between the gas conveyed and the peak hour demand trends are complex. Changes in weather patterns or the timing of gas usage of large industrial consumers has a considerable influence on overall peak gas demand, which partially explains the inconsistent relationship between the annual energy delivered and the total peak hour demand.

Our distribution network supplies gas to a number of high demand commercial and industrial consumers that have a significant impact on network operations and asset management. The locations of consumers with a significant individual energy demand (above 20TJ) are provided in Appendix D.

## 3.4. Distribution System Design

In general, our gas distribution network assets are relatively young, with the majority of assets being built from the late 1980s onwards, and predominantly constructed of steel and polyethylene materials[8].

Our distribution network is made up of a number of legacy systems developed independently by various network developers and now owned and operated by First Gas. Each of these networks was designed and operated to the standards applied by each of the developers. As a result, the defined standard operating pressures of similar sections of the network are not always consistent.

Any such design and operating conditions that do not conform to our standards are defined in our quality of supply standard. Over time, we intend to rationalise and standardise the design and operating pressure ranges in order to simplify network operations.

6 The peak demand is calculated by adding the peak load of each network system for a calendar year. Where a network system includes more than one gate station or a gate station supplies more than one network system, the coincident peak load is used.

7 Gas conveyed and peak demand are calculated over a calendar year as to include the entire winter season peaks. As such, information for FY16 is unavailable at this stage.

8 Further information on the age profiles of our distribution assets are found in Chapter 6.

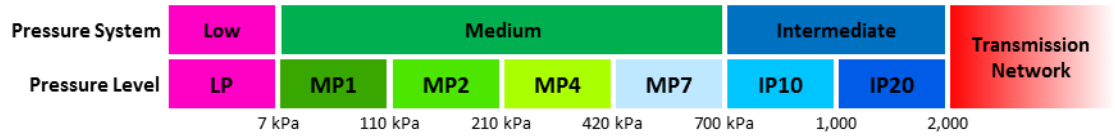
## 3.5. NETWORK CONFIGURATION

Our gas distribution network begins from the outlet valve of the transmission system, and terminates at the inlet valve on a consumers' gas measurement system, or gas meter. Our gas distribution networks broadly contain the following six main categories of assets:

- Distribution pipes
- Pressure stations
- Valves
- Corrosion protection equipment
- Monitoring systems
- Special crossings

The distribution network operates at pressures up to 2,000kPa, and is categorised into low, medium and intermediate pressure systems as defined by NZS 5258:2003. We further categorise these operating pressures into seven discrete pressure levels as shown below.

Figure 9: Distribution Pressure Systems

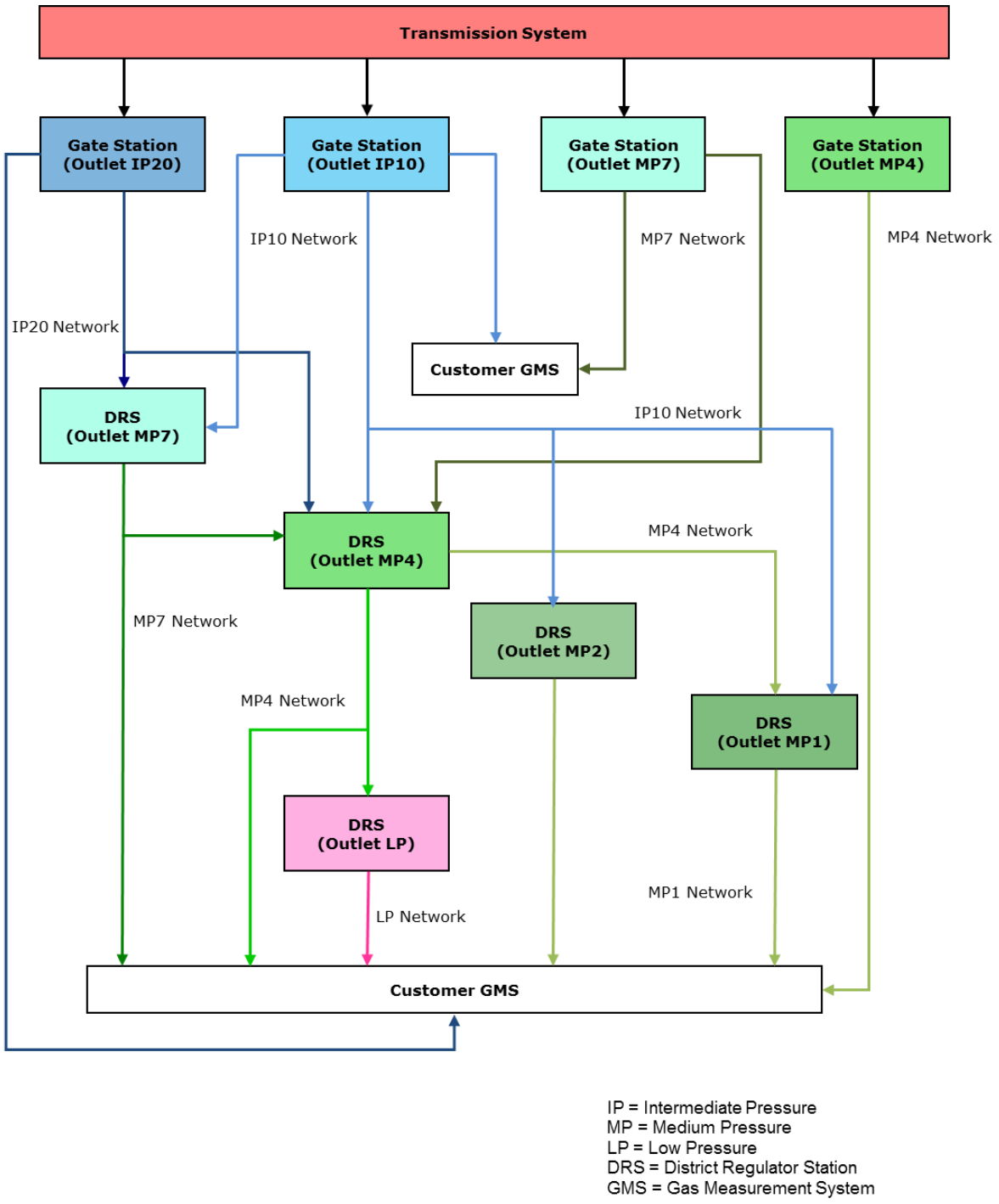



Our distribution network receives bulk gas supply from our high pressure transmission system operating across the North Island. The transmission system delivers gas, typically to our intermediate pressure (IP) and medium pressure (MP) distribution networks, via gate stations.

These IP and higher pressure MP systems tend to be radial in design, whereas the design of the majority of MP and low pressure (LP)systems tends to be mesh-based, providing back-feed security to large numbers of residential and commercial loads. MP and LP systems are often supplied from multiple District Regulating Stations (DRSs) thereby further increasing the security of supply.

A simplified depiction of our distribution network is presented on the next page showing the interconnection between various pressure levels.

Figure 10: Schematic of our Distribution Network




### 3.5.1. Mains and Service Pipes

Gas distribution pipes are categorised into the two asset types:

1. **Mains:** generally larger and higher pressure pipe used to transport gas through the network for further distribution and use.
2. **Service:** smaller pipes used to transport gas from a main to a GMS typically installed on the consumer's property.

## Mains

The table below shows the seven pressure levels used in our mains distribution pipes, along with the make-up of the network.

Table 3: Pressure Levels and Corresponding Pipe Lengths (30 June 2015)

| Pressure Level | Range | Length (km) | % of Network |
|---|---|---|---|
| **Intermediate Pressure 20 (IP20)** | 1,000-2,000kPa | 91 | 2% |
| **Intermediate Pressure 10 (IP10)** | 700-1,000kPa | 85 | 2% |
| **Medium Pressure 7 (MP7)** | 420-700kPa | 21 | 0.5% |
| **Medium Pressure 4 (MP4)** | 210-420kPa | 4,152 | 92% |
| **Medium Pressure 2 (MP2)** | 110-210kPa | 23 | 0.5% |
| **Medium Pressure 1 (MP1)** | 7-110kPa | 53 | 1% |
| **Low Pressure (LP)** | 0-7kPa | 71 | 1.5% |

The IP systems generally form the 'backbone' of the distribution networks with laterals diverging from pipes to supply adjacent areas. These pipes are operated in the IP range of 700 to 2,000kPa. The selection of these pressures has, in the majority of cases, been based on balancing gas volumes, transmission distances, and delivery pressures. The IP systems are all constructed to a high technical standard of welded steel. They are also all protected against corrosion by CP, using either a system of sacrificial anodes or an impressed current installation to aid in the prevention of corrosion.

The MP system makes up the majority of our distribution assets. The pipes in the MP system generally form the greater mesh network, and are used to directly supply gas consumers. These mains are constructed mostly of polyethylene and as such require no corrosion protection.

LP systems typically represent the oldest parts of the distribution system, supplying residential and small commercial loads. LP systems typically consist of polyethylene mains pipes.

Figure 11: Typical PE mains pipe installation

### Service Connections

Service connections provide the link between the gas mains in the street and the customer's gas meter. They comprise a service pipe, riser and a riser valve. The outlet connection of the riser valve designates the end of our distribution system. A service regulator is normally fitted downstream of the riser valve to regulate the gas pressure to the consumer meter-set and to downstream appliances. In these cases, the regulator is owned by retailers or GMS owners.

## 3.5.2. Pressure Reduction

Pressure reduction stations are those parts of a gas network that link two pressure levels through pressure regulators. They are the points where gas enters a lower pressure network and are used to maintain a consistent inlet pressure to each system. We have three categories of pressure stations on our distribution network: gate stations, district regulating stations, and service regulators.

### Gate Stations

Where the pressure station is the link between the gas transmission system and a gas distribution network, it is known as a gate station.[9] In these locations, high pressure gas equipment (i.e. pressure regulating equipment and custody transfer metering) within the gate station is operated by our transmission business, and is not considered part of the distribution network. Equipment downstream of the pressure regulation (i.e. associated valves and pipework) within the gate station is operated as part of our gas distribution networks.

### District Regulating Stations

Where the pressure station is the link between two differing pressure level systems it is known as a district regulating station (DRS). DRSs are used to reduce and regulate the operating pressure from higher operating pressure systems to systems with lower operating pressures.

**Figure 12: A standard DRS installation**

[9] An alternative name for a gate station is delivery point

DRSs are strategically located within the distribution network so that a continuous and safe gas supply is delivered to the maximum number of customers. They are primarily used to reduce the higher pressures associated with high-volume mains, (i.e. MP7 and above), down to more economical distribution pressure levels between 200kPa and 420kPa on the MP2 and MP4 systems.

They are also used to provide a controlled pressure into the LP networks from either an IP or MP system.

The lower operating pressures provided by the DRS assets allow modern technology and materials, such as polyethylene pipes, to be used to provide a safe, assured and cost-effective gas supply to customers.

As they are the source of supply to a significant number of consumers, they are critical component in the gas distribution network. Because of this importance, DRS installations are often duplicated in order to a reasonable level of security of supply. This redundancy also enables maintenance to take place without a loss of supply to customers.

#### Service Regulators

Service regulators are used to normalise the flow and pressure of gas supplied to individual premises, based on the consumer's supply requirements. Where, for practical reasons, a regulator is unable to be installed immediately adjacent the consumers gas meter (i.e. as part of the GMS) it is installed at a location upstream from the GMS and may be owned and maintained by First Gas.

### 3.5.3. Line Valves

Line valves are manually operated valves used in our distribution system. They fall into the following two categories:

1. **In line mains and service valves**: strategically located to isolate the flow of gas within the system when required.
2. **Blow down valves:** designed to vent/depressurise sections of the system in the event of an emergency.

The majority of manually operated valves used in our distribution system are ball valves, plug valves or gate valves.

### 3.5.4. Corrosion Protection Systems

Steel or metallic pipes and equipment installed in the distribution system (either above or below ground) are susceptible to corrosion. Various measures are employed to ensure the integrity of the asset is maintained.

Above ground pipe and equipment is protected against corrosion by the provision of paint or other suitable protective coatings e.g. wrapping. Periodic inspections are carried out to monitor the condition of these coatings.

Below ground steel pipes and equipment is protected against corrosion by the provision of protective coatings (e.g. high density polyethylene or epoxy coating) and the application of impressed current or sacrificial anode CP systems. Protective coatings are inspected whenever underground pipe or equipment is exposed. CP test points are provided at regular intervals on the system. They are monitored on a periodic basis and maintained to ensure that the levels of protection being provided to the underground plant are kept within prescribed maximum and minimum levels.

### 3.5.5. Monitoring Systems

At various strategic locations throughout our distribution network, monitoring systems are installed to observe and record network data. Generally located at gate stations and DRSs, these systems provide monitoring and alarming of critical inlet/outlet pressures, temperatures and flow rates, and corrected and uncorrected metering data.

The systems we use to monitor our gas distribution networks are a combination of Cello and VDS3000 data loggers and correctors. The data gathered by the monitoring systems is accessed through an archiving histogram called Wonderware. This information is then used in network modelling and forecasting to inform future network design and to ensure gas security standards are met.

### 3.5.6. Special Crossings.

Special crossings are locations where a section of pipe is installed either above or below ground in order to cross over a roadway, river, railway or any area of interest with a differing risk profile from a standard installation.

In certain instances, an above ground crossing (e.g. over a bridge) enables the gas distribution pipe route to negotiate obstacles where a below ground crossing is not practical.

### 3.5.7. Critical Spares and Equipment

An appropriate stock of critical spares and equipment allows us to ensure any maintenance or repairs to the network are not hindered by the lack of equipment or parts availability. Our critical spares and equipment holdings include spare pipe and pipe fittings, repair equipment, spare DRSs, and other items that have been determined critical based on lead time, turnover, risk, or other drivers. These items are held at various locations throughout the network to allow for fast repairs.

# 4. ASSET MANAGEMENT APPROACH

This chapter describe our approach to asset management and how this supports meeting our performance objectives and the expectations of our stakeholders. It is structured as follows.

- **Asset Management Framework**: describes our approach to ensuring alignment between our corporate objectives and our day-to-day asset management activities.
- **Asset Management Governance:** sets out how we make asset management decisions, including the roles of our Executive Team and Board.
- **Risk Management:** explains our approach to managing risk on our network, including how we identify and classify risks, and how we take appropriate actions to manage them.
- **Performance Measures:** sets our overall asset management performance objectives.
- **AMMAT:** discusses the outcome of our Asset Management Maturity Assessment Tool review.

## 4.1. ASSET MANAGEMENT FRAMEWORK

In this section we explain our asset management framework. An important function of this framework is linking our corporate objectives and stakeholder needs to specific asset management approaches through our Asset Management Policy.

### 4.1.1. OVERVIEW

Our asset management framework seeks to reflect good industry practice by setting an asset management policy, asset management principles, and focusing on prudent decision making through effective governance. Our decisions aim to reflect stakeholder requirements and inputs, the best information available on the health and performance of our assets, and the technical and financial resources available to First Gas.

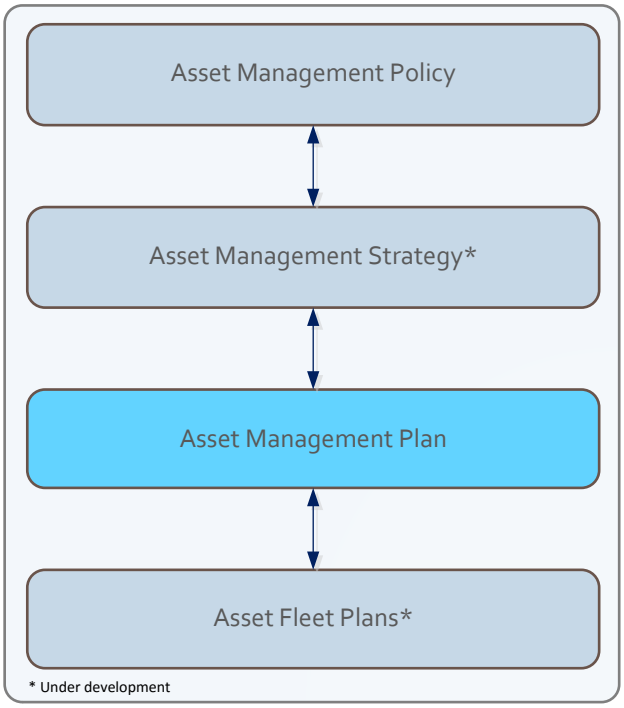
We are currently transitioning our asset management approach to align with the requirements specified by ISO 55000. One key focus of this transition is to strengthen our asset fleet documentation to provide a comprehensive description of how we manage our asset fleets across their lifecycle.

We have developed an asset management framework that links our corporate objectives to our day-to-day activities in managing our assets. This framework includes the following four components.

- **Asset Management Policy**: aligns our asset management approach with our corporate objectives. Our asset management objectives reflect this policy by emphasising the need for safety, stakeholder needs and the importance of effective risk management.
- **Asset Management Strategy**: sets out how the Asset Management Policy will be achieved. This aims to ensure that asset management activities are aligned with our corporate and asset management objectives. We have yet to finalise our formal strategy, but will do so over the next 12 months. Currently, our asset management strategy is integrated within this AMP, rather than being a separate document.
- **Asset Management Plan**: reflects our asset lifecycle model and aligns our regular processes and activities with high-level objectives.
- **Fleet Plans**: will apply our objectives to individual asset fleets, setting out our intervention plans. We plan to develop and refine these fleet based plans over the next 12 months.

The four components of our asset management framework are shown in the following diagram.

Figure 13: Documentation in our asset management framework




### 4.1.2. Asset Management Policy and Strategy

#### Asset Management Policy

The Asset Management Policy provides a high-level statement of our asset management direction, principles and guiding objectives. The policy provides direction for our asset management decisions and everything we do to manage our assets should map back to the policy.

The purpose of the policy is to reflect our corporate objectives and stakeholder needs in terms that can be translated into our asset management documentation. We have only recently introduced an Asset Management Policy, and it will take time to fully embed it within our business. However, we believe that adopting an Asset Management Policy is an important step because it plays a leading role in driving our asset management system. It is a key tool by which our senior management communicate to all stakeholders our principles, approach and expectations regarding asset management.

The policy also sets out key asset management principles that flow through our processes and systems. This is important to ensure the necessary linkages between our objectives and what we are aiming to achieve through our asset management practices.

The policy is set out below and has been approved by the First Gas Board and communicated to all staff.

**Asset Management Policy**

First Gas's Asset Management Policy is to effectively manage the gas distribution and transmission assets across their entire lifecycle in a safe, efficient and environmentally appropriate way to serve the needs of our customers, stakeholders and end users while optimising the long-term return of our shareholders.

Achieving operational excellence in asset management is key to delivering on First Gas's mission:

- To deliver stable and predictable financial performance through providing safe and reliable gas pipeline and network services.

**To deliver on our Asset Management Policy First Gas will:**

- Prioritise the integrity of our assets to ensure the safety of the people and places affected by our operations.
- Provide a reliable, resilient and secure service that meets customer needs.
- Preserve the environment by operating in a manner that mitigates environmental risks.
- Address and meet all legislative requirements.
- Communicate our investment plans to stakeholders, particularly the communities that host our assets.
- Operate in a manner that optimises long-term financial outcomes for our shareholders.
- Balance the needs of competing objectives in a consistent and transparent manner.

**To achieve and monitor this we will:**

- Engage with our stakeholders in an open and transparent manner, integrating customers into our decision making.
- Provide efficient and effective systems for whole of life asset management processes.
- Regularly review our performance using relevant leading and lagging indicators.
- Grow the organisational competence and capability of First Gas in step with our asset management objectives.
- Ensure our Board and management are fully informed with accurate and timely data to support their responsibilities.
- Communicate with all our people and key stakeholders on all aspects of this policy.
- Continuously strive for improvement in all areas of asset management and work to align with ISO 55000.

**All our people are responsible for:**

- Ensuring their own and others adherence to this policy.
- Escalating any issues that may put the aims of this policy at risk.

## Asset Management Objectives

Our Asset Management Policy provides us with a platform to more clearly define a revised suite of asset management performance objectives – against which we can measure our performance. These objectives are related to our performance measures discussed later in this chapter.

Over time we will transition to an expanded set of performance measures including representative measures for the objective areas below:

- **Safety:** prioritise the integrity of our assets to ensure the safety of the people and places affected by our operations.

- **Security and Reliability:** provide a reliable, resilient and secure service that meets customer needs.
- **Environment:** preserve the environment by operating in a manner that mitigates environmental risks.
- **Compliance:** address and meet all legislative requirements.
- **Communication:** communicate our investment plans to stakeholders, particularly the communities that host our assets.
- **Value:** operate in a manner that optimises long-term financial outcomes for our shareholders.
- **Decision Making:** balance the needs of competing objectives in a consistent and transparent manner.

The goals will be forward-facing and supported by a number of objectives with measurable targets, which will enable us to keep track of and report on, our progress. We believe that these objectives better reflect our corporate objectives and the needs of our stakeholders.

### Developing a new Asset Management Strategy

We plan to develop a new asset management strategy as part of our ownership transition. Strategic asset management planning is currently incorporated across this AMP (reflected in discussions in Chapters 5 and 6) and our internal asset planning documents.

As part of our transition efforts, the development of a formal asset management strategy will be a key focus over the next 12 months. It is envisaged the strategy will address such things as:

- Set out and explain a suite of new asset management objectives.
- Specify criteria for prioritising our asset management activities.
- Describe our approach to managing risk, in particular network security.
- Link our asset management practices, performance levels and our future targets.
- Provide a framework for the development of integrated maintenance and renewals plans.
- Set out a roadmap and timeframe for continuous improvement initiatives.

## 4.1.3. Asset Management Plan

Our AMP captures the key elements of our asset management document suite in a summarised form. It is an important means of explaining our approach to managing our assets to internal and external stakeholders. It has also been developed to meet our Information Disclosure obligations under Part 4 of the Commerce Act 1986.

This AMP has been developed with oversight and input from our Commercial and Regulatory Team, which advises on the Information Disclosure and certification requirements. In preparing this AMP, we have been conscious that it may be used as a valuable source of information in resetting the default price-quality path that will apply from 1 October 2017. We have therefore endeavoured to make our cost forecasts as accurate and robust as possible, and to provide sufficient supporting information to interested parties.

### Approval Process

Once the AMP and associated forecasts have been prepared by the Asset Management Team, they are reviewed and challenged by the Executive Team and it is then reviewed by a Board sub-committee prior to an initial Board submission. When the feedback from the Board has been incorporated, the AMP is then finalised and approved by a special Board meeting prior to publication.

### Key Assumptions

This AMP is based on some fundamental assumptions that underpin our long-term strategic direction and operating environment. These key assumptions are:

- The present gas industry structure will broadly remain the same. For example, we have assumed that over the planning period gas will continue to flow from the Taranaki region to customers located in other parts of the North Island.
- Works will continue to be delivered through our outsourced approach. We make decisions on the allocation of outsourced work, based on capability, cost and resource availability.
- There will be no major disruptive changes to the availability of service providers.
- Consumer demand and expectations will continue to follow long-term trends. While we aim to increase the use of our gas distribution network, we have adopted prudent growth forecasts that are tied to historic trends in the uptake and use of gas in New Zealand.
- There will be no major changes to the regulatory regime that governs our operational and investment decisions - for example, through structural changes to the regulatory institutions or the regulatory mechanisms currently in place that allow us to recover our efficient costs.

To the extent possible, all relevant assumptions made in developing this AMP have been quantified and described in the relevant sections. Where an assumption is based on information that is sourced from a third party, we have noted the source.

## 4.2. Asset Management Governance

This section describes how asset management decisions are made and approved in line with our governance framework.

Our governance framework includes the processes that ensure appropriate oversight and challenge are in place during the development and execution of our plans. Controls and enablers also ensure that resources are available and there is a methodological approach to decision making, promoting consistent, repeatable and auditable actions.

We have a continuing focus on improving the efficiency and effectiveness of our processes and systems, including investment in capturing and analysing asset information.

### 4.2.1. Expenditure Forecasting Process

We have a system of processes to approve all Opex and Capex. This ensures our governance objectives are met and that we make prudent and efficient decisions.

We have a number of asset management decision-making levels, ranging from strategic decision making by the Board, to approval of operations and maintenance decisions by operations staff or field crew. These layers are proportionate to the significance of the decision being made.

#### Financial Authority

Each project within our AMP is approved based on our delegated financial authority (DFA) policy. Any changes to project scope requiring additional expenditure triggers further review and a new approval process is required to agree any changes. DFAs set out the limits to which managers are allowed to authorise expenditure. This is reviewed annually.

The table below sets out our DFA levels.

Table 4: Delegated Financial Authority Levels

| GOVERNANCE LEVEL | FINANCIAL AUTHORITY CAPEX | FINANCIAL AUTHORITY OPEX |
|---|---|---|
| **CEO** | $4,000k | $2,500k |
| **COO** | $500k | $500k |
| **Distribution Manager** | $250k | $250k |

### Challenge Processes

The AMP reflects our system development plans, asset fleet plans, customer connections forecast, and our maintenance strategies. These plans and associated forecasts are prepared by the Asset Management Team in consultation with relevant staff members and engineers.

Reflecting its role as a key stakeholder document, the draft AMP is subjected to a thorough testing process prior to Board approval. As part of this process, proposed expenditure plans are scrutinised and challenged by the Executive Team to ensure alignment with the Asset Management Policy and that the plans reflect efficient and effective approaches. Non-network expenditure is also subject to the same process of testing. The Executive Team challenge process occurs multiple times until the AMP is deemed ready for Board review.

## 4.2.2. INVESTMENT PLANNING APPROACH

### Investment Principles

Apart from normal business risk avoidance measures, specific actions to mitigate the risks associated with investing in distribution networks include the following.

- **Act prudently**: where safety is not compromised make small incremental investments and defer large investments as long as reasonably practical (e.g. replace gate station components rather than an entire station). The small investments must, however, conform to the long-term investment plan for a region and not lead to future asset stranding.
- **Multiple planning timeframes:** produce plans based on near, medium and long-term views. The near term plan is the most accurate and generally captures load growth for the next three years. This timeframe identifies short-term growth patterns, mainly leveraging off historical trends. It allows sufficient time for planning, approval and network construction to be implemented ahead of the new system demand.
- **Ten-year medium-term plan:** capturing regional development trends such as land rezoning, new transport routes and larger infrastructure projects. It also captures changes such as the adoption of new technologies or behavioural trends (e.g. consumers' response to issues such as climate change, increased energy conservation).
- **Review replacement projects:** for large system assets rather than automatically replacing existing end-of-life assets with the modern equivalent, a review is carried out to confirm the continued need for the assets, as well as the optimal size and system configuration that will meet our needs for the next asset lifecycle.
- **Continuously review system performance**: to identify and apply remedial action in respect of poorly performing assets.

### Needs Identification

Identification of investment needs is an ongoing process across our business. Timely identification and analysis of these needs is a key asset management discipline. We identify Capex needs through

a number of activities, including condition monitoring, network studies, technology assessments, safety reviews. and the experiences of peer utilities

We place a large emphasis on potential safety-related investments to help manage this key risk area.

## Options Analysis

Once Capex needs are identified we begin to consider potential solutions. The number and type of solutions (or options) that are considered will vary depending on the type of investment: for example, whether the Capex is driven by security constraints or asset failure risk.

We describe the process used to assess alternative options and choose a preferred solution as 'options analysis'. Options analysis follows the same generic process though there are differences between approaches for certain investments. However, it generally includes technical studies, economic assessments and risk analysis. The process may also include stakeholder consultation.

Below we discuss the approaches used for our two main categories during the planning period, asset replacement and renewal (ARR) and network development.

### *Asset Replacement and Renewal*

Many ARR needs are recurring and can be addressed as part of ongoing work programmes. In such cases, our chosen approach is generally informed by specific, long-standing strategies.

The range of viable options considered in these programmes will vary based on the fleet and the need. In general, the issues can be addressed through one of the following options:

- Replacement
- Renewal
- Continued maintenance

Potential options always consider safety implications and likely performance impacts, including support for our asset management objectives. Lifecycle cost is an important consideration. In addition to Capex it is necessary to assess the cost of maintenance and other operational costs incurred over the life of the asset.

### *System Development*

The options analysis approach for development is commensurate with the size and complexity of the project. To guide this process and to ensure works receive an appropriate level of analysis we base our approach on the scale and complexity of the work.

For larger projects, options analysis will include developing a long list of potential options. The list of options is reduced to a short-list by applying specific criteria. These include whether an option addresses the identified need, is feasible (commercially and technically), and can be reliably and safely implemented in sufficient time to meet the need.

Having developed a short-list, we confirm the suitability of each option to fully meet the need, including operational and maintenance requirements and construction feasibility and timeframes. We also complete a high-level scope for each option to determine a cost comparison.

For smaller projects we apply the same principles, but modify the level of analysis according to the size of the investment.

## Cost Estimation

As a new company we are continuing to develop our capabilities in cost estimation. In order to produce robust estimates for this AMP therefore we have partially relied on work done and provided to us from previous owners of the assets. Our service providers also play a key role in our cost

estimating process allowing us to access expertise in estimating while we continue to develop our own skill set internally.

Our approach to cost estimates is dependent on the type of work being done and is summarised below. It applies to both Capex and Opex forecasts.

- Programmes of ongoing work are estimated in two ways. Firstly, where the programme consists of similar repetitive activities then the estimate is built up from a unit rate and multiplied by the volume of work envisaged. Where a programme of work involves activities with variable scope an analysis of average historical spend is used as a basis to set forecasts.
- Large projects with discrete scopes have cost estimations tailored for the work. These estimates are based upon a mixture of supplier quotes and analysis of previous similar work.
- ICT related work is estimated in a similar way to large projects in that a mix of supplier quotes and historical project analysis is used.
- Building refurbishment work is estimated using a per square metre rate multiplied by the area of building we are refurbishing. This is then modified by known additions e.g. heating ventilating and air conditioning work.

### Uncertainties

The forecasts included in this AMP are representation of our most current expected estimates for the Capex and Opex needed to maintain our distribution network during the planning period. As the planning period progresses, changes in operating conditions may affect expenditure and introduce levels of uncertainty into project scopes, cost estimates and ultimately the overall forecast.

These uncertainties have been managed as effectively as possible through the processes discussed in Chapter 5, and by adopting an approach that assumes the most likely cost outcome based on currently available information.

### Approvals

As projects move through the approval process they are subject to our governance processes. The confirmation of individual projects is undertaken using a staged approval process. Each of these stages culminates in an effective ‘go/no-go’ decision that determines whether a project will proceed to the next stage. These decisions are based on factors such as project cost, risk, and feasibility. They are decided at an appropriate management level based on the expected expenditure and complexity of the project.

Our Capex forecasts for the planning period have been built on a ‘bottom up’ basis where identified projects have been aggregated before being challenged and approved. This ensures that forecasts have been derived in a systematic and rigorous manner, and have undergone appropriate scrutiny.

### Investment Prioritisation

In presenting our plans for the future we have relied on the previous owners’ methodology for prioritising investments. We have initially tested these plans with our own risk based approach and found them to be appropriate. Our intention as we move forward is to prioritise using a risk based system named Non Routine Activity Management System (NRAMS). It is will be used to prioritise most asset lifecycle capital and operational work with consideration for the available resources both internally and externally to deliver the work required.

It will describe the consequences of not undertaking a project by considering wider issues such as stakeholder outcomes and operational, health and safety, environmental, legal, financial and regulatory risk, and our broader corporate objectives. Based on this, a priority rating for projects can be determined.

The resulting prioritised list of projects becomes an input for the capital works programme. For distribution growth projects, project prioritisation takes into account the following.

- Avoiding harm to people and/or the environment.
- Avoiding loss of supply issues that could lead to unsafe situations.
- Ensuring compliance with security standards.
- Meeting third party requests.
- Enhancing system efficiency (including works programme synergy).
- Implementation of long-term development opportunities.

NRAMS project prioritisation processes will support the business objective of cost efficiency in the following ways:

- Directing efforts onto the projects that either deliver the greatest benefits or mitigate the largest risks.
- Allowing multiple problems at the same site to be collected together and delivered as a single project (project delivery synergy).
- Allowing multiple problems to be considered at a single site to ensure that the recommended solution meets all requirements (design efficiency).

### 4.2.3. Works Delivery

#### Delivery Model

Field maintenance is predominantly an outsourced activity. After a competitive tender process in 2009, Electrix Ltd. was selected as the field service provider (FSP). Electrix is responsible for the preventive, corrective and reactive maintenance works on the gas distribution network.

We are establishing new contractual KPIs with Electrix and a framework with guiding principles to manage the working relationship. The objective of our outsourced business model is to improve the efficiency and quality of delivered services.

#### Works Management

We have begun the process of working with our FSP on continuously improving the coordination of the various activities associated with the delivery of the capital works programme. The objective is to achieve better utilisation of resources, enhance capital efficiency, and deliver improved customer outcomes. Improvement initiatives include:

- Introduction of integrated works planning across the end-to-end Capex process. This is to drive an efficient and deliverable works plan that coordinates work to optimise outage impacts and resource requirements.
- Introduction of early contractor involvement to drive:
    i. Improved risk management.
    ii. Clear understanding and development of scope and delivery sequence.
    iii. Early constructability input and reviews.
    iv. Earlier operational acceptance.
    v. Improved innovation.
    vi. Improved cost certainty and better executed project management with less variations.
- Significant refinement of the Capex programme delivery process to better define accountabilities across all involved parties.

### Competency and Training

All individuals performing design, construction, operations or maintenance on our distribution network must meet the competency requirements as specified by First Gas standard GNS-0080 – Personnel Qualification.

As a part of the contractual agreement with our FSPs and contractors, contracted personnel must meet the competency criteria for all work being performed. As specified, competency and training levels are managed by our service providers through a training matrix and green / red card system dictating competency levels for required works.

Internally, each staff role has a defined set of competency requirements within the position description that personnel performing that role are required to meet. We align training requirements with established competencies in technical operation and maintenance. A training and development plan exists to ensure that personnel involved with the operation and maintenance of the asset are appropriately trained. Our training and competency recording is maintained in the Training Manager software application, as outlined in Chapter 7, and the validation of competency forms part of our NZ7901 accreditation.

## 4.3. Asset Risk Management

All asset management decisions are linked, in various degrees, to managing risk. For a gas utility this includes minimising safety risks, avoiding capacity constraints, and managing asset failure risk through maintenance and renewals. Managing these risks requires sound governance processes to direct effective procedures and controls.

### 4.3.1. Risk Management Policy

The identification and effective management of risk is central to our success. We are committed to developing a culture that understands and manages the risks to our business. In doing so we will provide greater certainty to our shareholders, employees, customers, suppliers, and the communities in which we operate.

### 4.3.2. Risk Management Principles

Risk management is a key component of good asset management. The consideration of risk plays a key role in our asset management decisions – from network development planning, asset replacement decisions through to operational decisions. The assessment of risk and the effectiveness of options to minimise it is one of the main factors in our investment choices.

Given the potentially severe nature of failures in operation (particularly loss of containment) appropriate and effective risk management is integral to our day-to-day asset management approach.

Our asset management systems and our core processes are designed to manage existing risks, and to ensure emerging risks are identified, evaluated and managed appropriately. Our approach is to seek specific instances where features of our network which should make us resilient, do not suffice or apply. In particular, the following assessments are used.

- **Prioritise safety:** we prioritise those risks that may impact the safety of the public, our staff and service providers.
- **Ensure security of supply**: our works development and lifecycle management processes include formal evaluation of our assets against our security criteria.
- **Address poor condition/non-standard equipment:** our lifecycle management processes seek out critical items of equipment that are at a higher risk of failure or are non-standard.

- **Need for formal risk review and signoff:** our processes include formal requirements to manage the risks identified, including mandatory treatment of high-risk items and formal management signoff where acceptance of moderate risks is recommended.
- **Use of structured risk management:** we use structured risk capture and management processes to ensure key residual risks are visible and signed off at an appropriate level.

Gas industry codes (e.g. AS/NZS 4645[10]) require risk management to be a continuous process at all stages throughout the lifecycle of our gas distribution network. The nature of the gas distribution business is such that there are many inherent risks. In addition, safety management is one of our top operational priorities.

The gas distribution business unit has a risk management system that is outlined in a controlled document. This outlines the minimum requirements and ensures consistency in risk management by our business.

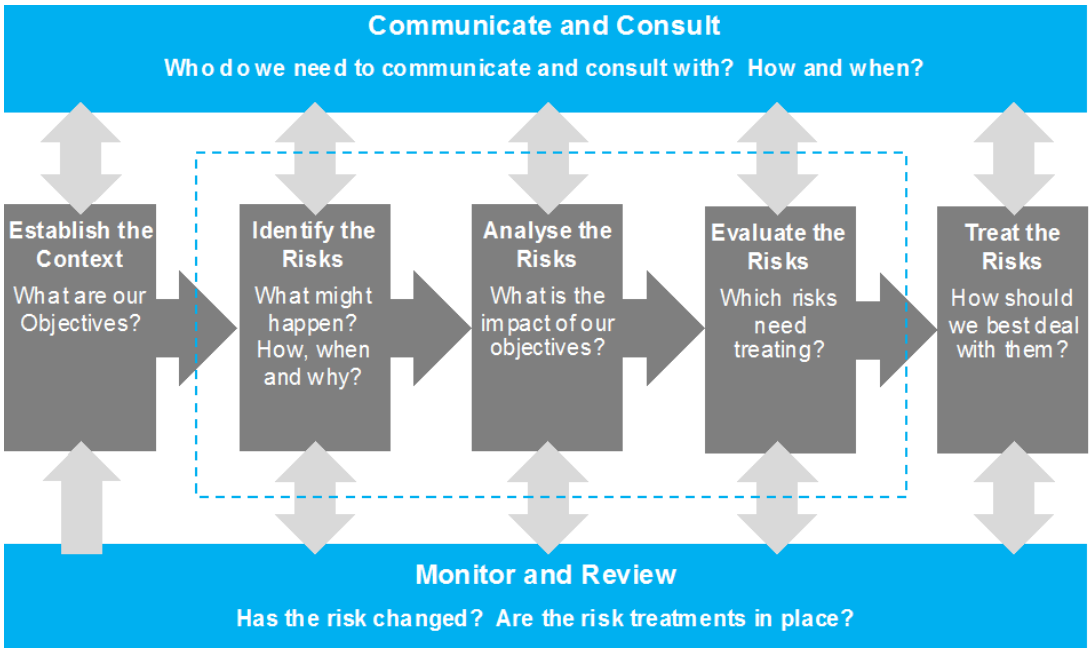
As risk severity is defined by the combination of likelihood and consequence, our approach to managing risk focuses on controls and treatments that either amend the likelihood of occurrence, or address the severity of the consequences.

### 4.3.3. Risk Management Framework

The risk management process is not solely about limiting risk by mitigating against adverse impacts. Rather, it is about fully appreciating and recognising all the risks the business carries, and balancing them so as to take advantage of potential opportunities in an informed manner.

Our risk management process is in accordance with the process outlined in AS/NZS ISO 31000:2009 as illustrated below.

Figure 14: Risk management process




The framework we apply to identify, assess, treat, monitor and review risks is consistent throughout the business. The risk management process includes the following activities:

- **Identify the risks**: this takes place throughout the business via a variety of mechanisms and techniques.

[10] AS/NZS 4645 – 2008- Gas distribution networks Part 1: Network management

- **Analyse the risks**: this involves developing an understanding of the causes and sources of the risk, their likelihood and consequences, and existing controls.
- **Evaluate the risks**: includes ranking of risk based on the results of the analysis phase. Decisions are made on which risks require treatment and in which priority.
- **Treat the risk**: involves developing options to reflect severity and ranking. They include avoidance, reduction of likelihood or consequence, elimination, acceptance, or sharing.

### 4.3.4. Identify the Risks

Risk management is applied at all levels of our organisation – from decisions in the field through to discussion at our Board. The purpose of risk management is to understand the types and extent of risks our business and operations face and to respond effectively to these through appropriate mitigation approaches.

To achieve this, our approach is to identify and understand the cause, effect and likelihood of adverse events occurring. Below we discuss how we identify network related risks on our gas distribution system.

We identify risks through a number of processes, including:

- Formal risk identification including pipeline safety management studies
- Feedback from incidents
- Comparison with incidents in other companies / industries
- Output from audits, reviews and inspections
- Individuals identifying risks in the course of their work.

When considering a new candidate risk, a range of factors will be taken into account to determine whether this is, a new risk, the rephrasing of an existing risk or, for example, simply an additional cause or loss of control for an existing risk.

### 4.3.5. Key Risk Sources

The most significant source of risk associated with gas distribution is that of asset failure or major damage. Complete elimination of this risk is not possible while still retaining the operation of the pipeline, thus emphasis is placed on minimising the likelihood of occurrence through a range of controls, together with an emphasis on mitigation and contingency measures. Key factors in this risk and its control are discussed below.

#### Potential for Third Party Damage

Third party damage is a significant risk to our network. Risk mitigations that apply to third party damage include: technician monitoring, signage, public education and a map provision service. Above ground assets may have vehicle bollards or purpose built enclosures. Indications that the network may be at risk to third party damage include:

- Whether or not the section has a history of third party interference (whether actual damage or near miss such as unauthorised works).
- The depth at which the pipe is buried or distance from the road in the case of DRSs.
- The degree of marking available for the network's location.

#### Pipeline Failure

The risk associated with pipelines failure is principally managed through compliance to industry codes. This includes protective measures such as depth of cover, pipeline wall thickness, protective concrete slabs and warning markers. The physical safety features are further supported by proactive

programmes to educate parties likely to damage pipelines and the promotion of industry based one-call systems.

We have a comprehensive inspection and monitoring programme to ensure the safety of our gas distribution pipeline system. We monitor the system status in real time on a 24/7 basis, and regularly conduct leak inspections, surveys, and patrols. Any issues identified as a threat to public safety are immediately addressed.

Sources of risk include the following:

- The potential for third party damage
- The potential for corrosion
- The potential for ground movement
- The physical design and characteristics of the pipe and fittings
- Construction methodologies

We also consider the proximity to high density population areas, potential reliability impacts and environmentally sensitive areas.

Where the risk of failure is deemed unacceptable then a replacement programme will be initiated.

### Potential for Corrosion

The risk of loss of pipe or above ground asset integrity due to a corrosion hole is set by a number of factors, such as:

- Pipe material and the coating design for steel pipes
- Above ground asset coatings
- Environmental conditions

### Potential for Ground Movement

Factors that may lead to loss of pipeline integrity through this mechanism include:

- The proximity to seismically active areas
- The potential for landslide
- The potential for soil erosion around the pipeline

### Additional Risk Sources

Adoption of the bow tie approach has seen a reduction in the number of key risks categories, with broader risk categories and a greater number of associated causal events, when compared with the previous risk register approach. The key identified risks for gas distribution are:

- Occupational safety or environmental incident
- Loss of key staff
- Legal, regulatory or standard non-compliance
- Off-specification gas in the system
- Electrical touch potential[11]

[11] This refers to risk of electric shock due to induced voltage on steel pipelines caused by external events such as lightning strikes and electrical transmission system faults

### 4.3.6. Analyse and Evaluate the Risks

There are three type of risk identified through the gas distribution risk management processes:

- Business risks
- Operational risks
- Project risks

#### Business-level Risks

Business risks are high-level risks that carry the most significant impacts. These are often summary risks providing a cumulative view of a number of operational risks. They tend to be ongoing risks that are inherent when operating a gas network (e.g. risk of damage to assets). They may occasionally be transient risks that can be dealt with in a fixed timeframe but would be significant and widespread.

AS/NZS 4645.1 imposes requirements for risk management. This requires risks to be assessed in accordance with a prescribed matrix, which has three categories – safety, environmental and security of supply.

#### Operational Risks

Operational risks are those individual risks that occur on a routine basis but are of lower impact than business-level risks. This may be because they are limited to a specific location, they may be of relatively low severity or they may be able to be dealt with in a fixed time. These risks can still be high, but do not necessarily affect the whole business.

These are dealt with principally via maintenance activities to address anomalies (e.g. as a result of an inspection) and preventive maintenance activities that have already been anticipated and have therefore been scheduled. The work requests are entered into our maintenance management system which creates work notifications. Each notification is then risk assessed and it either turns into a work order or it is scheduled for another risk assessment at a later date.

#### Project Risks

Project risks are those that are identified during the course of a project and relate to the risks associated with delivery of that particular work. These are self-contained within the project process. Completion of a project may introduce one or more new operational risks that will be captured in the wider risk process.

There are also risks that are intrinsic to the project and may not impact on the pipeline system itself, but which may affect project delivery – cost, schedule, construction safety etc.

Effective management of both these risk areas is achieved by a single project risk management approach. The majority of project risks will remain within the ownership of the project. However, any risks that are identified as being of potential significance to the business are escalated and managed as business-level or operational risks.

The depth and scope of risk management applied to any given project is commensurate with the scale and risk of the project work. The larger and riskier the project, the more significant and extensive the risk assessment is.

### 4.3.7. Treat the Risks

Once we have identified and understood the cause, effect and likelihood of risks, we then develop and implement strategies to manage such risks to an acceptable level. These efforts are supported by a comprehensive risk monitoring and reporting regime.

Once a business risk has been identified it is assessed in accordance with the relevant assessment matrix to determine its severity. An assessment is made of the severity of the risk as it would be if no

controls were in place (see below an example matrix with risk severities). Current controls that either prevent this risk occurring, or mitigate its consequences are determined and the risk severity reassessed with these controls in place. Each control is reviewed to determine if it is fully effective, partially effective, or not effective.

Figure 15: Risk assessment matrix

| | Catastrophic | Major | Severe | Minor | Trivial |
|---|---|---|---|---|---|
| Frequent | Extreme | Extreme | High | Intermediate | Low |
| Occasional | Extreme | High | Intermediate | Low | Low |
| Unlikely | High | High | Intermediate | Low | Negligible |
| Remote | High | Intermediate | Low | Negligible | Negligible |
| Hypothetical | Intermediate | Low | Negligible | Negligible | Negligible |

Once the current risk is ascertained, it is reviewed to determine whether it is acceptable or not. Broadly speaking, low and medium risks are acceptable and higher risks may be acceptable depending on the practicability of implementing mitigation factors. These assessments will be agreed in formal risk review meetings to maintain consistency and objectivity.

Where risks are deemed unacceptable, treatment actions will be identified that improve the risk position. A further assessment is made of the severity that can be anticipated once the treatments have been completed. Where treatments are identified, these become actions tracked through the review meetings

Following assessment of risks, AS/NZS 4645 requires risks to be treated in accordance with their severity. This specifies to acceptable levels as follows:

Table 5: Typical timescales to reduce risk

| RISK TYPE | TIMEFRAME |
|---|---|
| **Extreme** | Immediately reduced |
| **High** | Reduced over a period not more than a few weeks |
| **Intermediate (not ALARP)** | Reduced over a period not more than a few months |

For all extreme risks, high risks and all intermediate code compliance risks a summary mitigation plan is required in support of risk governance processes.

In general terms, although a broad spectrum of treatments may apply, higher risk treatments are more likely to result in larger Capex activities to amend plant or process, while lower risk activities are more likely to be managed via incremental improvements or ongoing maintenance works.

### 4.3.8. CONTINGENCY PLANNING AND RESPONSE

Our network and processes have been designed to be resilient to large events that are outside our control, such as natural disasters. The following aspects of our asset management approach limit the consequences should these events occur.

- **Multiple control options:** we have alternative control and emergency management capability available in the event that our primary site is disabled.
- **Emergency response plans:** we have well tested response plans and demonstrated capability to manage significant natural events and widespread damage to our networks.
- **Business continuity plans:** we have structured business continuity plans in place to ensure that the functional support aspects of our business are resilient and can support ongoing operations.

### Emergency Response Plan

To ensure that we are prepared for, and can respond quickly to a major incident that occurs or may occur on our gas distribution system, a comprehensive Emergency Response Plan has been developed. The plan describes the actions required and the responsibilities of staff during a major emergency or incident.

A key component of this plan is the formation of the Emergency Response Management Team. This team includes senior staff whose role is to oversee the management of potential loss of and restoration of supply following a significant event. The team is experienced and undertakes exercises at least annually.

### Civil Defence and Emergency Management

As a "lifeline utility" under the Civil Defence and Emergency Management Act 2002 (CDEM), we are required to be "able to function to the fullest possible extent, even if this may be at a reduced level, during and after an emergency". We are also required to have plans regarding how we will function during and after an emergency and to participate in the development of a CDEM strategy and business continuity plans.

We participate in CDEM emergency exercises and area meetings on a regular basis to ensure CDEM protocols are understood, as well as to test aspects of our emergency plans.

### Critical Spares and Equipment

Key to minimising the consequence of any unwanted event involving equipment failure are readily available tools and materials to enable quick restoration to normal operation.

To this end, a stock of spares is maintained for critical components of the gas distribution system, so that fault repair is not hindered by the lack of availability of required parts. Whenever new equipment is introduced to the system, an evaluation is made of the necessary spares required to be retained to support repair of any equipment failures.

## 4.4. Performance Measures

This section describes our performance targets. We have selected a more focused set of KPIs than used previously to allow us to concentrate our attention on what we believe to be most important. As explained in Chapter 2, a key premise for the AMP is that existing reliability and supply quality levels will be maintained. As can be seen we have targeted out KPIs to this area. These targets are presently set at a constant value for the current AMP planning period and mainly reflect historical target levels. It is our intention to embark on a process of continuous improvement that will be reflected in future KPI targets.

The targets specified below are applicable for each year of the AMP planning period. Where appropriate the targets have been developed to align with the definitions developed by the Commerce Commission for Information Disclosure.

Our service providers undertake data capture activities in accordance with our Gas Distribution Network Reliability, Integrity and Consumer Service standard. Through collation of this data into our Engineering Asset Management and Customer Management systems, we are able to provide integrity and reliability measures for disclosure reporting purposes. Reportable measures in addition to those described below include:

- Number of telephone calls to emergency numbers answered within 30 seconds
- Average call response time
- Number of reported emergencies

### 4.4.1. SAFETY

We routinely monitor HSE performance (internally and externally) and the HSE performance of our core contractors. In addition, we have a strong reporting culture and all incidents are reviewed weekly to ensure the appropriate level of investigation and that incident owners are assigned.

We are increasing our focus on critical risks, particularly those that can result in serious injury or fatality. Safety initiatives:

- **Collaboration:** we work collaboratively with our partner service providers. For example, we are making a step change in works planning to produce our plans earlier and improve their stability to create an environment where our staff and service providers can operate more safely and working with service providers to get better policies, work practices and reporting disciplines.
- **Asset management framework:** is being used to drive safe outcomes. We are implementing Safety in Design principles and applying these from concept to design, construction contracting and management and disposal of assets. We are training workers in these practices.
- **Communications:** we are supporting health and safety committees to work on meaningful projects, allocating resources to regularly communicate to workers, and setting up reward programmes to recognise individuals' behaviour.
- **Safety systems:** we are providing service specifications and policies to service providers to ensure best practice, reviewing work management policies and providing an improved and transparent safety system.

Note: there is no historical data available for safety statistics on our distribution network.

**SAFETY TARGET**

Lost Time Injury Frequency Rate: 0

### 4.4.2. SECURITY AND RELIABILITY: RESPONSE TIME TO EMERGENCIES (RTE)

Our aim is to attend to emergencies occurring on the distribution system as soon as practical to prevent any damage or harm to the public, employees, contractors and neighbouring properties.

Table 6: RTE – historical performance (note: historical figures are for a June–end financial year)

| | FY13 | FY14 | FY15 | FY16 * |
|---|---|---|---|---|
| **Proportion of RTE within one hour** | 89.8% | 84.6% | 93.8% | 80% |
| **Proportion of RTE within three hours** | 100% | 100% | 100% | 100% |

* Data not yet available. The 2016 target figure has been used for context.

RTE response within one hour has varied between 84% and 94% historically. We would like to push towards the upper half of this band over time. Our RTE target and definition are aligned to the quality standard specified in our DPP.

**RTE TARGET**

Proportion of RTE within one hour: 80%

Proportion of RTE within three hours: 100%

### 4.4.3. Security and Reliability: Customer Complaints

Although we seek to provide a high standard of service and a safe and reliable gas supply, there may be times when customers have concerns with their service. In these instances, our Customer Service Team takes actions to manage these concerns.

Table 7: Complaints per Customer – historical performance (note: historical figures are for a June–end financial year)

| | FY13 | FY14 | FY15 | FY16 * |
|---|---|---|---|---|
| **Number of Complaints per Customer** | 0.0005 | 0.0006 | 0.0003 | 0.0005 |

* Data not yet available. The 2016 target figure has been used for context.

Historically there has been a move to a relatively low number of complaints and we would like to maintain the level reached as we stabilise our customer management systems.

**Complaints Target**

Number of complaints per customer is less than: 0.0005

### 4.4.4. Safety and Reliability: Outage Timeframes

System Average Interruption Duration Index (SAIDI) measures the total time, on average, that a customer could expect to be without gas over the reporting period. It is a measure of interruptions, including third party damage and excludes interruptions directly resulting from interruptions on the transmission system. It is calculated by dividing the product of the number of interrupted customers and the duration of the interruption (in minutes), by the total number of customers connected to the network and further dividing by 1,000.

Table 8: SAIDI – historical performance (note: historical figures are for a June–end financial year)

| | FY13 | FY14 | FY15 | FY16 * |
|---|---|---|---|---|
| **SAIDI (minutes per 1000 customers)** | 4,950 | 6,960 | 1,180 | 988 |

* Data not yet available. The 2016 target figure has been used for context.

Historical achievement in SAIDI has not yet reached target levels. We are intending to hold the challenging target to continue to drive our focus and investment in reliability.

**Outage Timeframe Target**

SAIDI (minutes per 1000 customers): 988

### 4.4.5. Safety and Reliability: Outage Frequency

System Average Interruption Frequency Index (SAIFI) measures the average number of interruptions that a customer could expect over the reporting period, including those due to third party damage, but excluding those directly resulting from interruptions of the transmission system. SAIFI is calculated by dividing the total number of interruptions on the network in the relevant year by the total number of customers connected to the network and further dividing by 1,000.

Table 9: SAIFI – historical performance (note: historical figures are for a June–end financial year)

| | FY13 | FY14 | FY15 | FY16 * |
|---|---|---|---|---|
| **SAIFI (interruptions per 1000 customers)** | 21 | 31 | 13 | 5.9 |

* Data not yet available. The 2016 target figure has been used for context.

Historical achievement in SAIFI has not yet reached target levels. We are intending to hold the challenging target to continue to drive our focus on reliability.

**OUTAGE FREQUENCY TARGET**

SAIFI (interruptions per 1000 customers): 5.9

### 4.4.6. SAFETY AND RELIABILITY: OUTAGE DURATION

Customer Average Interruption Duration Index (CAIDI) measures the average outage duration of an interruption of supply per customer who experienced an interruption in the reporting period. CAIDI is the sum of the duration of each (excluding transmission) interruption, divided by the total number of (excluding transmission) interruptions.

Table 10: CAIDI – historical performance (note: historical figures are for a June–end financial year)

| | FY13 | FY14 | FY15 | FY16 * |
|---|---|---|---|---|
| **CAIDI (minutes per interruption)** | 241 | 227 | 90 | 152 |

* Data not yet available. The 2016 target figure has been used for context.

CAIDI performance has varied between 90 and 241 historically. We have selected a midpoint target consistent with previous target levels.

**CUSTOMER OUTAGE DURATION TARGET**

CAIDI (minutes per interruption): 152

### 4.4.7. SAFETY AND RELIABILITY: PUBLICLY REPORTED GAS ESCAPES (PRE)

We use Public Reported Escapes (PRE) as its primary technical network service quality measure for operational purposes. It is a critical safety measure and a reliable indicator of the condition of the network. This measure is impacted by a number of factors, including the effectiveness of renewal strategies, the condition and composition of assets, the level of odorant added (which increases the likelihood of PREs), and the extent and effectiveness of leakage surveys.

PRE is calculated by dividing the total number of confirmed public reported escapes of gas on the network (including mains, service pipes, valves, and pressure stations) in the relevant year by the total length of network (mains and services) and further dividing by 1,000.

Table 11: PRE – historical performance (note: historical figures are for a June–end financial year)

| | FY13 | FY14 | FY15 | FY16 * |
|---|---|---|---|---|
| **PRE events per 1000km** | 50 | 52 | 42 | 53 |

* Data not yet available. The 2016 target figure has been used for context.

Historically the performance against this KPI has been good ranging between 42 and 52 events per 1,000km. We are going to maintain the existing historical target.

**PUBLICLY REPORTED ESCAPES TARGET**

Public reported escapes (events per 1000km): 53

### 4.4.8. SAFETY AND RELIABILITY: LEAKAGE SURVEYS

Leakage surveys are a proactive maintenance strategy that attempts to locate gas leaks in the network. Leaks detected by system surveys are a clear indicator of the condition of the network and the effectiveness of maintenance strategies. Renewal strategies play an important role in improving the condition of the gas distribution network and reducing the number of leaks. We survey different parts of its network every year, taking five years to complete an entire network survey. It is therefore not meaningful to compare leak data on a yearly basis; a five year rolling average should be applied to any analysis of overall network condition.

Leak survey is calculated by adding up the number of leaks detected by routine survey and dividing this number into the total length of pipeline and further multiplying by 1,000.

Table 12: Leakage Surveys – historical performance (note: historical figures are for a June–end financial year)

| | FY13 | FY14 | FY15 | FY16 * |
|---|---|---|---|---|
| **Leakage surveys (events per 1000km)** | 0.2 | 0.2 | 0.2 | 1.4 |

* Data not yet available. The 2016 target figure has been used for context.

Historical performance has consistently met target and we intend to continue this level of target while we complete the current series of surveys.

**LEAKAGE SURVEY EVENTS TARGET**

Leakage Surveys (events per 1000km): 1.4

### 4.4.9. SAFETY AND RELIABILITY: POOR PRESSURE

Poor pressure due to network causes is a count of the number of unplanned incidents where delivery pressure drops below contracted delivery requirements. These events can be reported through customer or our own monitoring equipment.

Table 13: Poor Pressure – historical performance (note: historical figures are for a June–end financial year)

| | FY13 | FY14 | FY15 | FY16 * |
|---|---|---|---|---|
| **Poor pressure due to network causes** | 1 | 2 | 2 | 3 |

* Data not yet available. The 2016 target figure has been used for context.

Historical performance has consistently met target and we intend to continue this level of target.

**POOR PRESSURE EVENTS TARGET**

Poor pressure due to network causes: 3

### 4.4.10. SAFETY AND RELIABILITY: ODORIZATION

The purpose of this measure is to ensure the odorant levels of gas conveyed through our gas networks are maintained in accordance with the requirements of the Gas Regulations 1993 and the New Zealand standard NZS 5263 Gas Detection and Odorization.

Monitoring the number of non-compliant odour tests enables us to monitor the level of odour in the gas and identify if corrective action is required. A non-compliant odour test means the odour test result is above 0.9% gas-in-air or where the odorant concentration test result is less than 3 mg/m$^3$.

Table 14: Non-compliant Odour Tests – historical performance (note: historical figures are for a June–end financial year)

| | FY13 | FY14 | FY15 | FY16 * |
|---|---|---|---|---|
| **Number of non-compliant odour tests** | 5 | 3 | 0 | 3 |

* Data not yet available. The 2016 target figure has been used for context.

Historical performance has consistently met target, with the exception of 2013. Moving forward we intend to continue the same level of target.

**NON-COMPLIANT ODOUR TESTS TARGET**

Number of non-compliant odour tests: 3

### 4.4.11. Safety and Reliability: Third Party Damage

Third party damage events to networks are a significant cause of gas escapes and customer supply interruptions. The levels of third party interference damage provide some indication of the network operator's level of success in communicating awareness to those who control and/or are directly engaged in any activities that put gas networks at risk. As described in Section 6, we have a number of strategies, such as public safety awareness communications programmes, which are designed to increase public and contractor awareness and reduce the number of third party incidents.

Table 15: Third party damage – historical performance (note: historical figures are for a June–end financial year)

| | FY13 | FY14 | FY15 | FY16 * |
|---|---|---|---|---|
| **Third party damage (events per 1,000km)** | 59 | 61 | 50 | 67 |

* Data not yet available. The 2016 target figure has been used for context.

Historical performance has consistently met target and we intend to continue this level of target.

**Third Party Damage Events**

Third party damage (events per 1,000km): 67

## 4.5. Asset Management Maturity Assessment Tool

As a regulated supplier of gas distribution services, we undertake a self-assessment of the maturity of our practices in relation to asset management using a prescribed Asset Management Maturity Assessment Tool (AMMAT).

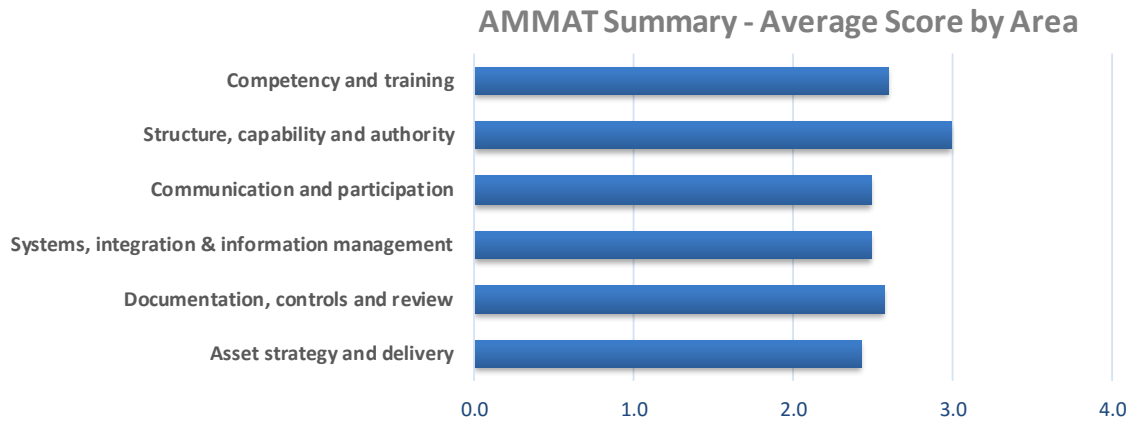
The AMMAT seeks to identify the maturity of a company's current asset management practices, relative to an objective standard based on good asset management practices, such as that described in ISO 55000. The AMMAT consists of 30 questions from the ISO 55000 assessment module, scoring maturity in each asset management area on a scale from zero to four. The detailed results of our self-assessment are included as Appendix C to the AMP.

We support the disclosure of the AMMAT because it allows interested persons to understand how well we are managing our assets against an objective and internationally recognised standard.

### 4.5.1. AMMAT Results

The AMMAT has been used to assess the maturity of our asset management practices. The chart below summarises our AMMAT results and our current level of maturity.

Figure 16: AMMAT Summary



Our initial assessment scored an average of 2.6. We have has set a goal to move to an average score of 3.0 over the next five years.

The AMMAT gap analysis demonstrates that while we have a solid core of competency in asset management. There is scope for improvement in a number of areas.

### 4.5.2. Improvement Initiatives

The AMMAT gap analysis demonstrates that while we have a solid core of competency in asset management there is scope for improvement in a number of areas. To lift our asset management maturity further, we have put in place an asset management improvement plan. Our asset management improvement programme includes a wide range of initiatives, which, together, will achieve sustained improvements in asset management and the long-term performance of our networks. These include:

- Further development of our overall asset management framework, governance and documentation to more closely align with ISO 55000.
- Development of an overall Asset Management Strategy and individual fleet asset strategies. These strategies will integrate lifecycle interventions and set out medium-term investments and implementation plans.
- Further development of asset information systems (e.g. development of a Maximo-based asset information system).
- Increase the level of communication of the Asset Management Policy and Asset Management Strategy to stakeholders.
- Development of asset health indicators and criticality approaches.

Over the next few years these initiatives will result in improving asset management practices, supported by enhanced asset information systems. These will allow us to more accurately assess risk on our system, and in particular, ensure appropriate levels of security.

# 5. SYSTEM DEVELOPMENT

This chapter introduces our approach to developing our gas distribution network. It explains what we mean by system development and our approach to planning these investments. It describes our capacity modelling and demand forecasting approaches. It sets out our development plans for each system.

## 5.1. SYSTEM DEVELOPMENT PLANNING

We use the term 'system development' to describe capital investments that increase the capacity, functionality, or the size of our network. These include the following main types of investments.

- **Growth**: investments are those which change the capacity and/or configuration of our network to ensure we meet demand at appropriate supply security levels. Typically, these investments extend the network to developing areas, or increase capacity or supply levels to cater for general demand growth.
- **Customer connections**: expenditure to facilitate the connection of new customers to our network that may be, at least partly, funded by the connecting third party.

### 5.1.1. PLANNING OBJECTIVES

Our primary objectives in system development planning are to identify and prevent foreseeable network related security[12], capacity and quality (system pressure) problems in a safe, prudent and cost-effective manner. The planning process involves the consideration of:

- The design and operation of the network and any potential safety risk to staff, contractors or the public.
- Supply quality, security or capacity issues that may prevent us from delivering to our target service levels.
- Adequacy of supply to new developments or areas requiring gas connections.
- Customers' reasonable gas supply requirements, inclusive of a prudent capacity margin to cater for foreseeable medium-term load growth.
- Statutory requirements imposed on the network design, including acceptable pressure levels.
- Potential supply quality problems identified from sources such as network measurement and monitoring (system pressure), gas flow modelling and customer complaint databases.

### 5.1.2. INVESTMENT DRIVERS

System development planning is concerned with delivering performance based on the availability of reserve capacity in the network to a level acceptable to the business, or as agreed with our customers. We have a number of key policies, standards and guidelines underpinning our system development planning approach.

- **Quality of supply**: our quality of supply standard specifies the minimum levels of network pressure (including levels of redundancy) to ensure an appropriate level of supply service.
- **Network parameters**: including acceptable operating pressure levels, pipe sizes, flow rates providing an appropriate operating framework for the network. These will generally be aligned with industry norms.

[12] Security as used in a planning context means the security of the gas supply – i.e. the likelihood that supply may be lost.

- **Service levels**: established as part of the use of network agreements with retailers and customers.
- **Technical standards**: ensure optimum asset life and performance is achieved. These ensure that capital cost, asset ratings, maintenance costs and expected life are optimised to achieve lowest overall cost. Standardisation also reduces design costs and minimises spare equipment holding costs, leading to lower overall project costs.

### Quality of Supply

We recognise the importance of supply quality to our customers. Our networks are designed to a quality level that ensures most modern gas-driven equipment can operate effectively. Strategies have been adopted to monitor and manage the impact of quality on the network. These include installation of pressure and flow monitoring equipment at gate stations, district pressure stations and customer sites and the application of modelling software and tools to predict the impact of supply quality on customers.

The capacity of an individual pipeline is determined by the operating pressure, the diameter of the pipe and the allowable pressure difference between inlet and outlet. Meshed distribution systems work under the same basic principle. As the network expands and demand grows, certain parts can become constrained resulting in lower downstream pressures. We therefore prepare regular system pressure monitoring surveys and modelling to identify constraints and implement upgrades before pressures become insufficient.

We have considered several factors in determining the quality of supply applicable to our gas distribution network. These include the degree of redundancy under different circumstances and supply pressure criteria which, when combined, build the overarching quality of supply criteria.

- We have adopted a 1-in-20-year winter incidence (i.e. severity) level, to ensure that distribution capacity shortfalls do not occur at an unacceptably high frequency.
- Under normal network operating conditions, our standard stipulates that the pressure at any point on the network shall be no less than 50% of its nominal pressure (NOP), and no more than 10% above its maximum allowable operating pressure.
- In some cases, non-standard minimum network pressures (MinOP) are used as a result of network configuration or special agreements with customers.

Additionally, our standard defines the minimum network pressures to be maintained using contingency provisions upon loss of a critical element in the supply chain.

- Intermediate pressure (IP) networks shall be operating at no less than 40% of NOP;
- Medium pressure (MP) networks shall be operating at no less than 30% of NOP; and
- Low pressure (LP) networks shall be operating at no less than 1.2kPa.

During contingency conditions, network pressures may drop below those experienced during standard and non-standard operating conditions.[13] In these situations, maintaining network pressure depends on the type of fault and the network configuration. Contingency provisions such as customer load shedding are used to maintain network pressure to the end users.

## 5.1.3. Managing Uncertainty

A number of precautions are taken to mitigate the risks of making long-term investments in an uncertain environment. Apart from normal risk avoidance measures, specific actions taken to mitigate the risks associated with network investments include:

[13] Under contingency situations, networks are isolated to maintain safety to customers and the general public.

- **Act prudently**: prioritise small incremental investments and defer large investments for as long as reasonably practicable. The small investments must, however, conform to the long-term investment plan for a region and not lead to future asset stranding.[14]
- **Optimise with replacement projects**: for large network assets, rather than replace existing end-of-life assets with the modern equivalent, a review is carried out to confirm the continued need for the assets, as well as the optimal size and network configuration that will meet our needs for the next asset lifecycle.

### Planning Timeframes

We produce plans based on near, medium and long-term views. This helps to address the differing levels of uncertainty that apply over different time periods.

- **Near term plan:** is the most accurate and generally captures load growth for the next three years. This timeframe identifies short-term growth patterns, mainly leveraging off historical trends. It generally allows sufficient time for planning, approval and network construction to be implemented ahead of changing network demand.
- **Medium-term plan:** covers the next ten years, and anticipates regional development trends such as land rezoning, new transport routes and larger infrastructure projects. The medium-term plan also captures behavioural changes such as the adoption of new technologies or global trends (e.g. impact of climate change on consumer behaviour).
- **Long-term plan** looks at growth patterns within the region at the end of the current asset lifecycle, around 40 years out. A top-down approach is used to predict probable network loads within the region, from which the requirement for pressure system upgrades or new gate stations and DRSs are identified. The objective of this is less about developing accurate load forecasts and more about providing a long-term development plan, identifying likely future network requirements.

## 5.1.4. Planning Methodology

Planning for growth investments requires anticipated shortfalls in capacity under forecast demand conditions. We plan for efficient and timely investment in additional capacity and security before reliability is adversely affected.

We use demand forecasts and network modelling to provide an accurate picture of future demand growth (or decline) so investment decisions can be made with confidence. When used in conjunction with equipment ratings, it is possible to plan for the required quality of supply margins within the network relative to our quality of supply standard and required service levels.

These developments need to fit within the context of our wider asset management activities (e.g. renewal plans), such that investments are optimised across all business objectives and constraints. We manage our assets using an asset lifecycle approach, which helps ensure these activities are integrated.

Our development planning process involves the following steps.

1. Needs Identification
2. Options Analysis
3. Solution Definition
4. Project Prioritisation

[14] A stranded asset is a financial term that describes something that has become obsolete or nonperforming well ahead of its useful life, and must be recorded on a company's balance sheet as a loss.

### Needs Identification

The need for a growth investment may arise following the identification of any of the following:

- Upcoming supply quality, security or capacity issues that may prevent us from delivering target service levels
- Adequacy of supply to new developments or areas requiring gas connections

In all cases, effective design requires consideration of the forecast planning demand, the capacity of network[15] and the impact of the environment in which the equipment will operate.

Using this information, we are able to monitor the network capacity relative to our quality of supply Standards and thus identify any potential shortfalls between available capacity and expected demand. If these capacity breaches are deemed to require an investment solution or modification to the network, a project will be initiated.

### Options Analysis

Once a modification to the network has been identified as necessary, a project is scoped and a number of possible options are developed that meet the modification's objectives.

These options may be asset or non-asset based, and the optimal solution may not necessarily result in system augmentation. Additionally, there are significant efficiencies that can result from a solution that allows conventional network investment to be deferred without compromising capacity or supply pressure.

In developing options, consideration is given to the following factors to ensure the investment decision is prudent and efficient.

- Currency and accuracy of network capacity rating
- Validated models by collecting actual system pressure data through pressure data loggers
- Load diversity opportunities (e.g. transfer to alternative pipelines or DRSs)
- Leverage of other projects to gain synergies, e.g. asset replacement, road re-alignment or new construction activities
- Use of risk assessment criteria to ascertain risk tolerance, and to test that:
    - the solution cost is not disproportionate to the benefits obtained
    - that recommended solutions are commercially sustainable
    - loss of supply to customers is minimised

The options considered are summarised in a business case that is submitted for project solution evaluation.

### Solution Evaluation

Once developed, the project options are evaluated (both financially and on a risk basis) to identify the optimum investment decision that meets both the project requirements and maintains the current service level to existing consumers.

System development improvements, or non-asset solutions, are preferred to defer system expenditures. If asset solutions are inevitable, smaller projects are prioritised over larger projects to reduce the risk of stranded assets. Early investment is avoided unless there are good reasons to do otherwise (for example, to take advantage of the synergy of implementing in conjunction with other projects).

[15] Including the capacity of all installed equipment. Refer Section 5.2.

### Project Prioritisation

Once we have identified the preferred project solution, we compile a list of development projects including other areas of network investment (e.g. asset replacement), along with their proposed schedule and initial budgets, and commence project prioritisation. Projects are prioritised based on corporate investment drivers, as per the investment prioritisation procedure outlined in Chapter 4.

## 5.2. Network and Asset Capacity

To enable the capacity of the delivery points (and subsequent pressure systems) to be assessed, it is necessary to have a reliable assessment of the capacities of the major components within the network. The major components within our distribution network include:

- Pipelines
- Gate stations
- District regulating stations (DRS)

Determining the capacities of these network components requires a detailed assessment of each sub-component. For example, in assessing the capacity of a DRS, we need to assess the performance ratings of the filter, meter, regulator and other accessories to ensure the sub-component with the lowest rating is identified. Therefore the minimum rated sub-component determines the overall asset rating.

The following subsections describe how the capacities of our major network components are assessed. In all cases, we use maximum operating capabilities to determine the asset capacities.

### 5.2.1. Pipelines

Due to the various pipeline types, network configurations, and varying consumer loads the analysis of pipeline capacity is quite complex. We determine pipeline capacity by examining the relationship between system pressures, pipe diameter and the allowable minimum operating pressure (MinOP). This is achieved using a network modelling tool called 'Synergi Gas'[16], that is capable of determining minimum pressures a pipeline system can sustain under load condition.

We also utilise Synergi Gas for our distribution network modelling.

### 5.2.2. Gate Stations

Our gas distribution network takes supply from the transmission system via gate stations, which are also operated and maintained by First Gas.

The capacity of these gate stations is designed to meet the 10-year forecast load requirements at that point in the network. We base this load on minimum design inlet and outlet pressures, and current load projections on the overall network.

From a gas distribution perspective, it is necessary that we to obtain an ongoing understanding of the design capacity of many of the gate stations upstream of our network. Any capacity constraints imposed at a gate station may impact on distribution investment decisions. Subsequently, by obtaining an improved knowledge of these gate station capacities and constraints, we are able to make improved development decision by offering a wider range of investment options.

### 5.2.3. District Regulating Stations

The purpose of a DRS is to control the pressure in the downstream mains pipeline to which it is connected. Similar to gate stations, we design a DRS with sufficient capacity to supply the 10 year

[16] SynerGi Gas is a proprietary gas network modelling software package developed by DNV.

forecast load. Again based on minimum design inlet and outlet pressures, and current load projections.

These design pressures are based on our quality of supply Standards to ensure adequate supply pressure and capacity across the network.

## 5.3. DEMAND FORECASTING

This section describes our approach to forecasting gas demand on our distribution network.

### 5.3.1. DEMAND FORECAST METHODOLOGY

We use a specially developed model to forecast gas demand on our distribution network. Using this model, we are able to project the winter (annual peak) forecasts at each gate station for the next 10 years based on historical trends by taking the followings steps.

1. We use historical monthly flow data to determine a maximum flow for each quarter. Where multiple meters are present at a gate station, we either sum or average the readings based on the station configuration. Zero, anomalous and incomplete data is excluded from analysis so as to not pollute the results. In some cases, where meter data is not available we utilise system pressure monitoring programmes to assess the network demand.[17] Where a gas network is supplied from two (or more) gate stations, the timing of the network peak gas flow may not coincide with either of the gates stations' flows.[18]
2. We then analyse the quarterly maximum flow values for several factors: long-term trend; business cycle effects; seasonality; and any unexplainable, random variation. As it is usually very difficult to isolate the business cycle effects in networks with a mix of consumers, we assume the trend component comprises both long-term average and cyclical effects. The process of analysing this data comprises two stages.
    a) **Decomposition**: applies moving averages to eliminate the irregular and seasonal variation in the data to identify the long-run growth trend within the time-series.
    b) **Adjustment**: secondly, historical flow data is seasonally adjusted and the trend is then extrapolated[19] and multiplied by an appropriate seasonal index to obtain the baseline long-term demand at each gate station.
3. Any confirmed future connections that are anticipated to have a significant impact on demand are manually added to the demand forecast. The resultant data gives us the long-term demand at each gate station and ultimately drives the expected future network configuration.

### 5.3.2. DEMAND FORECAST

The following chart shows the load forecast for our network based on the modelling methodology described above. The load forecast shows a consistent growth on the network of approximately 5% over 10 years consistent with expected connection forecast identified by Covec.

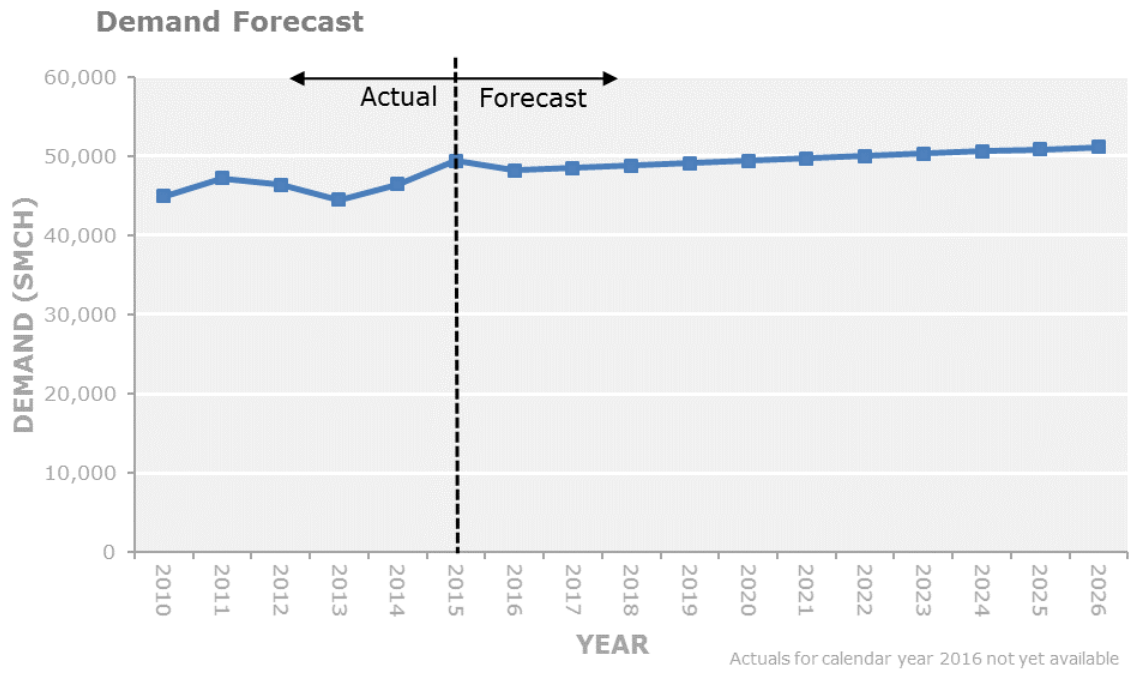
[17] Gate station flow data for Papakura MP4 and Wellsford is unavailable as they have no transmission metering capability.

[18] In such cases, we calculate a coincidence factor which we apply to the growth trend. This is expressed as the maximum peak flow into the network divided by the sum of the individual peak flows of the two gate stations. Similarly, a coincident factor is also applied where two network systems are supplied by one gate station. The coincident and non-coincident demand is the same for gas distribution networks with a single gate station supply.

[19] The extrapolation uses a linear trend except where the trend results in negative values. In these cases, zero growth is applied.

This growth is not expected to be uniform across the entire network, with certain regions identified as having a high growth potential, and others with little or no expected growth. The growth for individual gate stations within the network are further detailed in Appendix E.

Figure 17: Demand forecast for the next 10 years




## 5.4. Network Monitoring

Pressures throughout the network are monitored as part of ongoing surveys routinely undertaken on the network. These programmes are designed to provide the necessary system performance data that facilitates network modelling.

We employ multiple methods to collect the required network performance data, including:

- Manually downloaded or remotely downloaded portable electronic data loggers (e.g. Cello)
- Telemetry data from gate stations, DRS, or other monitoring installations
- Gas consumer time-of-use data obtained directly or indirectly from retailer measurement systems or meters
- Gas transmission Supervisory Control and Data Acquisition (SCADA) system data
- Isolated readings obtained during peak loading conditions

Chapter 6 provides functional and physical descriptions of these systems.

## 5.5. Network Modelling

To model our distribution network, we use a computer modelling tool called Synergi Gas. Synergi Gas is designed to model gas network flow, pressure profiles and capacity margins. We use this software for the following functions.

1. To determine the minimum pressure a pipe system can sustain under load conditions.
2. For scenario analysis when considering development options and assessing forecast demand.
3. To assess the impact of changes to network operating parameters (such as increasing or reducing operating pressure in parts of the network) and to assess network risk.

The majority of our network planning models have been developed from data extracted from our GIS and billing systems and adapted for use using the network modelling software.

Our network models are validated by comparing the model performance to the actual performance of the gas distribution network that is recorded as part of network monitoring. Where the model and actual network performance differ, the model is updated to reflect actual conditions.

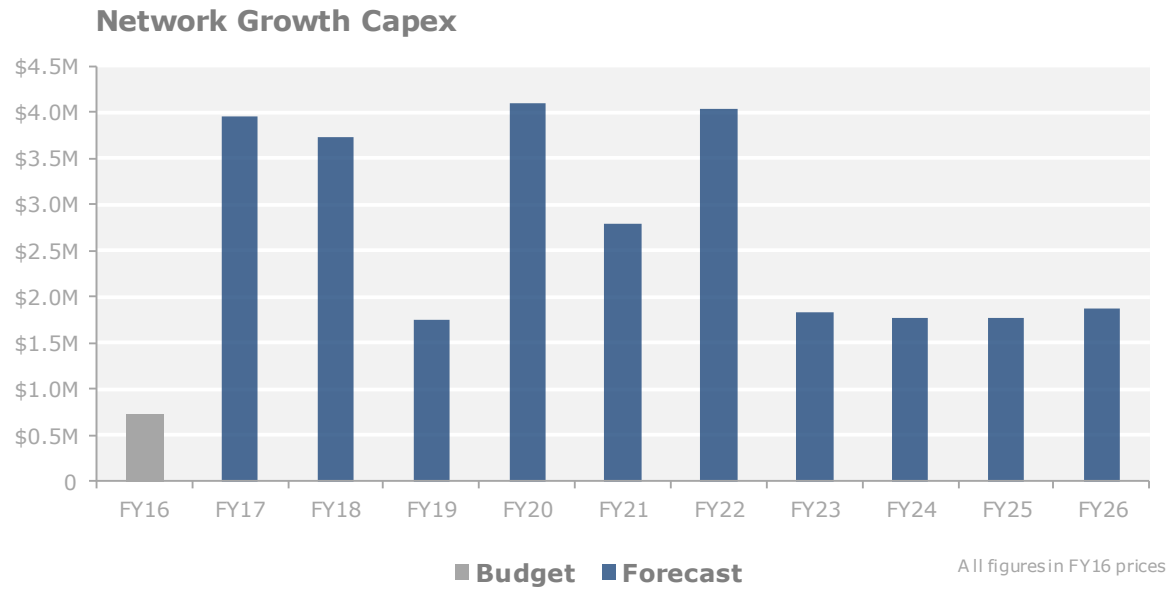
The total system flow for each network model is then scaled to align with the actual peak flow. This alignment is applied evenly across the network by adjusting the existing loads in the model. This becomes the base model for the network or pressure system.

Our network models are updated on a three–yearly cycle.

## 5.6. Network Growth Forecast

In this section we summarise our forecast asset investments to address expected network growth. Our forecast Capex for the planning period is shown in the following chart.

Figure 18: Network Growth Capex




Reflecting the project based nature of this expenditure, the profile for the period is impacted by a number of large one-off projects. In addition to these large projects we expect an underlying 'baseline' level of works. The main works driving the profile are discussed in Section 5.8.

## 5.7. Customer Connections

In our view increased gas availability is good for consumers, providing the power to choose their ideal energy mix at home and at work. We believe that having more gas users, with more diverse needs, will make our business more resilient and will ultimately lead to more competitive prices for our customers. In order to achieve this, we must deliver gas to the consumer cost effectively, securely and ensure connection to our network is as simple as possible.

We aim to work closely, and openly with consumers of all sizes in order to ensure confidence in our quality of supply and viability as a supplier of alternative energy.

### 5.7.1. CONNECTING TO OUR NETWORK

#### Residential

Gas delivers a clean, efficient, and economical source of energy. Providing endless hot water, precise cooking control, heating or to enhance outdoor entertaining, gas is the ideal energy choice.

Consumers interested in making a connection to our network or wishing to check our network coverage should:

- Call the First Gas connections number 0800 NEW GAS (0800 639 427), or
- Visit the First Gas website (www.firstgas.co.nz) to make an online enquiry.

The connection process generally takes around 6 weeks from acceptance to connection and we make all the arrangements. We obtain all the necessary plans and approvals from council and utility companies. Once we have these, we schedule a connection time dependent on demand and weather.

All connection fees are fully disclosed and depend on the orientation of the property, and the distance from the meter position to the property boundary.

Figure 19: Installation of a New Customer Connection


#### Property Developers

Developers wishing to make an enquiry regarding inclusion of gas reticulation into their developments, or to check our distribution coverage can:

- Call the First Gas connections number 0800 NEW GAS (0800 639 427) to talk to one of our development specialists, or
- Visit the First Gas website (www.firstgas.co.nz) to make an online enquiry.

#### Business and Commercial

Our industrial and commercial customers appreciate our ability to offer a gas supply that meets all their needs. We are proud to provide a reliable, economic, clean energy source to some of New

Zealand's most significant commercial and industrial operations that form the lifeblood of this country's economy.

Larger customers that are considering switching or including gas in their energy needs can contact our Commercial Team on 0800 NEW GAS (0800 639 427).

**Check before you dig!**

Parties planning an excavation or renovations on land where underground services may be present (e.g. gas pipes, electricity or other services), need to ensure safety is maintained while work is being carried out.

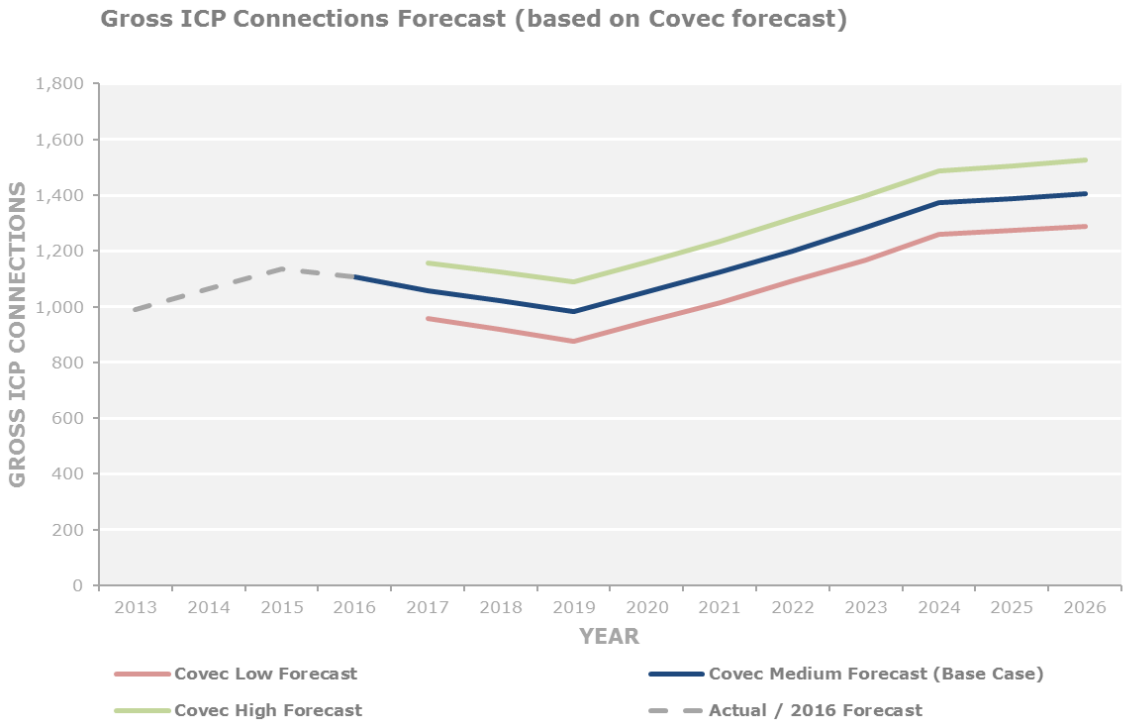
They should contact BeforeUDig by phoning 0800 248 344 or submit an enquiry form at www.beforeudig.co.nz before carrying out any activities that may disturb underground services. Here they will also find network maps, close approach consents and permits to work.

### 5.7.2. Forecasting Customer Connections

In 2014, Covec[20] was commissioned to independently forecast connection rates on the gas distribution network. In this review, Covec verified internal information, and identified that the key drivers for the future increase in new connections were primarily linked to Statistics New Zealand Census data (such as population growth projections and household size) and GDP growth forecasts (as provided by the Reserve Bank of New Zealand). Housing growth was also considered an indicator, but less influential.

Covec's review included three forecast scenarios as shown below to estimate future growth on the network. We have utilised the 'medium' growth forecast as a conservative basis for our connection forecasts in this AMP.

Figure 20: Forecast gross gas connections based on Covec's growth forecasts




[20] Covec is an economic consultant specialising in research, forecasting and public policy.

Unless significant changes are anticipated in gross connection numbers, these growth figures are not used in the demand forecasting described above. It is recognised that this growth is already incorporated into the growth trends interpreted from historical demand profiles. These rates do however form the basis of our investments associated with new customer connections.

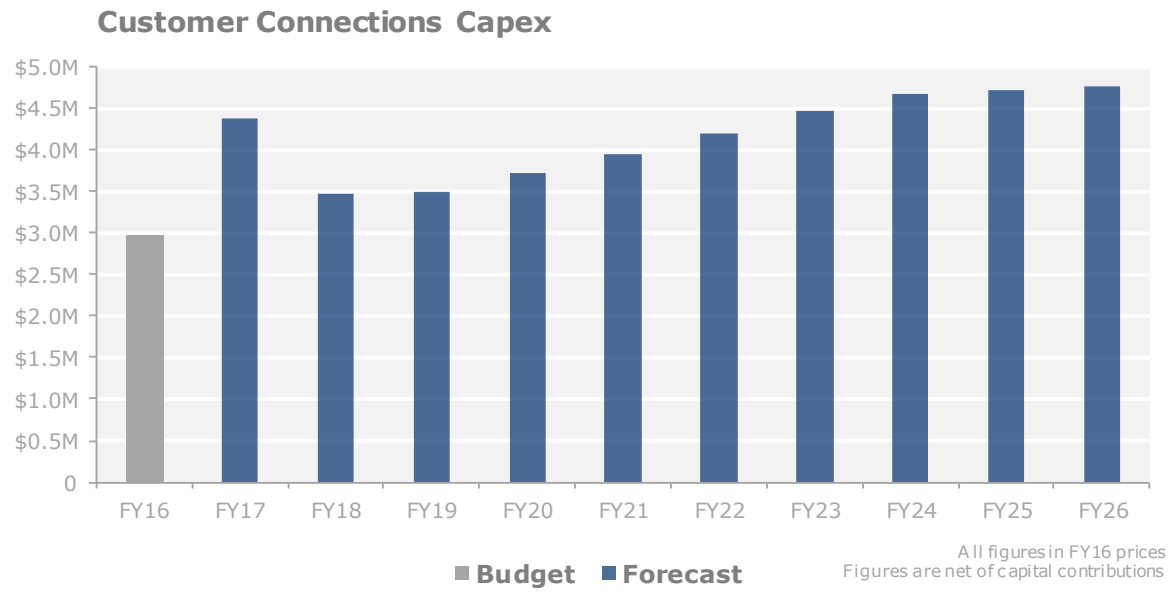
Larger commercial and industrial consumer connection rates are more difficult to predict than residential and subdivisions. As such, we use a more reactive approach to forecasting these loads, incorporating significant connections into the forecast models as requests arise.

The ICP connections forecast, combined with known and forecast subdivision, commercial and industrial connections, informs our forecast Capex spend on customer connections.

### 5.7.3. Customer Connections Forecast

Our forecast Capex for the planning period is shown in the following chart.

**Figure 21: Net Customer Connection Capex during the Planning Period**




The Covec connections forecast influences the trend of customer connections Capex over the planning period. The development of multiple subdivisions in FY17 has resulted in a spike in capital spending for this period.

## 5.8. Network Development Programme

Our distribution network development is managed across a number of pipe systems. Below we set out high-level plans for some of the larger systems, and systems with significant identified growth potential over the planning period. Further information on all systems can be found in Appendix F.

### 5.8.1. Waitoa

The Waitoa network system is supplied from the transmission system from a single gate station located at Wood Road. This system consists of one IP20 pressure system, one MP7 pressure system, one MP4 pressure system, and two DRSs.

A total of 46 consumers are connected to the Waitoa network system including 32 residential consumers and 14 commercial/industrial gas users. At system peak, the gas demand from five major gas users accounts for 95% of the total flow rate.

The Waitoa MP4 pressure system operates at a NOP of 400kPa and supplies gas to four large industrial consumers. Total forecast demand during the planning period is predicted to result in a MinOP of 152kPa (38% of the NOP), therefore falling below the minimum pressure criteria.

To address this issue, a two stage reinforcement project is planned to prevent a system pressure breach, and allow for a limited amount of growth.

- **Stage 1**: extend approximately 5,000m of 160mm MP7 PE pipe from the existing Waitoa MP7 pressure system to connect to a newly installed MP7/MP4 DRS in Ngarua. This will serve to reinforce the current network and prevent system pressure breaches and has a planned commencement in FY18.
- **Stage 2**: relocate the MP7/MP4 DRS further south to a new location, and extend approximately 5,200m of 160mm MP7 PE pipe to the south of Waitoa. This stage allows for further growth expected in the region and has a planned commencement in FY23.

Any significant growth projects (i.e. new commercial/industrial consumers) that may arise during the planning period will require a substantial modification to either the distribution network, or the transmission system.

### 5.8.2. CAMBRIDGE

The Cambridge network is supplied from the transmission system from a single gate station and consists of one IP20 pressure system, two MP4 pressure systems and three DRSs. There are approximately 1,900 consumers connected to the Cambridge network system. They are predominantly residential consumers with around 5% commercial/industrial gas users, including two large industrial consumers.

Recent requests from developers indicate that demand in the area will increase, resulting in the Cambridge IP20 network falling below the minimum pressure criteria during the planning period.

As a result, the following projects are planned to commence in FY21 and run through to FY22.

- Elevate the Cambridge gate station outlet pressure to 1,800kPa
- Construct approximately 3,400m of 80mm IP20 steel pipe from the Cambridge gate station along Zig Zag Road into Swayne Road
- Install a new DRS (IP20/MP4) at Swayne Road

In the Cambridge MP4 pressure system, no constraints have been identified and the system pressure is not forecast to fall below the MinOP. However, to enhance network security the following reinforcements are planned to commence in FY18. These projects have been initiated based on contingency scenario analysis and risk/consequence analysis.

- Construct 1,100m of 100mm PE pipe from DR-80244-CA Queen St to the bridge crossing in Queen Street
- Link 50mm PE pipes in Thompson Street (approximately 450m of 50mm PE)

### 5.8.3. HAMILTON

The Hamilton system is supplied from the transmission system at two gate stations, located at Te Kowhai in the north west and Temple View in the south west. The Hamilton system comprises one IP10 pressure system, one MP7 pressure system, three MP4 pressure systems, one MP2 pressure system, three MP1 pressure systems, five LP pressure systems and 38 DRSs.

The system supplies gas to our largest customer base, with around 28,000 consumers connected to the network. They are predominantly residential consumers with around 4% commercial/industrial gas users.

The only pressure system expected to breach during the planning period is the Hamilton East LP, where the MinOP is forecast to fall to 48% NOP. As a result, the following reinforcement project is planned to commence in FY17:

- Construct 1,150m of 100mm PE pipe at key sites in the Hamilton East LP pressure system.

Due to the criticality of the Hamilton network and the number of consumers served, there are a number of projects scheduled over the coming 6 years to enhance the security of the network. These projects have been initiated based on contingency scenario analysis of the network, and risk/consequence analysis on component failures and include the following.

#### Hamilton IP10

- Upgrading the existing IP pipe from Te Kowhai gate station to Avalon Drive from 1,200kPa to 1,900kPa (FY17)
- Construct approximately 7km of 225mm PE pipe from Te Rapa to Hamilton East (FY20-FY22)

#### Hamilton West MP4

- Install approximately 150m of 50mm PE MP4 in Avalon Drive (FY20)
- Install approximately 100m of 50mm PE MP4 from Roy Street to Livingstone Avenue (FY20)
- Install a new IP10/MP4 DRS at a location in Te Kowhai Road between Exelby Road and Ruffell Road (FY19)

#### Pukete MP4

- Construct approximately 650m of 80mm PE MP4 pipe loop in Te Rapa Road from to Mahana Road (FY19)
- Construct approximately 180m of 50mm PE MP4 from Bryant Road to Te Rapa Road (FY19)

### 5.8.4. GISBORNE

The Gisborne network is supplied from the transmission system from a single gate station and consists of one IP20 network and one MP4 network. About 3,400 consumers are connected to the Gisborne network system. They are predominately residential with around 9% commercial/industrial users.

No constraints have been identified and the system pressure is not forecast to fall below the MinOP criteria during the planning period. However, recent requests for increased gas load from industrial customers may result in the system pressure falling below the minimum pressure criteria. To cater for this potential load growth, the following reinforcements are planned in FY19-FY20:

- Upgrade the metering and regulator equipment at the Gisborne gate station to allow an increase in the outlet pressure
- Construct approximately 1,400m of 100mm IP20 steel pipe in Lytton Road between Aberdeen Road and Manuka Street, Te Hapara

### 5.8.5. MT MAUNGANUI

The Mt Maunganui network is supplied from the transmission system by two gate stations at Mt Maunganui and Papamoa. It consists of two IP20 pressure systems, two MP4 pressure systems and seven DRSs.

Approximately 4,300 consumers are connected to the Mt Maunganui network system. They are predominately residential consumers with around 5% are commercial/industrial users. However;

major industrial and commercial activities are expected in the northern part of Mt Maunganui. Growth and change in gas demand will be dependent on the business development in this area.

The Papamoa East area provides an important opportunity for Tauranga City Council and forms an important part of the Tauranga City Council SmartGrowth, providing significant green field urban development. Multiple commercial/industrial and residential development projects have already commenced.

In order to cater for the anticipated growth, and enhance security in the network, the following reinforcements are planned to the Mt Maunganui system.

### Mt Maunganui IP20

- Create IP20 pipe loops by constructing approximately 2,400m of 80mm IP20 steel pipe along Newton Street, Hull Road into Totara Road Mt Maunganui (FY24-FY26)

### Papamoa MP7

To support growth to the Mt Maunganui network, a new MP7 network will be progressively constructed off the existing Papamoa gate station. This will involve the following:

- Construct approximately 800m of 225mm MP7 PE pipe in Domain Road (FY18)
- Construct approximately 1,000m of 180mm MP7 PE pipe in Parton Road (FY20)
- Construct approximately 1,700m of 225mm MP7 PE pipe in Tara Road (FY19)
- Install a DRS (MP7/MP4) at the junction of Parton Road and Papamoa Beach Road (FY21)
- Install a DRS (IP20/MP7) adjacent to Papamoa gate station (FY20)

# 6. LIFECYCLE MANAGEMENT

This chapter explains our approach to managing our gas distribution assets using a lifecycle-based asset management approach. We discuss this approach and the main activities it will entail during the planning period.

The chapter discusses our main asset fleets, providing an overview of the characteristics that drive our asset management activities. The chapter is structured as follows.

- **Asset Lifecycle Management**: provides an overview of our approach to managing our gas distribution assets.
- **Asset Replacement and Renewal**: discusses our approach to replacing and renewing our assets.
- **Maintenance**: explains our approach to maintaining our assets.
- **System Operations and Network Support**: discusses additional Opex directly related to the management of our gas distribution assets.
- **Asset Fleets**: finally, a series of sections provide more detail on individual asset fleets. This includes describing their characteristics, discussing asset management issues, and setting out key investments over the planning period.

## 6.1. ASSET LIFECYCLE MANAGEMENT

Safety is the key consideration in the design, construction and maintenance of our gas distribution network. As such, we manage our assets in accordance with all relevant acts, regulations and industry standards.[21] Our gas distribution assets are designed and built to deliver gas safely to the service level standards set out in connection agreements with our customers.

To cost effectively achieve the required level of safety and service, the assets have to be kept in good operating condition. This is achieved by replacing, renewing, and maintaining the assets. We use the term asset lifecycle management to describe these activities.

The asset lifecycle approach we use includes the following main activity phases.[22]

- **Develop**: this includes investments in new (or larger) assets to ensure we can meet demand on our network at appropriate supply security levels (discussed in Chapter 5).
- **Operate**: includes real-time network control, monitoring and event response. This involves planning for assets to be safely taken out of service (discussed in this chapter).
- **Maintain**: is the care of assets to ensure they provide the required capability in a safe and reliable manner from commissioning through to their replacement or disposal (discussed in this chapter).
- **Asset replacement and renewal**: includes the replacement of assets with like-for-like or new modern equivalents, and investments that extend an asset's useful life or increase its functionality (discussed in this chapter).

In this chapter we also discuss asset relocations where existing services need to be moved as a result of the activities of other utilities or developers.

[21] In particular, the Health and Safety in Employment (Pipelines) Regulations 1999, NZS 5258, NZS 7901 and AS/NZS 4645 standards require First Gas to operate and maintain a safe and reliable gas distribution asset

[22] Our approach also includes construction and disposal activities.

### 6.1.1. Lifecycle Management Strategy

Our overarching lifecycle strategy is to maintain a safe, efficient and reliable network while ensuring an optimal trade-off between Capex and Opex. Achieving this requires a balance between effective maintenance and prudent asset renewal.

To inform decisions and policy regarding asset lifecycle management, the following strategic drivers are taken into consideration. These form the basis of our long-term asset management, maintenance and asset renewal approaches:

#### Safety:

- Ensure the safety of the public, employees and contractors.
- Ensure our inspection regimes effectively identify safety hazards.
- Protect the integrity of our network and assets by monitoring and managing the activities of other parties.

#### Security and Reliability:

- Ensure the pipe system is designed, operated and maintained to the required standard to provide the agreed level of service.
- Maintain an informed and justified view of the expected life of all asset types based on research, industry practice, experience and knowledge.
- Maintain a feedback cycle from maintenance activities to inform current asset condition and to continually refine the maintenance approach.
- Maintain existing assets in good and safe working order until new assets are built or they are no longer required.
- Ensure pipe system operation is reliable.

#### Environment:

- Preserve the environment by operating in a manner that mitigates environmental risks.

#### Compliance:

- Comply with relevant acts, regulations and industry standards.

#### Communication:

- Ensure an appropriate level of response to customer concerns, requests and enquiries taking into account any pricing and regulatory trade-offs.
- Minimise landowner disruption when undertaking work.

#### Value:

- Strive to achieve the optimal balance between capital and operational costs.
- Ensure pipe system investments and operating activities are prudent and efficient.
- Strive for continual innovation and efficiency improvements in our lifecycle activities.

#### Decision Making:

- Coordinate asset replacement and new asset creation programmes.
- Maintain a business funding approval process aligned to the anticipated replacement or decommissioning of assets.
- Apply innovative approaches to solutions, development and projects execution.

## 6.2. Asset Replacement and Renewal

Asset Replacement and Renewal (ARR) is necessary to address asset deterioration and to ensure that assets remain in a serviceable and safe condition. As the level of condition deterioration increases, the asset reaches a state where ongoing maintenance becomes ineffective or excessively costly. Once assets reach this stage we look to replace or renew them.

- **Replacement Capex:** includes replacing assets with like-for-like or new modern equivalents.
- **Renewal Capex:** extends an asset's useful life or increases its functionality.

If an asset is identified for replacement or renewal, the original design basis is reviewed for validity prior to confirming replacement. During this review we also assess other alternatives, such as the decommissioning of assets. The availability and feasibility of these types of options depends on a range of factors. Our ARR investments are generally managed as a series of programmes focused on a particular asset fleet.

### 6.2.1. Investment Drivers

Optimisation of Capex requires comprehensive evaluation of the condition, performance and risk associated with the assets. From this evaluation, we are able to develop a clear indication of the optimal schedule for asset renewal. In some cases, it may be more efficient to extend the life of an asset beyond normal predicted asset life by renewing the asset.

There are a number of factors taken into account when assessing assets for replacement or renewal including:

- Ensuring Safety
- Legislative and standards
- Asset condition
- Standardised equipment and designs
- Overall lifecycle cost

#### Ensuring Safety

A key strategy is to ensure the safety of the public, employees and contractors at all times. This includes making sure our inspection regimes effectively identify safety hazards. We also focus on protecting the integrity of our network and assets by monitoring and managing the activities of third parties.

There are a number of events or changes that can impact the safety of a pipe network and may result in a change of the identified risk level. Any such changes in design or substantive change to the operating environment lead to a review of network safety. Such changes can include:

- Urban encroachment
- Pipe related incidents
- Findings from routine monitoring
- System improvements
- System modifications
- Inspections and audits

As the network is transitioned to be operated in accordance with AS/NZS 4645, the requirements of the Formal Safety Assessment as prescribed by the standard will be adopted.

The design and operation of the system will not present a safety risk to staff, contractors or the public. This is supported by adoption of safety-in-design principles.

**Safety-in-Design**

We are committed to ensuring that our operations do not put our employees, contractors or the public at risk. This extends to safety being a key focus of the design phase of the work we do - it is at the design stage of creating assets that the greatest opportunity exists to build in safe operability for the whole lifecycle of the asset.

Safety-in-design is about eliminating or controlling risks to health and safety as early as possible in the planning and design stage, so that whatever is designed will be safe to construct, operate, repair and maintain and ultimately, safe to decommission and dispose of at the end of its lifecycle. This concept is implicit in our work practices.

## Legislation and Standards

Our gas distribution assets have been purchased, designed and constructed, and are operated in accordance with the following principal Acts, Regulations and industry codes.

- Gas Act 1992 and Gas Amendment Act
- Health and Safety in Employment Act
- Gas (Safety and Measurement) Regulations
- Civil Defence and Emergency Management Act
- Hazardous Substances and New Organisms Act
- NZS 5258 Gas Distribution Networks
- NZS 7901 Electricity and Gas Industries – Safety Management Systems for Public Safety
- AS/NZS 4645.1 Gas Network Management
- NZS 5263 Gas Detection and Odorization

These Acts, Regulations and industry codes include prescriptive and performance based requirements that have been embedded into our suite of design, construction, maintenance and material specification standards. The purpose of these technical standards is to provide a comprehensive reference source for use by our personnel and others involved in the design, construction and maintenance of our gas distribution network.

We have outsourced the construction and maintenance of our gas distribution network to Field Service Providers (FSP), and our technical standards form part of the contract with the FSP.

## Standardised Equipment and Designs

We use standardised equipment and designs throughout our network.

Standardisation has been applied to pipes, DRS equipment, and installation practices. We may apply differing architectural treatments to DRS to better align with local architecture, however construction techniques, materials and fit-outs align with our well-established standards.

Generally speaking, standard designs are introduced to avoid producing bespoke solutions for similar network installations. We have adopted the approach that when a design is repeatedly used on the network, a standard design is developed. Subsequently, as design improvements are identified (either by our own staff or as feedback from our FSP) standard designs are amended and updated.

A standardised design provides the following advantages when managing our distribution assets:

- Ensures a rigorous equipment selection process to select fit-for-purpose units while ensuring appropriate equipment performance over the life of the equipment
- Delivers cost savings in design
- Lowers project costs through competitive bulk materials supply agreements

- Simplified procurement and reduced stockholding
- Standardised maintenance practices
- Reduced rework during construction
- Safer outcomes and improved mechanism for capturing incremental improvements

The table below identifies some of the key design standards used in the development of our distribution network.

Table 16: Key design standards by asset

| ASSET | STANDARD | DESCRIPTION |
|---|---|---|
| **District regulating stations** | GNS-0001 | Design of district regulating stations |
| **Pipes** | GNS-0002 | Piping system design |
| **Corrosion protection systems** | GNS-0003 | Design of above ground corrosion protection systems |
| **Corrosion protection systems** | GNS-0004 | Design of below ground corrosion protection systems |

## Asset Condition

The condition of our assets is based on FSP surveys, observations, test and defect work schedules. The asset performance evaluation is based on asset fault records and reactive maintenance records.

We emphasise assessing asset condition, performance and risk in order to determine the optimum time for planned repairs, renewals, or replacements. Where practical, all ARR investments are condition-based rather than being driven by asset age. There are a number of exceptions where asset characteristics make condition assessment impractical, e.g. metering systems.

Drivers for replacement are based on factors relevant to the particular asset fleet, and may include:

- They are irreparably damaged
- There is an imminent risk of asset failure
- Assets become obsolete and hence impossible or inefficient to operate and maintain
- Reliability and performance has become unacceptable
- Output from survival models
- Factors affecting the rate of degradation such as the environment
- Failure and outage rate – historic and projected
- Known defects in certain assets or groups of assets
- Limit to acceptable service life such as compliance with safety or environmental regulations
- Asset age and the life expectancy of the asset fleet

## Overall Lifecycle Cost

Optimisation of Capex and Opex is a key consideration. This requires comprehensive evaluation of the condition, performance and risk associated with the assets, to provide a clear indication of the optimal time for assets' replacement or renewal.

Efficiencies can often result from solutions that allow conventional system investment to be deferred without compromising performance or safety. In evaluating possible solutions, we consider the following factors:

- Estimation of maintenance costs over the remaining life of the asset relative to cost of replacement
- Determine whether a change in maintenance or operational regimes would alleviate the identified issue and whether such a change could be implemented safely

- The use of non-network solutions and demand management techniques
- Scope to leverage off other projects (e.g. growth projects) to gain synergies

### 6.2.2. Summary of ARR Capex

Once an asset is identified for replacement, our prioritisation methodology is applied to determine the ranking of replacement projects. This methodology is based on assessing the criteria giving rise to the need for replacement. These include the following:

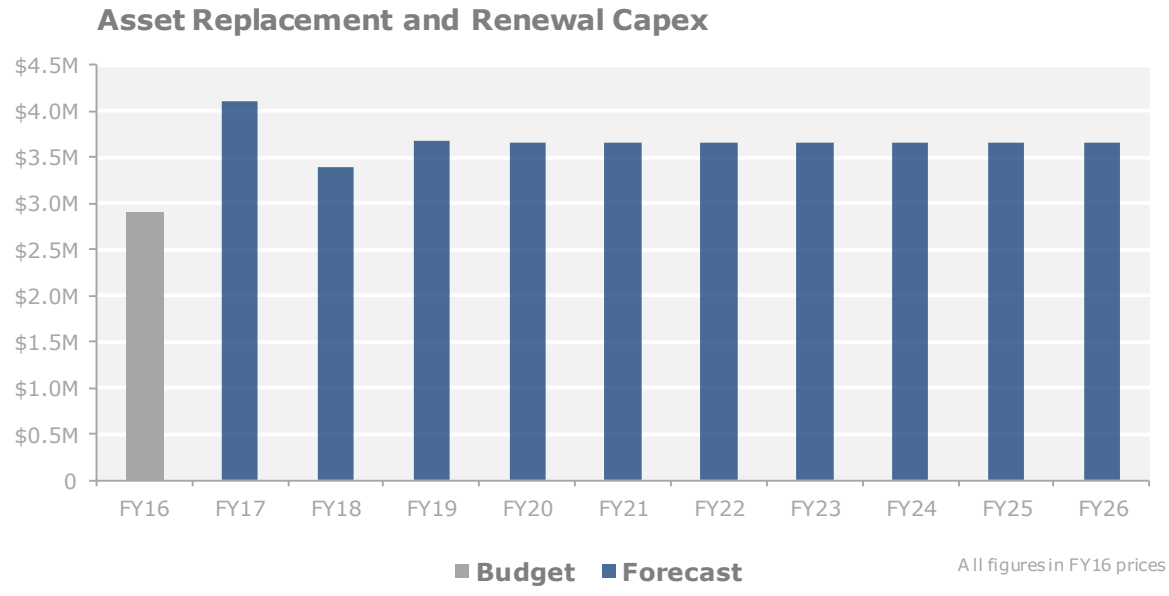
- Health and safety risks
- Customer needs
- The importance (criticality) of the asset
- The impact should the asset fail and the likelihood of such failure
- Risk to other assets
- Potential effects on the environment
- Reputational risk
- Potential financial impacts

The final project prioritisation list, along with budgetary estimates, forms the basis of the annual renewal budgets for each fiscal year.

Our asset replacement and renewal investments need to fit within the context of our wider asset management activities (e.g. system development), so that investments are optimised across all business objectives and constraints.

Our forecast ARR Capex for the planning period is set out in the following chart.

**Figure 22: Asset Replacement and Renewal Capex during the Planning Period**




ARR Capex forecasts are based on actual historical costs for similar renewal projects. The majority of asset renewal work is carried out by our FSP.

Below we highlight a number of key ARR programmes over the planning period. The underlying issues are further discussed in Section 6.5.

**Pre-1985 PE pipe replacement**
PE pipe manufactured up to the mid-1980s is known to be susceptible to premature brittle-like fracture issues. Our distribution network includes approximately 410 km of pre-1985 PE mains and of which 368 km (89%) operate at MP4 and the balance at LP and MP1.

A fault data analysis along with industry practice has led us to implement an ongoing pre-1985 PE pipe replacement programme targeting the replacement of higher risk sections of the pre-1985 PE system prior to their standard design life. Additionally, further risk assessment on the issue, along with possible mitigation measures, is currently being carried out.

**Mechanical coupling / small pipe replacement on Hamilton MP4 steel network**
Mechanical coupler joints were prevalent on the Hamilton network in the 1970s and early 1980s when the majority of the MP4 steel pipes were installed. These couplers have the potential to cause of leakage due to corrosion (i.e. of the fitting and/or pipe), seal failure or movement of the pipe within the coupler. A programme has been implemented to identify and remove mechanical couplers on our network.

**Hamilton CP replacement programme**
Following the completion of the initial stages of the Hamilton MP4 CP system upgrade programme, a problem with the electrical continuity of some steel service connections within the upgraded areas was identified. Following investigations into the cause of the electrical continuity problems, a 5 year programme (FY15 to FY19) to restore CP to the remainder of the Hamilton MP4 steel service pipes is now underway.

**Riser valve replacement**
Prior to the introduction of ball valves in the early 1990s, a plug type riser valve was used for residential and small commercial connections. Because of its mechanical design, this type of valve is prone to seizing and gas escapes.

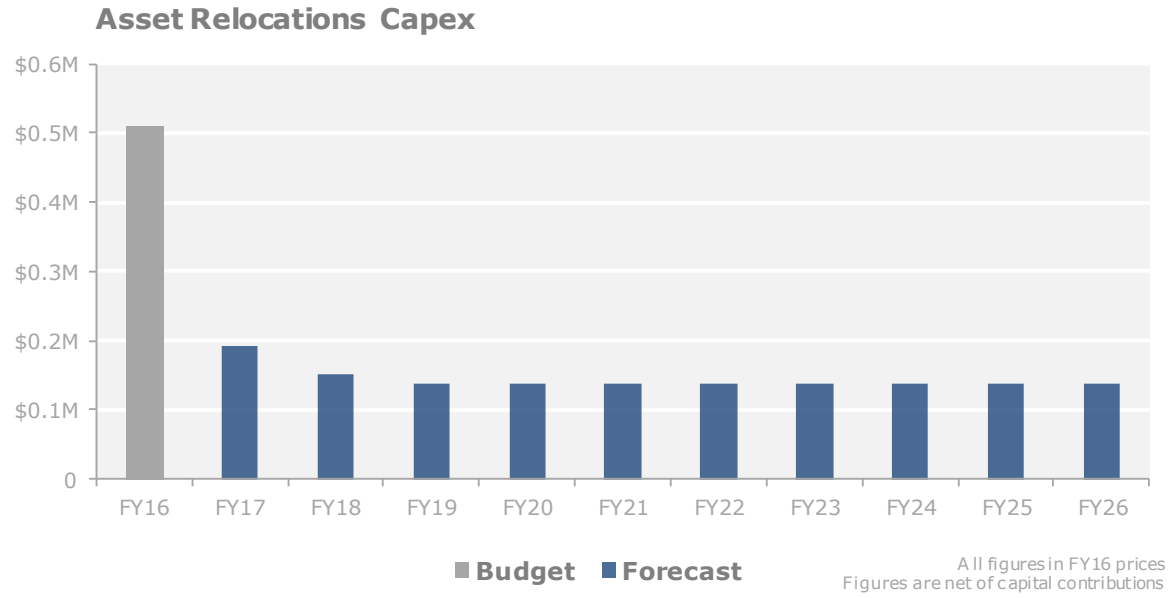
In order to mitigate the risks associated with riser plug valves, annual audits of approximately 1,000 riser valves are undertaken. These audits in high priority areas target areas known to have relatively high populations of plug type riser valves, and are carried out in accordance with the our technical standard GNS-0013 Valve maintenance.

### 6.2.3. RELOCATIONS

We relocate existing services when required as a result of the activities of other utilities, authorities or customers. For example, the development of a state highway in the vicinity of our assets and may require us to relocate the asset. Relocations are identified following third party works notifications. Typically, asset relocations projects are predominantly funded through capital contributions by the third parties requesting the relocation.

Our forecast relocations Capex (net of capital contributions) for the planning period is set out in the following chart.

Figure 23: Asset Relocations Capex during the Planning Period




We have used information about known relocations projects to forecast expenditure in the immediate period. Relocation projects are difficult to forecast beyond the immediate five years, however, and as such our forecast expenditure is based on historical average trends expected over the planning period.

## 6.3. MAINTENANCE

Our overarching maintenance strategy is to maintain our assets to ensure a safe, efficient and reliable network. We will do so while optimising the trade-off between Capex and Opex. Achieving this requires integrating our maintenance approaches and asset renewal strategies.

### 6.3.1. MAINTENANCE APPROACH

Our maintenance approach is designed to ensure that our assets achieve their expected life and to minimise lifecycle costs. We use information obtained in the course of maintenance work to guide our future maintenance programmes and to inform renewal decisions.

We are required by the Gas Act to design, construct, maintain and operate our network in accordance with the Gas (Safety and Measurement) Regulations 2010. This regulation cites both NZS 5258 and AS/NZS 4645 as a means of compliance. We have adopted NZS 5258 as our means of compliance, however this standard has not been updated since 2003 and no further updates of this standard are planned. For this reason there is a move within the wider industry towards adopting AS/NZS 4645.

We have a comprehensive suite of asset maintenance standards that describe our approach to maintaining our asset fleets. There are significant differences required in the approach for different asset types, but as a broad rule the maintenance standards specify the following.

- Required asset inspection frequency
- Routine and special maintenance activities to be carried out during these inspections
- Condition testing that needs to be carried out and the required response to the test results

We are currently in the process of reviewing these technical standards to align with AS/NZS 4645. The review has seen a progressive adoption of specific requirements of AS/NZS 4645. This will continue until the review is competed in FY17, at which time the migration from NZS5258 to AS/NZS 4645 will be complete.

**Maintenance Objective**
The overarching maintenance philosophy adopted for the asset is to provide timely, quality and cost-effective maintenance services to ensure that assets are maintained to support the required level of safety and reliability, availability, output capacity, and service quality.

During the planning period our main strategies to achieve this objective are as follows:

- Regularly review the effectiveness of routine maintenance for each asset type and update our maintenance standards and activities as required to deliver optimum performance.
- Regularly review the effectiveness of our monitoring programme to identify components that may require more intrusive inspection or could have less frequent inspections.
- Ensure that staff are vigilant in identifying activities of third parties working near our assets, and taking appropriate action to ensure the integrity of our network is not compromised.
- Educate the public and customers through regular communication about the dangers of working near our network.

## Activity Drivers

Our approach to maintenance is influenced by a number of factors. These include the number, type and diversity of our asset fleets, their condition and age, and external factors such as legislative requirements, environmental factors and third party activity.

## Maintenance Standards

Our asset maintenance standards are prepared by the Asset Management Team. Asset inspections and maintenance work is carried out by FSP, under the direction of our distribution services group.

We have developed maintenance regimes for each asset fleet. The regimes form a key part of our schedule for planned maintenance. The purpose of these regimes, in conjunction with corrective maintenance, is to ensure assets operate safely and deliver their designed outcomes with regard to life and performance.

As part of the asset maintenance standards, the frequency of inspection and reporting per asset category has also been defined. This forms the basis of the asset maintenance schedule.

All relevant standards are available to personnel engaged in maintenance activities, as well as to our FSP. They must comply with the standards and inspection schedules for each class of assets.

Our standards are updated in accordance with an established review cycle, and any new findings or updates are incorporated in the standards as soon as they are reviewed by the Asset Management Team, and signed off by all interested parties. Our service providers contribute to, and form an integral part of this continuous improvement process.

We monitor progress of our maintenance schedules and associated maintenance costs on a monthly basis. Any concerns identified during asset maintenance or inspections are recorded in an asset management database. Our service providers provide recommendations for the priorities of remedial works for asset defects, which we then reviewed prior to issuing orders for the work. Maintenance priorities are based on cost, risks and safety criteria.

In making a decision to repair an asset we will consider recommendations submitted by our service providers, as well as the factors discussed above. We also take into account the long-term asset plans as supported by trend analysis when making these decisions.

Root cause analysis is normally undertaken as a result of faulty equipment. If this identifies systemic faults or performance issues with a particular type of asset, and if the risk exposure warrants it, a programme will be initiated to carry out the appropriate remedial actions on an asset fleet. We also amend the asset and maintenance standards to reflect the learnings from such analysis.

### Information Disclosure

For the purposes of the AMP we categorise our maintenance work into the following Information Disclosure categories.[23]

- Routine and Corrective Maintenance and Inspection
- Service Interruptions, Incidents and Emergencies

## 6.3.2. Routine and Corrective Maintenance and Inspection (RCI)

Immediately after new assets are commissioned the RCI maintenance regime begins. As an asset ages and its condition worsens, the cost of corrective repairs to maintain fitness for purpose will escalate until it becomes more cost-effective to decommission or replace it. We use ongoing condition monitoring throughout the asset's life to identify the point when the asset should be decommissioned.

Routine and corrective maintenance, and inspection measures may include:

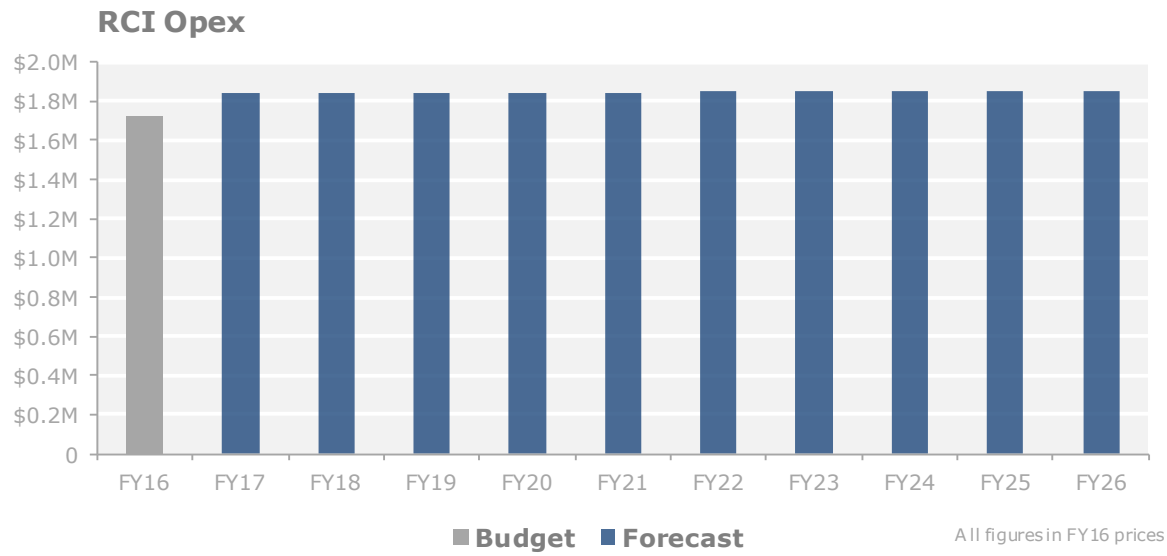
- Pipe patrols, inspection and condition detection tasks and maintenance service work
- The coordination of shutdowns of station facilities, restoration of supply along with the capture and management of all defined data
- Advanced investigative and corrective technologies to extend machinery life such as root cause failure analysis, installation/commissioning performance verification, purchase specification, spare parts management, reliability engineering and research
- Painting and repair of buildings and asset enclosures, removal of decommissioned assets, one-off type inspection and condition detection tasks outside of planned maintenance standards
- Repair of assets identified from programmed inspections or service work assessed to be unserviceable or in poor condition

Taking all of the above into account, maintenance strategies and plans are developed that determine maintenance activities and frequencies. The plans are updated as required on a monthly basis and used to inform our Network Opex forecasts. The routine maintenance and inspection tasks carried out on our distribution network are detailed in Appendix H, along with categorised forecasts for the activities over the planning period.

As shown in the following chart, we have forecast stable RCI expenditure over the planning period. We expect any increasing costs due to network growth to be offset by efficiency gains and improving overall asset condition.

[23] We currently do not assign any expenditure to the ARR Opex category.

Figure 24: Routine and Corrective Maintenance and Inspections forecast for the planning period (real 2016)




### 6.3.3. Service Interruptions, Incidents and Emergencies (SIE)

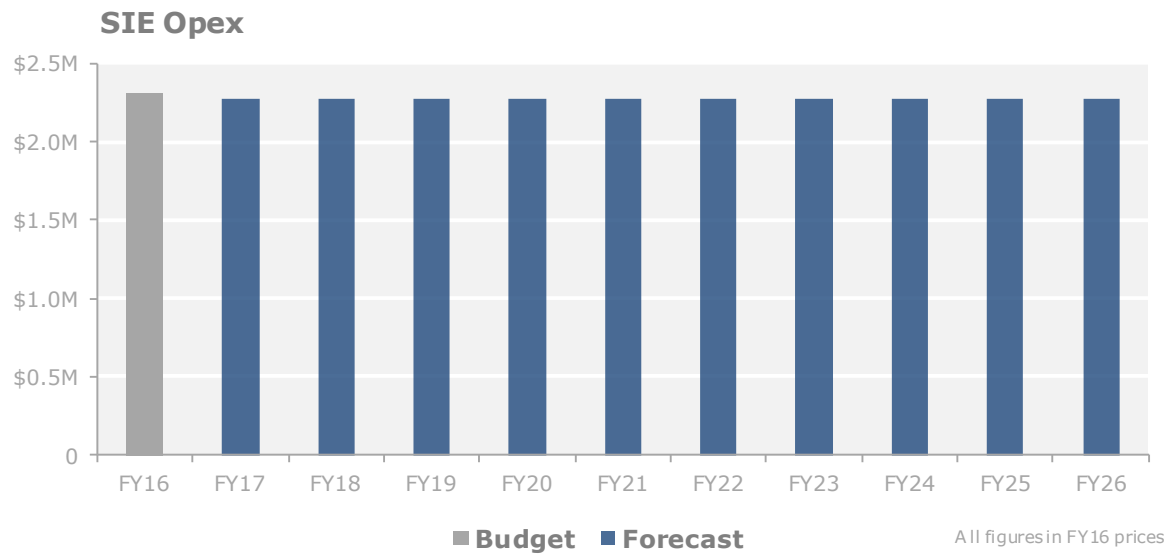
These activities are undertaken directly following incidents or any other work that is required to rectify asset failure or damage to assets caused by unplanned or unforeseen circumstances. This may include the following activities.

- Safety response and repair (or replacement) of any part of the asset damaged due to environmental factors or third party interference
- Response to any fault at a station where safety or supply integrity could be compromised
- Remediation or isolation of unsafe network situations

We take every reasonably practicable precaution to prevent third party interference with our network assets. However, experience and history has shown that emergency situations arise from time to time. In most circumstances pipe integrity breaches do not result in catastrophic failure or rupture of the pipe, and suitable repair methodology and techniques can be applied. In more serious cases pipes may have to be isolated and sections of pipe replaced.

Service interruptions and emergencies Opex is based on historical trends and operational experience. Forecast expenditure is expected to be largely stable (see following chart) over the planning period, as is consistent with our arrangements with our FSP.

Figure 25: Service Interruptions and Emergencies forecast for the planning period (real 2016)




### 6.3.4. Maintenance Delivery

Asset maintenance is delivered by our FSP based on the standards and inspection schedules for each class of asset.

The resources employed by the Distribution Services Team are mainly in-house and are supplemented by the use of external contractors to balance work load requirement as required. The Distribution Services Team is responsible for planning and scheduling maintenance requirements and ensuring that sufficient skilled resources are available to deliver against requirements.

Progress against the maintenance schedules and associated expenditure is monitored on a monthly basis.

## 6.4. System Operations and Network Support

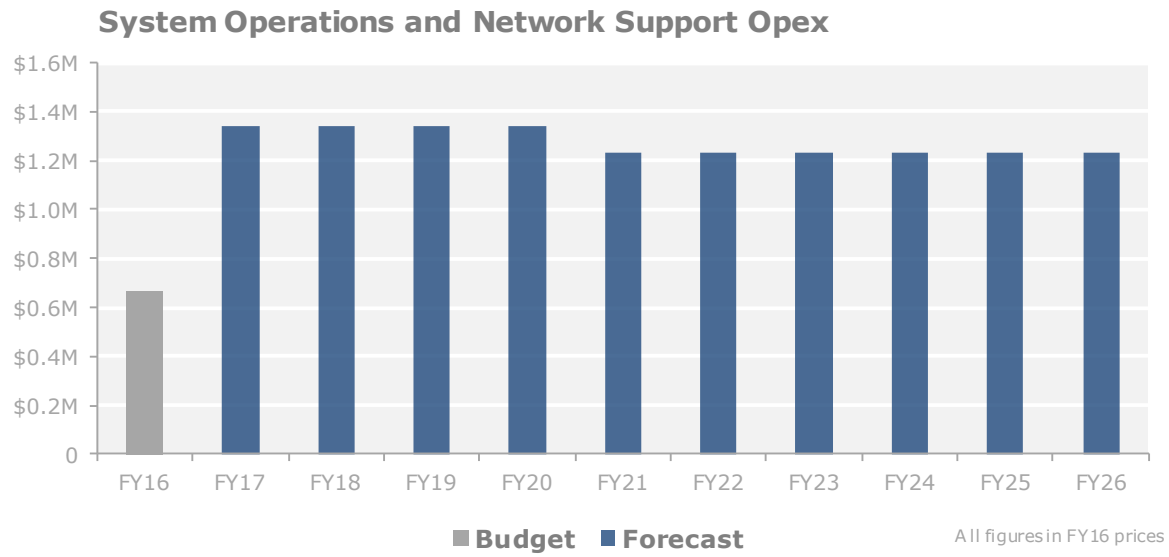
System operations and network support Opex relates to expenditure where the primary driver is the management of the network. These expenses include the following activities:

- Asset planning, including preparation of the AMP, load forecasting, network modelling
- Network and engineering design (excluding design costs capitalised for capital project)
- Network policy development, standards and manuals for network management
- Network record keeping and asset management databases including GIS
- Outage recording
- Connection and customer records/customer management databases
- Customer queries and call centre
- Operational training for network management
- Field staff operational vehicles and transport
- IT & telecoms network management including IT support for asset management systems
- Day-to-day customer management
- Engineering and technical consulting
- Network planning and systems audits

- Logistics and stores easement management, surveying of new sites
- Contractor/contract management
- Network personnel related expenses (e.g. vehicle, travel, training)
- Network related research and development

The forecast is based on historical trends, a bottom up review of network costs and operational experience. The forecast for the planning period is shown in the following chart. It shows a stable trend moving forward. Minor ongoing system transition costs are present through to FY20, at which point they terminate and ongoing expense stabilises.

Figure 26: System Operations and Network Support Opex during the Planning Period (real 2016)




Some notable network support related expenditure areas over the planning period are described below.

## External Specialist Support

Based on historical data and anticipated activity levels it is expected that a number of engineering and design studies will be required to support technical our initiatives, identification of alternative options and decision making. In certain cases, external support may be required to complement our internal skillset, and assist with various activities. Typical activities may include assistance with:

- Identifying failure modes
- Peer review of root cause analysis investigations
- Assistance with particular technical aspects such as civil and geotechnical engineering disciplines
- Peer review of internally developed improvement strategies for coating specifications, CP specifications and buried station pipework risk assessment and prioritisation
- Further assessment of pre-1985 PE pipe failure, including sample testing and analysis, and risk identification
- Engineering standards review for compliance with NZS/AS 4645
- Annual Certificate of Fitness survey
- Investigation of mitigation measures for electrical touch potential issues associated with buried metallic pipes

### Control of Works Adjacent to Pipes

Our pipe integrity engineers have formalised the process by which proposals for activities on or adjacent to the pipe easement are investigated. Suitable responses are formulated in First Gas document Communication and Assessment of Works Adjacent to Pipes.

The Land and Planning Team conduct the following activities.

- Provision of 24/7 one-call number
- Responses to "Dial B4Udig" requests including coordination of pipe locations and easement work permits and advice
- Works adjacent to pipe proposal reviews

## 6.5. ASSET FLEETS

The definitions of asset categories and asset classes used in the AMP are largely aligned with those defined by Information Disclosure and hence those reported in Schedule 12a – Report on Asset Condition included in Appendix B. However, some categories don't map directly (e.g. sub-components) and as such, some of the asset grades recorded in Schedule 12a reflect the overall condition of the asset class or asset category and not the asset grade of the sub-components.

The following sections provide more detail on the individual asset fleets that form our distribution network. This includes describing their characteristics, discussing risks and asset management issues, and providing background information on our key investments over the planning period. It covers the following asset types.

- Mains and service pipes
- Pressure reducing stations
- Line valves
- Cathodic protection
- Monitoring systems
- Special crossings
- Critical spares and equipment

### 6.5.1. MAINS AND SERVICE PIPES

Gas distribution pipes are categorised into the two asset types:

1. **Mains:** generally larger and higher pressure pipe used to transport gas through the network for further distribution and use.
2. **Services:** smaller pipes used to transport gas from a main to a GMS typically installed on the consumer's property.

## Fleet Overview

The composition of our gas distribution network is set out in the table below.

Table 17: Fleet Overview (30 June 2015)

| ASSET CATEGORY | ASSET MATERIAL | LENGTH (KM) | % BY CATEGORY |
|---|---|---|---|
| **Mains** | PE | 2,843 | 90 |
| **Mains** | Steel | 310 | 10 |
| **Service** | PE | 1,327 | 99 |
| **Service** | Steel | 16 | 1 |

The age profiles for our mains and service pipes are shown in the charts below.

Figure 27: Mains pipes age profile

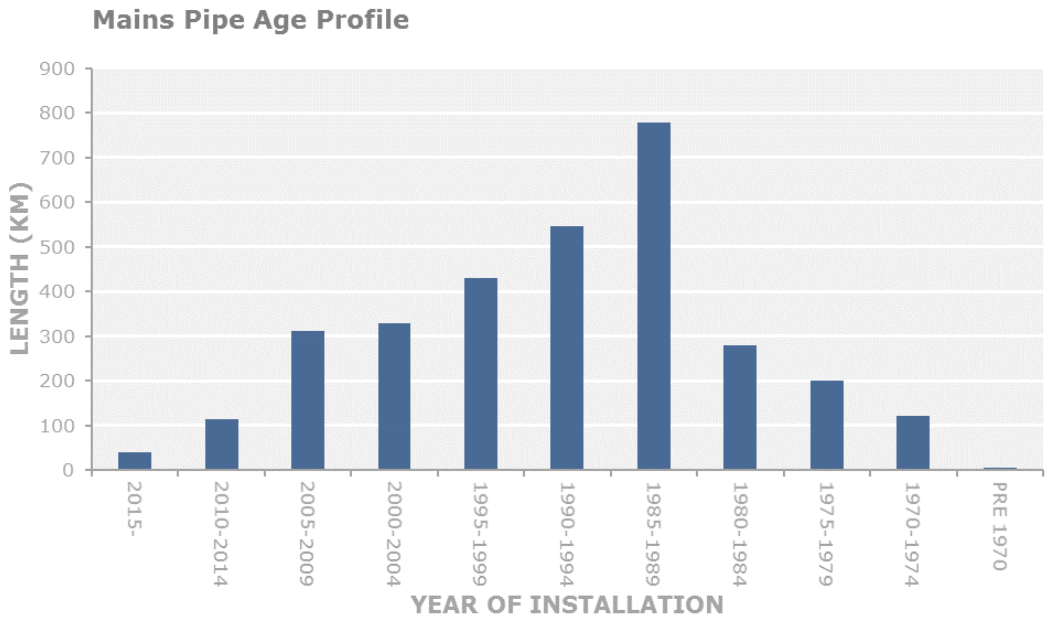
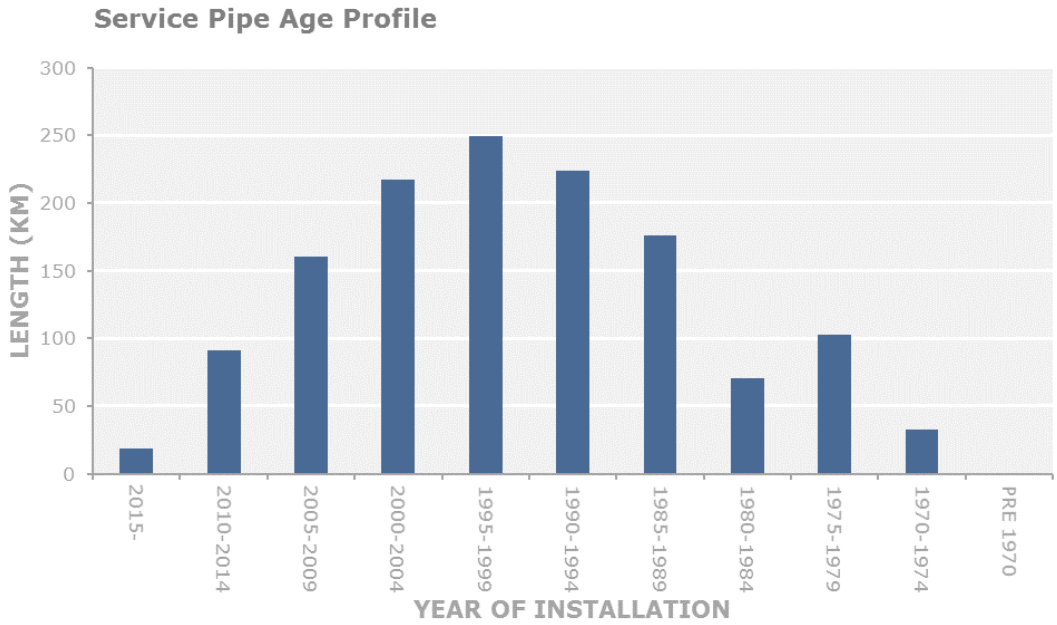



Figure 28: Service pipes age profile



The majority of our mains and service pipes, both steel and PE, have been installed from the late 1980s onwards as the network experiences further growth and the availability of gas increased. The PE network predominantly consists of PE80 material, with PE100 pipes being installed from the late 1990s onwards.

## Condition

### *Steel Pipes*

During recent years, our network has undergone a program to ensure steel pipe systems have adequate CP in accordance with the requirements of NZS 5258 and AS/NZS 4645.

The average age of the steel pipe assets is approximately 37 years. The standard design life for steel pipes operating on a MP network is 60 years, and for those on an IP network 70 years. Based on condition monitoring, the overall condition of the pipes is good. No programmed replacement of these pipes is envisaged within the standard life of the asset.

The replacement of underground steel pipes is expected to continue to be of a corrective nature, targeting specific locations and addressing localised issues rather than a large scale replacement program.

### *PE Pipes*

The average age of PE pipe assets is approximately 22 years. The standard design life of PE pipes manufactured prior to 1985 is 40 years, and the standard design life for modern PE (post 1985) is 60 years.

PE pipes were first used in our distribution network in the 1970s. Early PE materials (i.e. pre-1985) have been known to exhibit premature brittle-like issues. Based on this, we have commenced a heightened monitoring program and risk assessment process. Further information on this issue, and our attitude to the mitigation of this risk, can be found below. However, this issue was resolved in PE materials manufactured post 1985, and pipes produced from this material have been found to be very durable.

Isolated problems have been found with certain PE butt and saddle tee joints due to poor quality control and jointing techniques used in earlier PE systems.

## Risks and Issues

### *Steel Pipes - Mechanical Coupling Joints on Hamilton MP4 Steel Network*

Mechanical coupler joints (e.g. gibault joints) have been encountered on a regular basis on some parts of the Hamilton MP4 steel network. The use of this type of joint (i.e. instead of welded connections) was prevalent on the Hamilton network in the 1970s and early 1980s when the majority of the MP4 steel pipes were installed, but the practice has long since been discontinued. Couplers are a potential cause of leakage due to corrosion (i.e. of the fitting and/or pipe) or movement of the pipe within the coupler. In addition, the presence of couplers can inhibit the level of CP protection available to adjacent sections of steel pipe.

To mitigate the risks associated with mechanical couplers installed on the Hamilton MP4 steel network, an ongoing programme to identify and remove mechanical couplers on this network has been initiated. Historical fault records and construction records are being researched to identify sections of steel pipe that have a higher concentration of mechanical coupling joints. The replacement of these sections of pipe will be prioritised based on PRE levels and condition.

### *Steel Pipes - Small Diameter Steel Pipes*

The Hamilton MP4 distribution system includes approximately 11 km of steel mains pipe with a nominal diameter of 25mm or less.

As conventional stoppling equipment is not available (either locally or internationally) for 25mm diameter pipe or less, the isolation of sections of small diameter steel pipe can only be achieved via the use of isolation valves already installed on these pipes, or by the operation of isolation valves (and/or the installation of stopples) on the larger diameter upstream pipes.

The small diameter steel mains pipe in Hamilton is comprised of pipe sections that range in length from a few metres, supplying a handful of customers, to several hundred metres in length, supplying 20 to 30 customers. As many of the small diameter mains sections do not have isolation valves fitted, in the event that a section needed to be isolated it is likely the isolation could only be achieved by operating isolation valves on the larger diameter upstream system and/or carrying out a stopple operation on the upstream system.

This situation inevitably increases the risk of delays in isolating the supply in emergency situations, and could significantly increase the number of service connections affected by an outage. In order to mitigate the risk, an ongoing pipe replacement programme to replace Hamilton MP4 small diameter steel mains with PE has been initiated.

### *Steel Pipes - Electrical Hazards on Metallic Pipes*

The close proximity of high voltage power networks and buried pipes can result in hazardous voltages on the pipe. The primary mechanisms involved in the transfer of electrical energy to a buried pipe include earth potential rise and low frequency induction. AS/NZS 4853 (Electrical hazards on metallic pipes) requires pipe owners/operators to reduce the risk to personnel and equipment from identified electrical hazards (including lightning) to an acceptable or tolerable level. AS/NZS 4853 also requires the electrical hazards and their controls be documented in an Electrical Hazard Management Plan (EHMP).

AS/NZS 4853 requires the assessment of electrical hazards and associated risks to be carried out over two levels - i.e. level 1 is a conservative assessment and determines if an electrical hazard exists and, if so, whether the risk level is negligible; level 2/3 is a detailed risk assessment of locations that are not accepted as low risk by the level 1 assessment. Because of the nature of the analysis required, it is typically carried out by external consultants who are specialists in this field.

We are currently in the process of developing an EHMP for our gas distribution network. It is expected that an interim EHMP (including prioritisation of detailed electrical hazard studies on at-risk sections, and standard mitigation designs) will be completed by the end of FY16, and the final EHMP implemented (including implementation of mitigation measures) by the end of FY19.

### *PE Pipes Pre-1985*

Our distribution network includes approximately 410 km of pre-1985 PE mains and of which 368 km (89%) operate at MP4 and the balance at LP and MP1. The majority of these mains are located in the Waikato region in the Hamilton distribution system. Additionally, our network contains approximately 116km of pre-1985 service pipe with the majority located within Hamilton.

PE pipe manufactured up to the mid-1980s is known to be susceptible to premature brittle-like fracture issues due to the resin type that was in use at the time of manufacture. The issues occur as a result of stress intensification brought on by the PE pipe being exposed to excessive shear and/or bending forces while in service.

The US National Transportation Safety Board published a Special Investigation Report (SIR-98/01) in 1998 titled 'Brittle-like cracking in plastic pipe for gas service'.[24] The report was produced following the investigation of a number of pipe accidents involving plastic piping cracking in a brittle-like manner.

[24] http://pstrust.org/docs/ntsb_doc30.pdf

The report is recognised internationally. It concluded that much of the plastic pipe manufactured and used from the 1960s through to the early 1980s may be susceptible to premature brittle-like incidents when subjected to stress intensification.

One of the key recommendations made in the report was for gas operators to closely monitor the performance of older plastic piping and to identify and replace in a timely manner any of the piping that indicates poor performance. In the USA the risks associated with pre-85 PE failure have been covered off by a 2009 amendment to the US Federal Pipe Safety Regulations which requires all US gas distribution pipe operators to develop and implement integrity management programmes.

The issues have been found to occur as a result of stress intensification brought on by the PE pipe being exposed to excessive shear and/or bending forces while in service.

Key factors behind stress intensification within PE pipes are:

- Occluded particles contacting the pipes surface
- Pipe squeeze off
- Connections to PE or steel fittings (including butt welding)
- Severe pipe bending

The most recent analysis of faults relating to pre-1985 PE pipes on our distribution network was completed in late 2015 and covered the July 2013 to April 2015 period. The results of the analysis highlighted the following key points:

- The PRE rates for our pre-1985 PE systems were significantly higher than the average PRE rate for the whole of our distribution network
- The PRE rate for MP4 pre-1985 PE systems was significantly higher than the PRE rates for LP, MP1 and MP2 pre-1985 PE systems
- The Waikato region (i.e. the Hamilton system) had the highest rate of PRE
- Squeeze off failures accounted for over 40% of the pre-1985 PE PRE for the 2013 to 2015 period and this was a slight percentage increase on the 2012 to 2013 period
- The pre-1985 PE PRE rate for the 2013 to 2015 period was slightly higher than the rate for the 2012 to 2013 period

The output from the analysis confirms that the strategy adopted during FY2015 to implement an ongoing pre-1985 PE pipe replacement programme targeting the replacement of higher risk (i.e. based on operating pressure, failure consequence etc.) sections of the pre-1985 PE system is still appropriate.

Further assessment of the risk associated with this issue is currently being undertaken to determine the extent within our network. This assessment will consider the prioritisation of pipe replacement in areas where squeeze offs and other activities likely to contribute to stress intensifications as well as other risk mitigation techniques.

### *PE Pipes - Butt Fusion Joints*

Butt fusion jointing of PE pipes was the standard method of jointing PE pipe when PE pipe was first introduced on our network in the early 1970s. This jointing technique continued until the introduction of electrofusion (EF) jointing in the mid to late 1980s - although butt fusion jointing is still considered viable (using electronic controlled processes) for larger diameter pipes, due to the cost benefits it can provide.

Poor quality control and jointing techniques used in the early 1970s and 1980s has resulted in some butt fusion joint issues. This legacy issue has resulted in a higher risk for PE butt joints.

It is estimated that our network includes approximately 368 km of MP4 and 42 km of LP/MP1 older PE mains that utilise butt joints.

Our risk mitigation controls include scheduled leakage survey. PE butt joints are currently replaced on an as required basis and no proactive replacement programme is anticipated unless there is a marked change in butt joint incidents.

### Key Projects

#### *ARP4 - Pre-1985 PE Replacement Program*

Our distribution network contains approximately 410km of pre-1985 PE mains pipe. Pipe of this vintage has been known to be susceptible to premature brittle failure. We are currently implementing an ongoing program to target the replacement of affected pipes in high risk (i.e. based on operating pressure, failure consequence etc.) areas within the pre-1985 system.

Concurrently, we are conducting a detailed risk assessment on the issue to ascertain the mitigation techniques, program schedule, prioritisation and expenditure required moving forward.

#### *ARP4 – MP4 Steel Replacement Due to Mechanical Coupling Joints (Hamilton)*

Legacy mechanical coupling joints on the Hamilton MP4 network are a potential cause of leakage due to corrosion (i.e. of the fitting and/or pipe) or movement of the pipe within the coupling. In addition, the presence of couplings can inhibit the level of CP protection available to adjacent sections of steel pipe. We are conducting an ongoing programme to identify and remove mechanical couplings on our distribution network.

#### *ARP4 – Replacement of Small Diameter Steel Mains (Hamilton)*

The Hamilton distribution system includes approximately 11 km of MP4, MP1 and LP steel mains pipe with a nominal diameter of 25mm or less which is difficult to sectionalise in the event of an emergency where supply needs to be isolated. We are conducting an ongoing pipe replacement programme to replace all Hamilton MP4 small diameter steel mains with PE.

#### *ARP4 – Inspection of Small Sections of Stranded Steel Pipe (Hamilton)*

Field inspections of small sections of stranded steel pipe located within the wider Hamilton MP4 PE network will be undertaken during FY17 to determine if addition CP protection is required at these locations

#### *ASC1 – Unspecified*

Periodically sections of mains and service pipe will be identified that need to be replaced (on an as required basis) due to safety or compliance issues. Examples include pipes located under buildings, or pipes of non-compliant material specification. The expenditure forecast for this item is based on historical expenditure.

## 6.5.2. Pressure Reduction

Pressure reducing stations are those parts of a gas system that link two pressure levels in gas networks, through pressure regulators. They are the points of input to a pressure level and comprise the following three types:

- Gate stations
- District regulator stations
- Service regulators

Pressure stations linking the gas transmission system and a gas distribution network are known as gate stations. High pressure equipment (pressure regulating equipment, custody transfer metering, etc.) within the gate station is operated and maintained by First Gas Transmission, whereas distribution system equipment (i.e. check-metering where installed, and associated valves and

pipework etc.) within the gate station is operated and maintained as part of our distribution networks.

Where a pressure station links two gas distribution pressure networks, it is known as a district regulating station (DRS). These are operated and maintained as part of our distribution network.

The purpose of DRS and gate stations is to automatically control the pressure in the downstream mains, and meet the following service and performance standards:

- Have the capacity to supply the forecast load based on minimum design inlet pressure and design outlet pressure and current load projections
- Be twin stream with each stream meeting the forecast load capacity
- Have adequate over-pressure protection – preferably two safety protection devices including an automatic shut off (ASO) device
- Be accessible at all times and be able to be isolated external to the enclosure
- Have a 35 year minimum life
- Pilot loaded regulator DRSs should maintain delivery pressure at ±5% of set point
- Spring loaded 'direct acting' regulator DRSs should maintain delivery pressure at ±10% of set point
- Normal operation shall maintain delivery pressure at or below Maximum Allowable Operating Pressure (MAOP) at all times
- Under fault conditions, delivery pressure should be maintained at or below 8 kPa for Hamilton LP systems, and at or below 110% MAOP for MP and IP systems
- Each DRS is to have an inlet and outlet isolation valve located at least 5m away from the enclosure
- DRSs must comply with our standards and legislative requirements

A service regulator is used to control the supply pressure to large industrial/commercial consumers. A service regulator is typically comprised of a small-capacity pressure regulator along with upstream and downstream isolation valves. These units are installed upstream of the customer GMS and may be owned and maintained by us.

### Fleet Overview

Our DRS installations comprise the following elements:

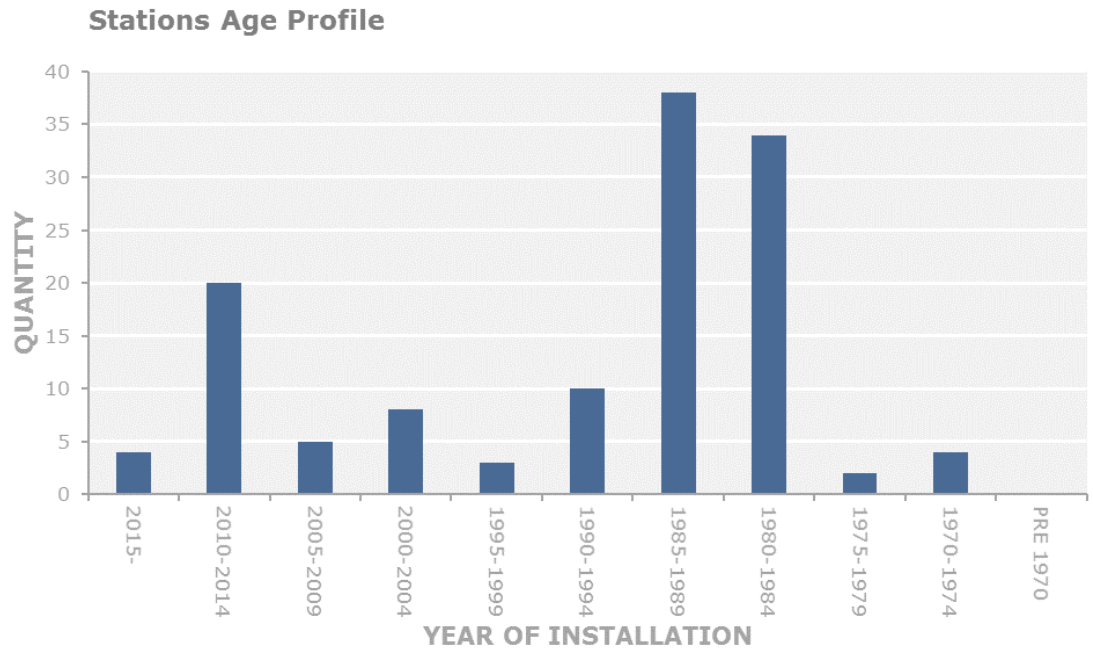
- Remote (fire stop) inlet and outlet isolation valves (in most sites)
- Inlet and outlet valves
- Filters
- Regulators
- Over-protection control – monitor regulators and/or slam-shut mechanism and/or relief valves
- Metering (in some sites)
- Telemetry (in some sites)
- Enclosure – varies from wire mesh to solid timber/concrete block building

The average age of the DRS population is 24 years. The standard life for DRS is 35 years. DRSs are generally installed above ground, but a growing number of factory-built underground DRSs are being installed.

Only two service regulators are in service on our distribution network, both of which are in good condition. One of the service regulators is installed in small pit below ground, and the other is installed above ground.

The age profile for all stations on our network is shown below. The majority of the pressure reduction facilities were installed in the 1980s alongside the growth in the network observed in the pipeline network age. Many of these facilities have been renewed or upgraded with newer sub-components that are not represented in the below data.

Figure 29: Stations age profile




## Condition

An initial field audit of all DRSs was undertaken during FY2010 to provide a baseline against which ongoing condition assessments could be measured and DRS upgrade priorities could be determined. The audit assessed the condition and status of each DRS and covered the following general areas:

- Enclosure dimensions, amount below ground, enclosure type and ventilation provided;
- Confirmation the reliefs valves vented to a safe location;
- Inlet and outlet fire valves present and accessible;
- The condition of the enclosure and ease of access/egress; and
- The condition of DRS equipment – i.e. regulators, pipework, filter, relief valve, meter and corrector.

A condition assessment rating was assigned for each of the DRS components based on the audit results. The assessment rating was based on a seven point scale where one is very poor condition and seven is good condition. Since the original audit was undertaken, a DRS integrity register has been updated on an ongoing basis as DRS upgrades are completed. Currently there are 3 DRS (i.e. 3% of total DRS) that have an average condition assessment rating of 4 (there are no DRS with a rating of less than 4); DRS with an average condition assessment rating of four or less are considered to be high priority for replacement or renewal, however in this case the 3 DRSs are candidates for removal pending the results of network modelling.

The relative priority of individual DRS for replacement or renewal has been further assessed by considering the relative number of low condition assessment ratings (i.e. pipework rating, enclosure

rating etc.) assigned to each DRS. DRSs that have a relatively high number of compliance issues are considered to have the highest priority for replacement or renewal.

The ongoing condition assessments form the basis of our DRSs upgrade programme to address the integrity issues identified. The average integrity score for all stations has shown a steady improvement over the period, and the count of low condition assessment ratings has shown a significant decrease (improvement) over the period.

The two service regulators installed on our distribution network perform adequately.

In terms of DRS performance, one DRS site has insufficient ventilation to meet our design standards - i.e. there is insufficient ventilation and/or the ventilation openings are not adequately distributed on the walls of the DRS enclosure. This site has been assessed and prioritised for upgrading. The upgrade of this site will be completed during FY18.

Due to legacy practices, there is one DRS site where the relief valves are not piped or where the vent pipe ends within 1m of a building. This site is scheduled for decommissioning pending the results of network modelling analysis.

A risk assessment has been carried out on those sites that do not have both an inlet and outlet fire valve. The high-risk sites will be programmed to have the valves installed. Replacement of the lower risk sites will be programmed with other site works.

There are eight sites where the DRS enclosure is located within 1 metre of another building. Some of these sites are scheduled to be rebuilt (and relocated) or decommissioned over FY17 to FY18. The remaining sites are being evaluated to determine if there are any openings into the building within 1 metre (or directly above) the enclosure, or to determine where the hazardous zones are. If there is a hazardous zone within 1 metre of an opening, then options to alter or restrict the hazardous zone are to be considered and implemented.

## Risks and Issues

### *Obsolete Regulators*

There are three known DRSs that have obsolete regulators. Spare parts for these regulators are no longer available and thus they cannot be easily maintained. The three sites are scheduled for decommissioning (pending the results of network modelling analysis) and so no upgrade of the sites is currently planned.

### *Inadequate Pressure Relief Capacity*

Over-pressure protection in our network is often provided by installing full capacity relief valves. With the increase in capacity caused by installing larger regulator orifices/ports, coupled with installing vent pipes on relief valves, some sites may no longer have full capacity relief. Currently there are approximately 13 DRS sites with inadequate relief capacity; four of these sites are candidates for decommissioning (pending the results of network modelling analysis) or upgrading. For the balance of the sites the issue relates to bypass streams with inadequate relief capacity.

### *Over-pressure Protection*

Our standard DRS design for new DRS installations employs two over-pressure safety devices - e.g. a monitor regulator and a slam-shut ASO device. In certain circumstances the DRS design standard allows a single over-pressure safety device to be used - i.e. where the inlet pressure is IP10 or lower, the outlet pressure is MP4 or lower, and the system demand is less than 500 scmh. This standard was adopted after reviewing the DRS over-pressure protection requirements of relevant industry codes, and exceeds the over-pressure protection requirements of AS/NZS 4645.

There are approximately 34 existing DRS sites that have a single over-pressure safety device only, and do not meet our DRS design criteria. Nine of these sites are currently scheduled to be upgraded

by FY18. Although the balance of these sites are compliant with the over-pressure protection requirements of AS/NZS 4645 (i.e. with regard to the number of over-pressure safety devices), a risk assessment will be carried on these sites to determine if the current level of over-pressure protection is adequate. For those sites which are assessed as high risk, the installations will be bought up to current standard (for new installations).

### *Pressure Reducing Stations with Standby Streams*

There are 14 known DRS sites that are twin stream but where the streams are not similar in terms of performance or quality of supply. Generally, one stream has monitor/active pilot loaded 50 NB regulators while the second stream has a single spring loaded 25 NB regulator. The second stream is a standby stream and is meant to be valved off at all times except when maintaining the other stream. An audit and assessment of these type of sites has been carried out to determine if this action (i.e. valving off the second stream) compromises the ability to supply, and the relief capacity if the main stream malfunctions.

Currently six sites have the bypass valved off and a further three sites can have the bypass valved off; of the balance, four sites are to be upgraded or decommissioned by FY18.

### *Equipotential Bonding and Earthing*

We are currently in the process of amending the DRS design standard to require the installation of equipotential bonding on all DRS pipework, the earthing of riser pipework and DRS kiosks (including concrete pad reinforcing and the enclosure structure where appropriate), and the installation of surge diverters (where required) for all new DRS. The amendments to the DRS design standard are being developed in conjunction with the development of an electrical hazard management plan (EHMP) as required by AS/NZS4853.

In order to mitigate electrical hazards that could be present at approximately 110 existing DRS installations, a 3-year programme to retrofit equipotential bonding, earthing and surge diverters (where required) to all existing DRS is planned for FY17 to FY19.

## Key Projects

DRS and gate station maintenance is carried out in accordance with our technical standard GNS-0012 Maintenance of gate and district pressure reducing stations.

All underground sites are inspected quarterly, and all above ground sites are inspected six monthly. The integrity of the site and enclosure is reviewed and all defects recorded. Operation of equipment is checked and variations outside normal conditions are remedied. Remedial actions are recorded.

In addition, on an annual basis the set points of all equipment are checked and confirmed as within operating parameters. Any variations outside normal conditions are remedied. Remedial actions are recorded and all valves are actuated.

Maintenance records are reviewed on an annual basis. Trends are used to confirm the appropriateness of maintenance cycles and drive replacement programmes.

### *Replacement Programme*

The replacement of gate station, DRS and service regulator assets is based on an assessment of the following criteria:

- **Condition**: physical deterioration is excessive i.e. beyond economic maintenance. This includes the enclosure.
- **Functional changes**: obsolete equipment – spare parts no longer available and equipment is not operating correctly; equipment malfunction leads to replacement; third party interference; inadequate/poor design.

- **Site changes**: fire stop valves in the carriageway; new/altered surrounding buildings compromising egress, ventilation and access to fire stop valves; vent pipes too close to new/altered buildings; risk consequence/frequency for DRS increased; flooding.
- **Code/standard changes**: legacy plant layout etc. does not meet current codes of practice/First Gas standards.

A DRS replacement/renewal programme has been implemented based on the criteria described above and the results of ongoing condition assessments. The programme prioritises sites according to condition and risk. Specific projects have been scheduled over FY17 to FY18. The programme targets the replacement or renewal of approximately six DRSs on our network. The programme includes those DRSs that have been assigned an average condition assessment rating of four or less or which have a relatively high number of technical or regulatory compliance issues.

Where a DRS replacement or renewal candidate is scheduled for removal as a result of a system rationalisation study or is scheduled to be relocated as part of a relocation project, the replacement or renewal of that DRS is deferred.

The condition assessment rating was based on the following key assessments:

- Compliance assessment:
  - Fire valve rating
  - Relief valve rating
  - Relief venting rating
  - Ventilation rating
- Condition assessment:
  - Regulator obsolescence rating
  - First Gas technical standards rating
  - Condition of fittings, equipment and enclosure

Priority is also given to those DRSs where the design capacity will be exceeded and to those DRSs which contain obsolete equipment. The scope of individual upgrades range from the complete rebuilding of a DRS to the replacement of individual DRS components, as determined by the latest condition assessment.

There is no planned service regulator replacement programme. Service regulators will be replaced on a reactive basis.

### 6.5.3. Line Valves

Distribution system valves are comprised of inline mains and service valves (to control the flow of gas within the system) and blow down valves (to depressurise sections of the system in the event of an emergency).

Valve types currently in use include ball valves, plug valves and gate valves. Due to their design, ball valves are relatively maintenance free whereas the other types require some measure of periodic maintenance to prevent issues and to ensure they remain operable.

Valves are expected to achieve the following level of service and performance standards:

- Mains are to have sufficient valves to isolate consumers in blocks of 500 to 1,000
- Installation at every 2,000m in PE systems with MAOP greater than 420 kPa
- All IP services are to be fitted with an isolation valve

- All services that enter a building at other than the GMS location, pass through a space where gas could accumulate, cross private property to supply another property, or is one of several extending to different floors of a building, are to be fitted with isolation valves
- Each service shall end with an isolation valve(s) and shall be upstream of the GMS
- Valves are to be installed to isolate high-risk areas, such as CBD areas, bridges and rail crossings (note that these valves may be automatic shut-off valves)
- Valves are easily accessible, operable and leak free
- Valves comply with our standards and legislative requirements

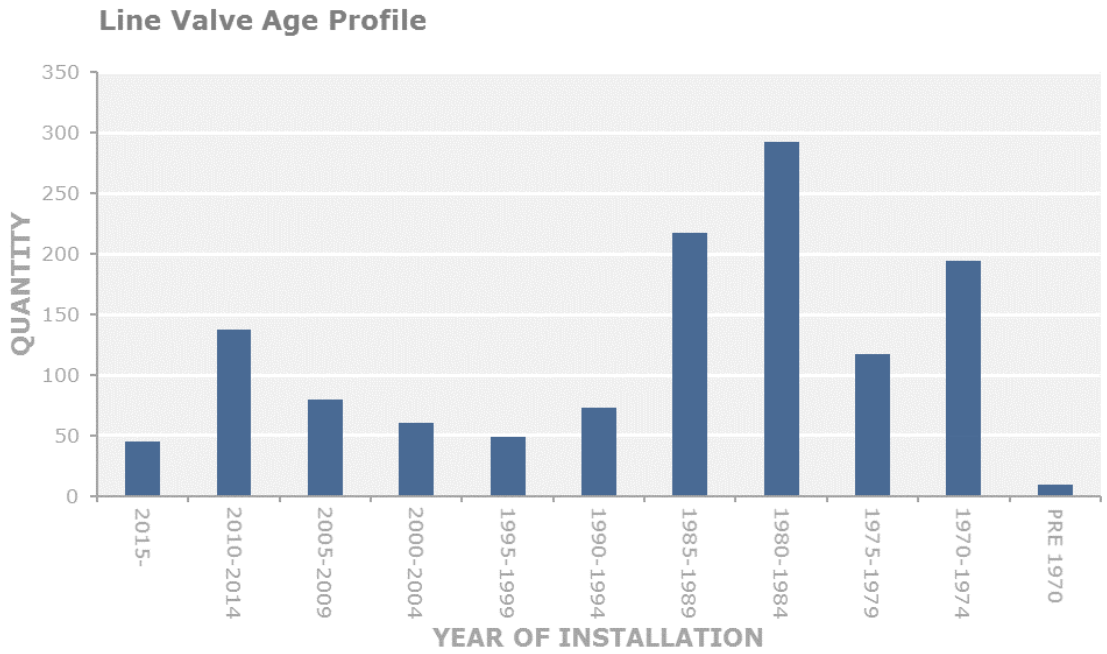
## Fleet Overview

Information on valve types (i.e. ball, plug etc.) installed on our networks is not currently available as it was not historically held in either the GIS or asset management systems. The quantity of plug valves installed on our network is unknown. The use of plug valves ceased around the mid-1980s. Plug valves require a higher level of maintenance, because of their design, which includes regular greasing to prevent the valve seizing and/or leaking.

The age profile for line valves on our network is shown below. Ball valves have been used since the mid-1980s and are considered to be reliable and relatively maintenance free.

Mains and service valves are typically installed below ground. The majority are direct-buried and access to the valve is provided via a valve sleeve. In some cases, (e.g. on larger diameter mains) valves are installed in pits or above ground. Below ground valves are generally operated by a purpose-made valve key, whereas above ground valves are typically operated by a hand wheel and gearbox mechanism. Note references to mains valves excludes valves that are installed above ground at gate stations and DRSs; these are operated and maintained as part of station equipment.

**Figure 30: Line Valve age profile**




## Condition

Ball valves are typically in good condition and operate adequately. Plug valves represent a significant operational and maintenance problem due to:

- The need for continual greasing to overcome seizing problems
- The grease drying out

- Wads of grease contaminating downstream facilities

Some valve sites are susceptible to the access sleeve filling up with debris. This has to be cleaned out before the valve can be maintained.

In some cases, older valves are no longer able to be located. This is typically due to road alterations or re-sealing which result in obscured valve locations. This is an ongoing problem and in order to mitigate the risk, the deployment of electronic locator balls is being trialled.

## Risks and Issues

### *Under Pressure Shut-off Valves*

In the past, road controlling authorities have sometimes stipulated (as part of their consent to attach a gas main to a bridge) that an under-pressure shut-off (UPSO) valve be installed in the pipe on the upstream side (i.e. the supply side) of the bridge. Where UPSO valves were fitted, in some cases they were installed without an appropriate means of periodic testing/tripping of the valve. All known UPSO valves without testing/tripping facilities have now been removed and replaced with ball valves.

Two remaining UPSO valves are known to be in service on our network. Although these valves have the required testing/tripping facilities to allow periodic maintenance to be carried out, they do not have a full bypass installed to allow the valve to be taken out of service if required. The current maintenance standard GNS-0013 Valve maintenance is currently being amended to include provision for the testing of UPSO valves.

### *Valve Activation*

The maintenance programme for ball valves requires valves to be partially operated to confirm that the valve is operable, whereas the maintenance programme for plug valves requires only valves that are “designated emergency valves” to be partially operated.

The reason for different maintenance practices for ball and plug valves is that plug valves can be prone to seizing and by limiting the partial movement operation to critical valves only, the risk of a plug valve seizing in a partially closed position is reduced. However, this approach does increase the risk of a plug valve that is not subject to a periodic partial movement operation seizing during an emergency operation. International practice is being researched to determine an appropriate maintenance strategy for plug valves.

### *Blow Down Valves*

It is an AS/NZS 4645 requirement that section blow down valves be installed on gas distribution networks where shown to be necessary by risk assessment. Due to legacy practices, blow down valves have never been considered for our network. Risk assessments will be carried out on a system by system basis as part of a long-term network isolation study to determine if additional blow down valves are necessary.

### *Riser Plug Valves*

Prior to the introduction of ball valves in the early 1990s, a plug type riser valve was used for residential and small commercial connections. Because of its mechanical design, this type of valve is prone to seizing and gas escapes.

In order to mitigate the risks associated with riser plug valves, annual audits of approximately 1000 riser valves are undertaken. The audits target areas known to have relatively high populations of plug type riser valves, and are carried out in accordance with the our technical standard GNS-0013 Valve maintenance.

### *Sectional Isolation Valves*

It is an AS/NZS 4645 requirement that sectional isolation valves be installed to facilitate the safe operation of the gas distribution network.

A long-term network isolation study of high-risk areas (such as CBD areas) is underway to determine if there are sufficient isolation valves to ensure the safe operation under normal or emergency conditions.

### *Unknown Valve Types*

Information on valve types has historically not been captured in the GIS or SAP-PM systems. This impacts on preventive maintenance scheduling as different valve types (e.g. ball or plug etc.) require different types of maintenance activity. The quantity of plug valves installed on our network is unknown. A review of available valve data will be undertaken and uploaded into SAP-PM where possible. This will be carried out as part of a larger programme to upload asset data into SAP-PM.

## Key Projects

### *Valve Replacement*

In general valves are expected to last the lifetime of the network system to which they are connected. However, valves will be replaced on an as required basis where:

- The valve cannot be practically actuated
- Excessive gas escapes are evident
- In the case of plug valves, the amount of lubricant being installed is compromising the operation of the downstream network
- The cost of maintenance outweighs the cost of replacing/relocating the valve

### *Network Isolation*

The ongoing network isolation study has identified the need for additional valves on key pipe systems to ensure their safe operation under normal or emergency conditions. The installation of additional isolation valves (including DRS fire valves) on our networks is planned for the FY17 and FY18 periods.

### *Whakatane Bridge UPSO*

An upgrade of the Whakatane Bridge UPSO valve to install a full bypass (i.e. to allow the valve to be taken out of service if required) is planned for FY17.

### *Riser Valve Replacement*

In order to mitigate the risks associated with riser plug valves, an annual expenditure provision has been made for the audit of approximately 1,000 to 2,000 riser valves per year.

## 6.5.4. Corrosion Protection Systems

Apart from certain sections of the Hamilton MP4 systems that require CP restoration or installation The age profiles for our mains and service pipes are shown in the charts below.

All steel pipes on our network now have functional CP systems by the provision of a protective coating (e.g. high density polythene) and the application of either an impressed current or sacrificial anode CP system. CP systems are intended to meet the following level of service and performance standards:

- Provide an instant off potential of more negative than 850 mV
- Provide an instant off potential less negative than 1,200 mV when measured with a copper/copper sulphate reference electrode

- Comply with First Gas standards and legislative requirements

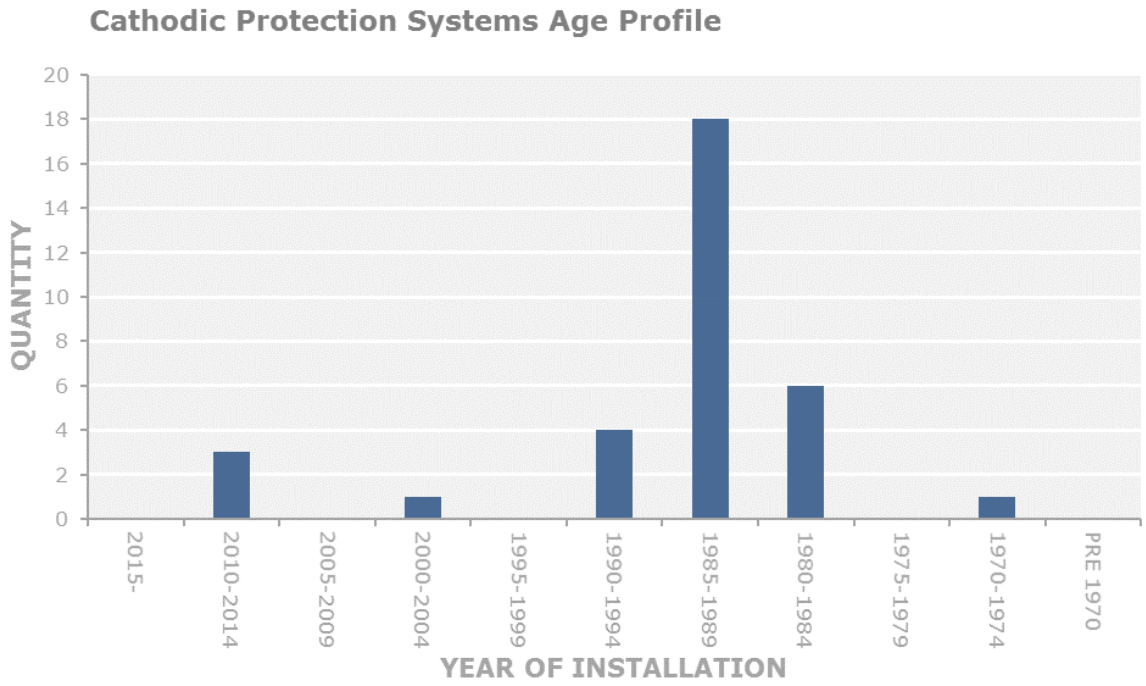
## Fleet Overview

The CP systems in our networks comprise of the following:

- 5 Impressed Current CP (IC) systems
- A further 2 IC systems that are operated and maintained by First Gas Transmission but which also provide CP protection to our distribution network
- Approximately 27 sacrificial anode CP systems
- A number of other small sacrificial anode systems protecting pockets of steel pipe and bridge crossings

As can be seen in the following age profile, the majority of these systems were installed in the 1980s along with the IP and MP steel mains networks.

Figure 31: Cathodic protection age profile




## Condition

Apart from the exceptions noted below, the condition of the overall CP system is considered adequate.

Some CP systems still have inadequate test points to meet the test point spacing requirements of AS2832.1; Further upgrade work is planned to install additional test points on these CP systems to meet the requirements of AS2832.1.

Following the completion of the Hamilton MP4 CP system upgrade programme, we identified a problem with the electrical continuity of some steel service connections within the upgraded areas. Subsequent investigations confirmed that not all MP4 steel service lines within the upgraded areas are electrically connected to the steel mains that they are supplied from and therefore have limited or no CP. A five year programme (FY15 to FY19) to restore CP to the remainder of the Hamilton MP4 steel service pipes has been initiated.

## Risks and Issues

### *Third Party Issues*

Short circuits are an ongoing problem in a number of areas in Hamilton, particularly the CBD. They are generally caused by faulty insulation joints or to the steel pipes touching other utility assets. Due to the nature of the problem and their location, they can be difficult and time consuming to identify and expensive to remedy. These short circuits can take months/years to locate and can cause excessive current drain, which may contribute to early failure of the CP systems.

When GMSs are replaced on steel services, the insulation joints are occasionally improperly reinstated. These can also cause excessive current drain and contribute to early failure of the CP systems. To address this risk a CP insulating joint tag has been developed. The tag is designed to be installed on GMS risers to warn anyone working on the GMS or the riser that an insulating joint is required on the outlet of the riser valve. The requirement to use the tag will be included in the next revision of First Gas' technical standard GNS-0059 Construction of below ground corrosion protection systems.

### *Incomplete Inspection*

The configuration of a small number of sacrificial anode CP systems within our network has prevented instant-off measurements being taken due to the inability to synchronously interrupt the CP system. Although "on" readings are being taken and these give an indication of CP protection, they do not meet the requirements of AS/NZS 4645. The majority of these sacrificial anode systems have now been upgraded by means of installing CP coupons which allow instant-off testing to be carried out.

### *Test Point Spacing*

An analysis of the network CP test point spacing has shown that on some sections of our network the spacing may not meet the requirements of AS2832.1 Cathodic protection of metals. A 6-year programme (FY13 to FY18) to install additional CP test points on our network to meet the requirements of AS2832.1 is currently underway.

### *Cased Crossings*

There are a number of cased crossings of steel pipes on our network. Cased crossings are typically installed on steel pipes which cross under railway lines or major roads etc., and consist of a larger diameter steel duct through which the steel carrier pipe has been installed. Rail and road operators sometimes insist on the installation of cased crossings on the basis that the casing will vent gas away from the rail or road crossing in the event of a fault on the steel carrier pipe.

Cased crossings are generally avoided as the casing can shield the pipe from its CP. In the event that water, or another electrically conducting medium, enters the casing, the steel pipe may be exposed to risk of corrosion. In some cases the actual casings do not have CP, thus over time they will corrode which may lead to problems with water or other liquids entering the casing.

The current checks made to cased crossings are to confirm that the CP voltage readings are different from the pipe readings, and that their readings do not alter while an instant on/off potential survey is carried out. This confirms that the casing and the steel pipe are not touching. A review has confirmed that all known cased sites are being monitored, however further research is being carried out to identify any unrecorded cased sites.

## Key Projects

### *Ongoing Maintenance*

CP maintenance is carried out in accordance with our technical standard GNS-0015 Maintenance of Below Ground Corrosion Protection Systems.

- All impressed current installations are inspected every two months. The output current and voltage are recorded.
- All drainage bonds are inspected every two months. Electrical connections are inspected to ensure satisfactory operation.
- All galvanic installations are inspected to ensure satisfactory operation: three monthly, six monthly and annually in major urban, urban and rural areas respectively.
- All test points are tested three monthly, six monthly and annually in major urban, urban and rural areas respectively. The on and instant off pipe to soil potential measurements with respect to a copper/copper sulphate reference electrode is recorded.
- All test points are tested three monthly and six monthly in urban and rural areas respectively. The on pipe to soil potential measurements with respect to a copper/copper sulphate reference electrode is recorded.
- Electrical isolation points are tested three monthly, six monthly and annually in major urban, urban and rural areas respectively. Any electrical isolation between buried or submerged pipes and other underground metallic structure are tested to ensure they are electrically isolated from each other.
- Interference test points are tested every five years. The on and instant-off pipe to soil potential measurements with respect to a copper/copper sulphate reference electrode is recorded. The testing is carried out in conjunction with the foreign-structure owner with each system being interrupted in turn.

### *Replacement Programme*

In general, impressed current systems are expected to last the lifetime of the network system to which they are attached. However, they will be replaced where the cost of maintenance outweighs the cost of replacing them.

Sacrificial anode systems will be replaced when the anodes have been consumed, or when the CP current requirement exceeds the capacity of the anode system. This may be due to coating deterioration (it is usually more cost effective to increase current to protect coating defects than repair coating defects) or an increase in network size which is beyond the capacity of a sacrificial anode system.

The replacement programmes for our network include an annual provision for the replacement of CP assets as required e.g. installation of surge diverters, installation of new ground beds, upgrade of existing ground beds, replacement of expired sacrificial anodes, relocation of at-risk test points.

A six year programme (FY13 to FY18) is underway to install additional CP test points as required to meet the test point spacing requirements of AS2832.1 for "suburban and high-rise" areas.

The final project of the Hamilton MP4 steel mains CP upgrade programme is scheduled for FY17. This project (i.e. the upgrade of various small standalone steel systems) was re-scheduled due to delays in an associated project to restore CP to steel service pipes.

Following the completion of the initial stages of the Hamilton MP4 CP system upgrade programme, a problem with the electrical continuity of some steel service connections within the upgraded areas was identified. Following investigations into the cause of the electrical continuity problems, a five year programme (FY15 to FY19) to restore CP to the remainder of the Hamilton MP4 steel service pipes is now underway.

In order to further improve the level of CP protection available to the Hamilton MP4 steel network, the installation of a third IC system is being investigated; It is anticipated that the additional IC system will be installed and commissioned during FY17.

### 6.5.5. Monitoring Systems

The primary system we use to monitor our gas distribution networks is the Cello system. We deploy Cello systems at permanent monitoring sites around our network and install temporary Cello units for winter gauging or to obtain customer profiling. The Cello telemetry system monitors pressure data at DRS sites and locations where low pressures are anticipated through modelling.

The Cello system has capability to provide additional functionality that we are not currently using to monitor our network. Investigation is being carried out on areas of expanded functionality where net benefits may be gained. Examples of areas where this functionality could be expanded include:

- Monitoring of a DRS slam-shut sensor (this is being evaluated currently)
- Monitoring of unauthorised entry to DRS station
- Detection of gas escapes at DRS stations
- Remote monitoring of CP sites

#### Fleet Overview

Our network previously consisted of ten Telenet equipped remote terminal monitoring facilities that provided live monitoring data. The automated functionality of these sites has since been deactivated as they were deemed to provide insufficient benefits for the cost. The monitoring data collected by these sites remains capable of manual download, however the automatic transmission of telemetry data is no longer used. Alternate solutions to data collection at these, and other sites are currently being reviewed.

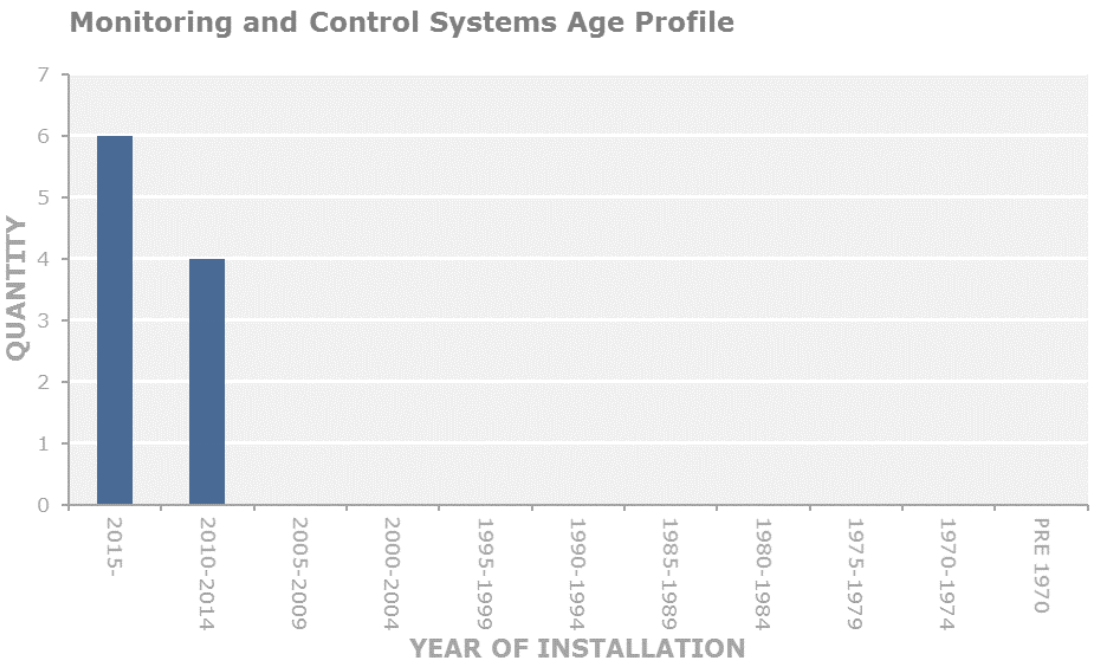
Permanent Cello data logger installations currently provide pressure monitoring at approximately 45 DRS and other locations.

The Cello system is comprised of GSM remote data loggers that use SMS messages for communication, and a receiving PC located at our New Plymouth Bell Block office. The Cello unit itself is an intrinsically safe unit that can monitor flow and pressure and initiate alarms. Data collected from Cello sites is accessible via a Wonderware data historian.

In addition to the Cello units, approximately 30 further units are used as portable data loggers for winter gauging or performance analysis purposes.

The following age profile highlights the replacement programme of Cello units based on their short standard service life, with all current monitoring assets being installed from 2010 onwards.

Figure 32: Monitoring and Control Systems age profile[25]




### Condition

The average age of our remote monitoring units is approximately 2 years. All sites perform adequately with no performance or reliability issues, and all equipment is in good working order.

The average age of Cello units installed at permanent monitoring locations is throughout our network is approximately 4 years. The standard life for the batteries within these units is 5 years.

The Cello system performs reliably and adequately, and all equipment is in good working order.

### Risks and Issues

Currently there are no significant risks associated with the Cello telemetry system.

### Key Projects

Currently there are no significant projects associated with the telemetry system.

## 6.5.6. Special Crossings

Special crossings are locations where a section of pipe is installed either above or below ground in order to cross over a roadway, river, railway or any area of interest with a differing risk profile from a standard installation.

### Fleet Overview

Special crossings are typically attached to road or rail bridge structures, although in a few cases they are attached to dedicated pipe bridge structures. These crossings are comprised of either a PE or a steel carrier pipe. Where the carrier pipe is PE it is encased in a steel or PVC duct in order to provide physical and ultraviolet protection to the carrier pipe. The duct is typically attached to the bridge structure by means of galvanised or stainless steel fittings. Where the carrier pipe is steel it is

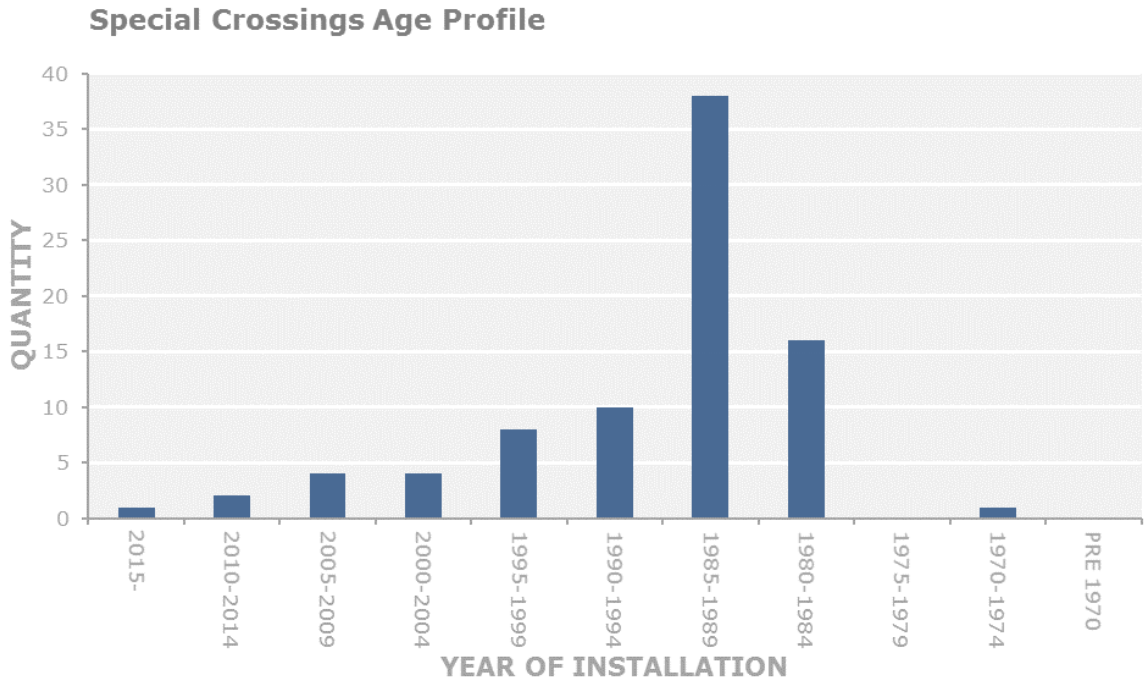
[25] Age profile for monitoring and control systems includes assets categorised as “Remote Terminal Units”, and therefor excludes Cello data logger units.

typically either painted or wrapped (to provide corrosion protection) and attached directly to the bridge structure by means of galvanised or stainless steel fittings and rollers.

Ensuring adequate access to the special crossing to carry out maintenance inspections is an ongoing challenge at some special crossing sites. This can be due to the physical design of the bridge structure (e.g. the carrier pipe is encased within the structure), or the need to obtain approval (i.e. from the structure owner or operator) to gain access to the bridge structure.

Our distribution network currently has 84 special crossings, the majority of which were installed from the late 1980s onwards. The figure below shows the age profile of the special crossings in our distribution network.

Figure 33: Special crossings age profile




## Condition

We have completed detailed condition assessments for the majority of the special crossings on our distribution network that indicate that approximately 60% of special crossings are in good or reasonable condition. The remainder of our special crossing sites require various levels of upgrade work over the coming planning period. Additional budget allowances have therefore been included in the capital and operating expenditure forecasts to cover a range of upgrade work including the replacement of damaged or loose bracket fixings and damaged or poorly designed pipe support brackets, and corrective maintenance work to repair pipe coating damage and ground to air interfaces etc.

## Risks and Issues

### *Environmental Exposure*

Special crossings installed over waterways (particularly estuaries) and high-volume roads (e.g. motorways) are exposed to a harsh physical environment which can compromise the integrity of pipe coatings and support brackets. Where above ground crossings are attached to bridges, additional risks are present due to the potential impact on the general public in the event of a pipe incident or due to corrective maintenance activities. Targeted maintenance inspections are carried out to mitigate the risks associated with these crossings.

### *Seismic Resilience*

In 2012, a seismic review of critical gas distribution infrastructure was commissioned to assess certain assets for compliance with the seismic provisions of NZS 1170. The review included two bridge crossings - one each in Hamilton and Whakatane. The subsequent report included recommendations to improve the seismic resilience of both bridge crossings.

A detailed design to improve seismic resilience of the bridge crossing located in Hamilton was obtained from a specialist consultant and the recommended upgrade work was completed during FY16.

A detailed design was also obtained for Whakatane bridge crossing, however because of the complexity of the design (due to the physical constraints of the bridge structure) this option was not adopted. Instead an existing UPSO valve located on the gate station side of the bridge and an existing non-return valve located on the opposite side of the bridge will be upgraded during FY17. This will allow periodic maintenance and testing of these valves to be carried out to ensure that in the event of a failure of the bridge crossing the gas supply across the bridge would be isolated.

### Key Projects

The following special crossing projects are planned for the forecast period:

- Upgrade work on the UPSO and non-return valves located either side of the Whakatane bridge crossing is planned for the FY17 period to allow periodic maintenance and testing of the valves to be carried out.
- Upgrade work is planned for the FY17 to FY21 period to address specific asset condition issues identified by the recent detailed condition assessments and includes the replacement of damaged or loose bracket fixings and damaged or poorly designed pipe support brackets.
- Additional corrective maintenance work is planned for FY17 and FY18 to address specific asset condition issues identified by the recent detailed condition assessments and includes the repair of pipe coating damage and ground to air interfaces etc.
- A small annual expenditure provision has been made to allow for the replacement of pipe brackets and supports as required due to integrity issues.

## 6.5.7. Critical Spares and Equipment

A stock of critical spares and equipment is maintained so the repair of a network fault is not hindered by the lack of availability of required parts or equipment. Critical spares and equipment items for our networks are owned by us, and held our behalf by our FSP. When new equipment is introduced to the network an evaluation is made of the necessary critical spares and equipment items required to be retained to support the repair of any equipment.

The majority of the critical spares and equipment items are held in our FSP's main depot in Hamilton, with small inventories also being held at regional depots in Whangarei, Mt Maunganui, Rotorua, Taupo, Gisborne and Kapiti.

Additional lists of critical spares and equipment are maintained for each of the FSP's emergency depots. These lists have been developed over a period of time and are the result of collaboration between ourselves and our FSP. When new critical spares and equipment items are required they are typically sourced via our FSP. Where the scale of a proposed purchase warrants it (e.g. the purchase of a major equipment item), direct purchase by First Gas would take place.

### Fleet Overview

The critical spares and equipment lists include items that are low volume (turnover) or high cost, or have long lead times for purchase, or are no longer produced (obsolete) or where the level of risk associated with not holding a spare is considered high.

The list includes fittings and equipment related to steel pipes (e.g. TD Williamson drilling and stoppling equipment, repair clamps, valves), DRS spares (e.g. Cocon cartridges, regulators) regulator overhaul kits and PE fittings. The need for the wide range of items is due to the relatively long lead times to obtain replacement parts from key suppliers and the geographic spread of our network.

### Condition

The general condition of the critical spares and equipment is adequate. Some of the equipment (e.g. TD Williamson drilling equipment used for hot tap operations on live steel gas mains) is at least 25 years old and its current condition reflects the relatively high level of service. The standard life for critical spares (i.e. excluding critical equipment) is 50 years.

An appropriate range of critical spares and equipment is held within our FSP network. The performance of the critical equipment items is adequate, although in some cases the type of drilling equipment currently held limits the range of specialised fittings that can be used e.g. completion plugs. The compatibility of equipment with the range of specialised fittings currently available will be considered when planning the replacement of existing, or the acquisition of additional, items of critical equipment.

### Risks and Issues

A replacement programme for critical spares and equipment has not been formalised. An audit of critical spares and equipment was completed during FY16 to confirm stock holdings.

The management of the critical spares and equipment inventory and associated preventive maintenance inspections is carried out within our FSP's data-warehouse system. We have access to the critical spares and equipment inventory data via a web-based Citrix report, however preventive maintenance inspection records are not currently included in the report. Options to provide further visibility to preventive maintenance records will be explored following the network transition.

### Key Projects

The development of a replacement/renewal programme for critical spares and equipment is expected to be completed in FY16. A nominal annual expenditure provision has been made for the replacement of unspecified critical spares and equipment on an as required basis.

# 7. ASSET MANAGEMENT SUPPORT

This chapter discusses the functions and capabilities that support our day-to-day asset management activities. It describes our:

- **Non-network assets**: including our Information and Communications Technology (ICT) systems and office facilities
- **Business support**: activities that support our gas distribution service

## 7.1. NON-NETWORK ASSETS

This section discusses our non-network assets. It explains our approach to delivering ICT capabilities and managing associated assets. It also discusses our other non-network assets (e.g. our buildings).

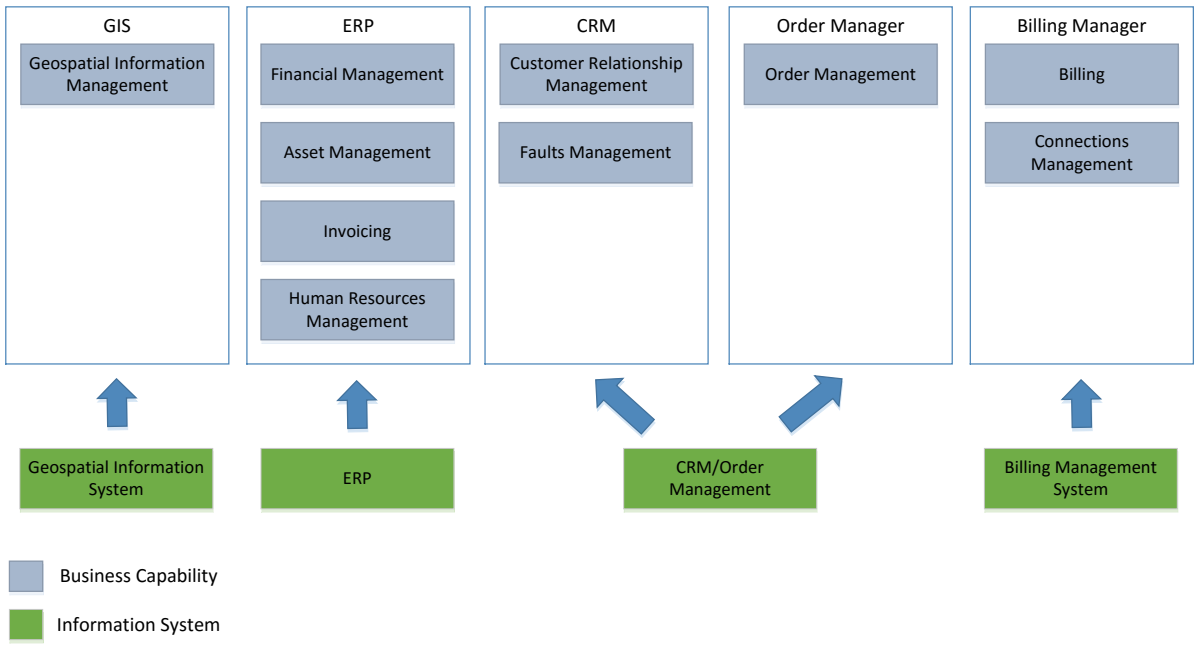
### 7.1.1. ICT ASSETS

We are in a transition period during which we have progressively taken control of asset management activities on the network. This transition includes the management of ICT systems. These systems and functions include:

- **Core network related systems**: support capabilities that manage information directly relating to First Gas network assets and their operation and management.
- **Supporting network related systems**: are smaller systems that support capabilities that manage information that also directly relates to First Gas network assets and their operation and management.
- **Supporting ICT infrastructure systems**: support the integration and operation of both the core network and supporting network related systems.

The following diagram illustrates the relationship between our business functions and processes, hereafter referred to as business capabilities, and our core network related systems.

Figure 34: Business Capabilities and Core Network Related Systems



We expect to invest significantly during the initial years of the planning period to ensure we have a fit-for-purpose ICT infrastructure.

### 7.1.2. Information and Data

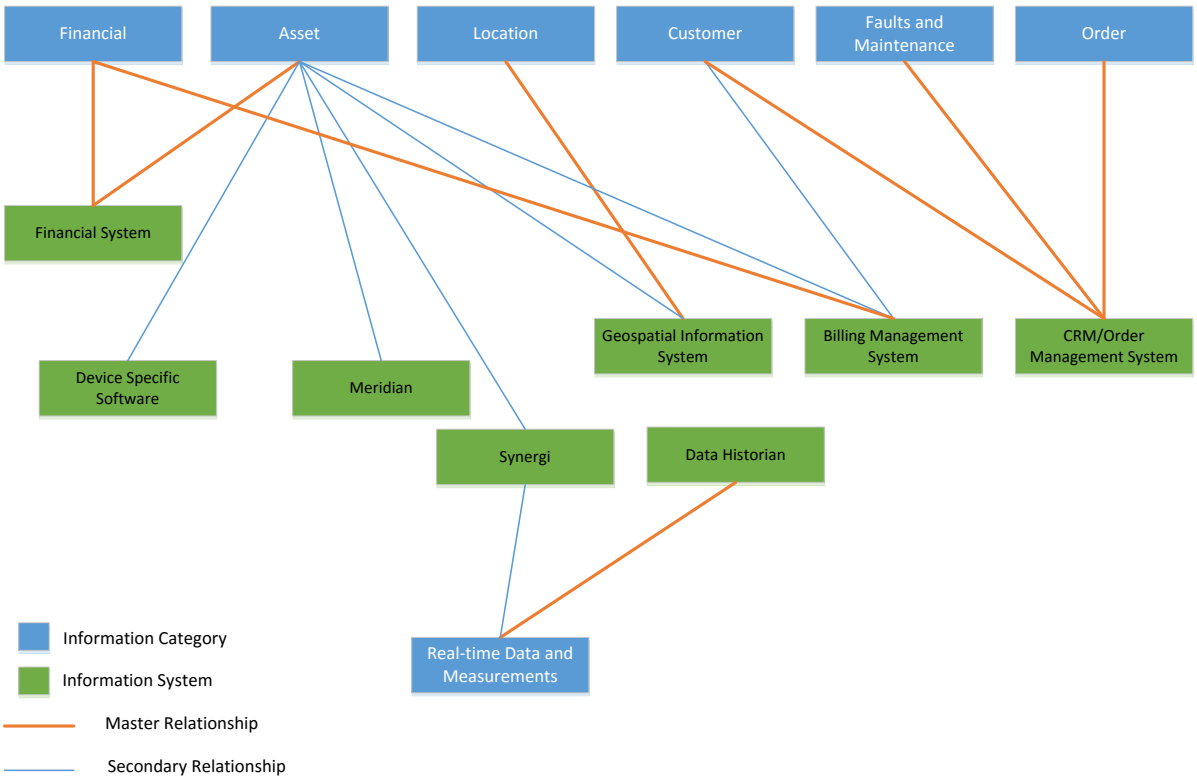
Our network and supporting network information systems are used to manage data that is necessary for the effective day-to-day operation of our network assets and the ongoing planning activities relating to those assets.

The information can be divided into several categories:

- Asset (e.g. type, size, installation date, operating/maximum pressures)
- Location
- Customer
- Order
- Financial
- Faults and maintenance
- Real-time data and measurements

These information categories are managed by our information systems as shown in the following diagram.

Figure 35: Information and Systems Relationships




## ICT Strategy

Our ICT strategy aims to ensure we develop capabilities enabling us to support our planned asset management changes over the planning period, including:

- Enhancing our asset management analysis capabilities
- Supporting increased work volumes on our networks

- Providing real-time information to our customers, including through new information channels
- Enhancing the way we deliver works with our service providers

Over the planning period, we recognise that the range of available options to deliver ICT capability will shift and evolve rapidly. Our strategies and plans are designed to maximise flexibility in a changing environment.

As a lifeline utility we also recognise that system resilience is a fundamental expectation.

Our architecture must be developed on industry accepted standards for cyber security in an increasingly connected communications landscape.

Over the planning period we need to ensure that our ICT assets are:

- **Flexible**: built on technologies forming a solid central platform that allow rapid development of new capabilities around the margins.
- **Scalable:** to accommodate increase data processing / storage and accessible to ensure customers and internal users have real-time access to the information they need and can rely on the quality and security of that information.
- **Resilient:** to maintain 'lifeline' utility levels of reliability, ensuring our systems are resilient, reliable and responsive, designed with multiple layers of redundancy matched to the criticality of the capabilities they support.

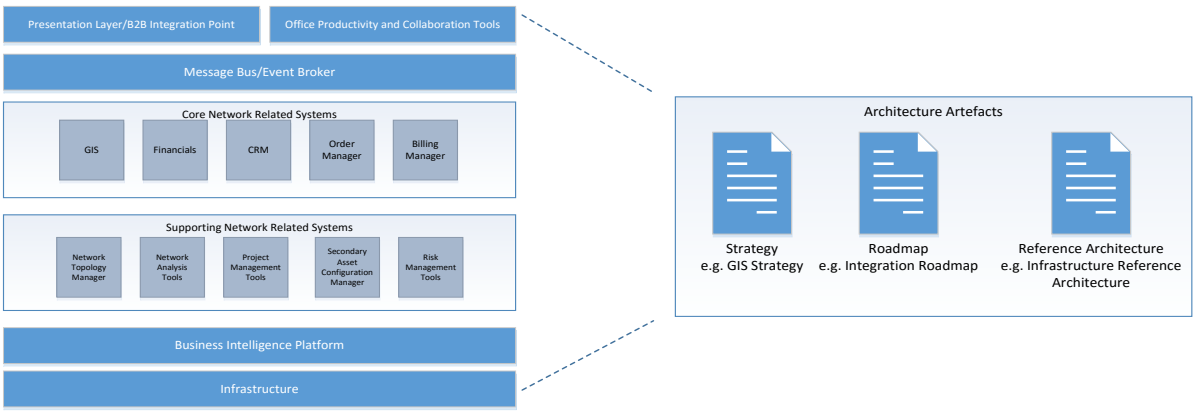
## ICT Investments

This section describes our approach to investing in ICT assets that support our asset management functions and the cost of maintaining these services.

It includes investments in ICT change initiatives and network related ICT. It covers the ICT programmes and projects that ensure our processes, technology and systems help deliver our asset management objectives. This expenditure is included in our Non-network Capex as set out in Chapter 8.

Each component within our ICT technology architecture has a collection of supporting architecture documents. These documents are referred to as 'Architecture Artefacts'. They are used to define the strategy, roadmap, and detailed reference architecture specific to each component.

Figure 36: Architecture Artefacts




These 'Architecture Artefacts' are used to inform the investment planning for each Information Technology System and Infrastructure Component. Financial modelling is also used in addition to these artefacts to ensure that IS investment decision making takes into account financial constraints such as total cost of ownership and IS asset depreciation.

Furthermore, our expenditure forecasts are informed by historical costs, expected unit cost, and price trends. We have worked with suppliers to determine unit costs for current technologies or their likely replacements. Due to the rapidly changing nature and relatively short lifecycle of ICT related hardware and software it is difficult to determine accurate unit cost estimates for products and services more than two years out.

To develop 10-year expenditure forecasts we have assumed that software costs will progressively move from Capex to Opex as software providers shift to the software as a service model. We also assumed that hardware costs are likely to be stable over the next 10 years on a like-for-like basis.

We believe an uplift in ICT expenditure will be required over the first two to three years of the planning period due to our investments in new systems. From year four expenditure is expected to stabilise.

## Main ICT Systems

Table 18: Key Systems

| SYSTEM | DESCRIPTION |
|---|---|
| **Navision** | Finance |
| **Maximo** | Enterprise Asset Management |
| **Intergraph and ARC GIS** | Geospatial Information System |
| **Microsoft CRM** | Customer Relationship Management |
| **Axos** | Billing |

### *Finance (Navision)*

Our Financial Systems Strategy is to ensure that all financial solutions are fit for purpose and cost effective to maintain. This will allow us to leverage asset information without the systems becoming overly complex and costly. We have selected Microsoft Navision as our financial manager and implementation of this system occurred in FY16.

### *Enterprise Asset Management (EAM): Maximo*

To meet our organisational objectives, we must continue to focus on capturing accurate data at source and making information accessible to the business with tools that allow us to leverage value and improve our performance.

In line with our objective of optimising lifecycle asset management capability, the EAM and associated business processes have been designed to hold the planned maintenance schedule for each asset, according to the relevant engineering standard. It also captures transactional information against each asset record, including that gathered through inspection activities, maintenance activities and defects lists.

The format for transactional information entered into the EAM is defined by our engineering standards, including maintenance standards. Works management is enabled by deriving inspection and maintenance schedules from the information held in the EAM, in line with our operational and engineering standards and supported by our asset engineers. The EAM is also known as a computerised maintenance management system.

Capturing field data regarding maintenance activities is carried using both a paper system with data inputted by administrative staff and an electronic based system comprising of tablet devices and associated software linking between tablets and the EAM.

Maintenance routines recorded in the EAM are reviewed and refined as part of the maintenance strategy. The requirements for additional software to support the maintenance strategy will be

further evaluated in FY16 following the introduction of the risk based work selection system described in Chapter 6.

Our EAM includes six management modules in an enhanced service-oriented architecture. It allows us to use asset information to achieve our customer and regulatory outcomes, increase our operational efficiency and to identify opportunities for disciplined growth and improvements in our cost efficiency. These modules are:

- Asset management
- Work management
- Service management
- Contract management
- Inventory management
- Procurement management

Maximo was implemented during FY16 however some ongoing development expenditure is forecast for FY17.

### *Geographical Information System*

The GIS we have employed are the proprietary systems Intergraph and ARC GIS. Currently ARC GIS holds distribution asset data but it is intended to transfer the transmission system asset data from Intergraph to ARC GIS in the near future. GIS is the master asset register for below ground pipeline assets and includes geospatial, technical, hierarchical, spatial, contextual, connectivity, CP and land management data. The functional locations of assets generated and recorded in the EAM are also recorded in GIS for cross referencing.

GIS provides a computerised mapping system, which shows the location of all assets against land-based data provided by Land Information New Zealand via CoreLogic. Its primary purposes are to provide pipeline information for the BeforeUDig service and to support Pipeline Integrity Management System and demand modelling systems.

A key piece of equipment used in the field to capture the location of assets is GPS receivers. GPS uses satellites to establish an accurate position and coordinates on the earth's surface and allows data to be captured about the asset loaded into the GIS.

We are creating a roadmap to move our transmission data from Intergraph to ARC GIS to gain synergies from a modern single source of GIS data.

### *Customer Relationship Management (CRM)*

Our CRM Systems Strategy is to ensure that all CRM solutions are used "as designed" with the minimal amount of customisation. Such solutions will allow us to better serve customers without the systems becoming overly complex and costly. It will enable us to interact with our customers effectively and efficiently so as to achieve our customer and regulatory outcomes, increase our operational efficiency, to identify opportunities for disciplined growth and improvements in our cost efficiency.

### *Billing (Axos)*

Our Billing Systems Strategy is to ensure that the billing solution is 'fit for purpose' for the billing requirements of the business. The solution will allow us to better control billing processes without the system becoming overly complex and costly. It will enable us to execute billing processes effectively and efficiently so as to achieve our customer and regulatory outcomes, increase our operational efficiency, to identify opportunities for disciplined growth and improve our cost efficiency.

*Training Manager*

Our training and competency recording is maintained in the Training Manager Application of Kaizen Software CA (California) 2016.

The application is the latest enterprise version and services all areas of the company's training and competency recording, updating and reporting. It facilitates technical and development training as well as conferences and seminars for in-house staff and records contractor qualifications when these are provided.

Our reporting enables planning, budgeting and resourcing capability for internal and external courses. Industry and Regulatory training is also able to be recorded and reported on. It allows for local configuration of set up so it can be customised to business requirements aligning with the organisational structure.

## System Integration

We have recently incorporated a number of independent data management systems to meet the various needs of asset management. Our ongoing objective is to integrate useful system where appropriate (including service provider systems) either by providing a common portal or synchronising databases. System integration will allow for greater access of information and interfaces with service providers own applications, and deliver increased flexibility, efficiency and resolution of data.

## Data Quality Management

Our asset data is largely captured and maintained by FSPs through an as-building process. These activities are controlled by asset data standards, business rules, work instructions and the relevant provisions of the contractual agreement between us and our the FSPs.

Our asset data standards determine which assets are captured in our asset management systems, what attributes of those assets are recorded, and what transactions we want to be recorded e.g. records of planned inspections, faults and defect data. These standards are scheduled to be reviewed following the full implementation of our new EAM system and will be subsequently issued to our FSPs.

Our FSPs gather and upload data in accordance with our standards, but we are responsible for processing the data or formulating maintenance plans or strategy on the basis of the data.

The quality of data in our primary network related systems is measured through monthly performance indicator management reporting. First Gas standard GNS0081 defines the data content and quality requirements.

## Data Limitations

Our distribution network asset data has been inherited from previous organisations and over time has been converted from physical construction documents, and between data management systems. As data collection requirements have increased over time through monitoring and reporting programs, historical data has been found to be deficient in both accuracy and completeness. The main reasons for this are the less accurate (or non-existent) data collected historically, or data loss / mismatch through conversion from physical historic documents to electronic systems, and between systems. The predominant asset data types that we are aware of limitations are:

- **Location data**: includes inaccurate asset locations based on historical construction records, and fault / repair locations prior to the collection of accurate location data through GIS.
- **Material data:** pipe material specifications and test records for our older assets is inconsistent. This can often be inferred from surrounding assets and asset installation date.

To address this legacy issue, systematic efforts are being made to verify data accuracy and map existing systems to complete our data. Continuous improvement and review projects following the implementation of our EAM and GIS systems are intended to identify major gaps in historical data and our data requirements.

When conducting maintenance on buried infrastructure, the accuracy of location data is considered and positive identification of the asset is achieved prior to commencing heavy works. As work is carried out on a section of our network, as built location data is utilised to confirm and update the data within our systems and accurate GIS data is captured. Furthermore, when exposing assets with insufficient material data, material tests and inspections are carried out to validate and complete our records.

### 7.1.3. Other Non-Network Assets

This includes all other Capex not encompassed within our direct network or ICT Capex. It comprises the following main expenditure types.

- **Offices and facilities**: costs related to the relocation, refurbishment and development of our office buildings and facilities.
- **Vehicles**: includes investments that maintain our motor vehicle fleet.
- **Minor fixed assets**: costs of ongoing replacement of office equipment including workstations, laptops, mobile phones and peripheral devices.

#### Offices and Facilities

Our expenditure during the planning period mainly relates to the refurbishment of our New Plymouth offices. The main drivers are the improved productivity and effectiveness of a fit-for-purpose office. The current office is overdue for major refurbishments. Refurbishment costs are based on estimates of the likely 'fit-out' (e.g., interior partitioning and office furniture).

#### Vehicles

Our approach with vehicles is to lease our fleet. However, for some limited examples it makes better strategic sense to own a vehicle directly. This might be where certain towing ability is required or where specific plant equipment is required.

#### Minor Fixed Assets

All our employees are provided with a standard setup of a workstation includes a desk, chair, storage, PC and communication equipment. We classify minor technology fixed assets as the following:

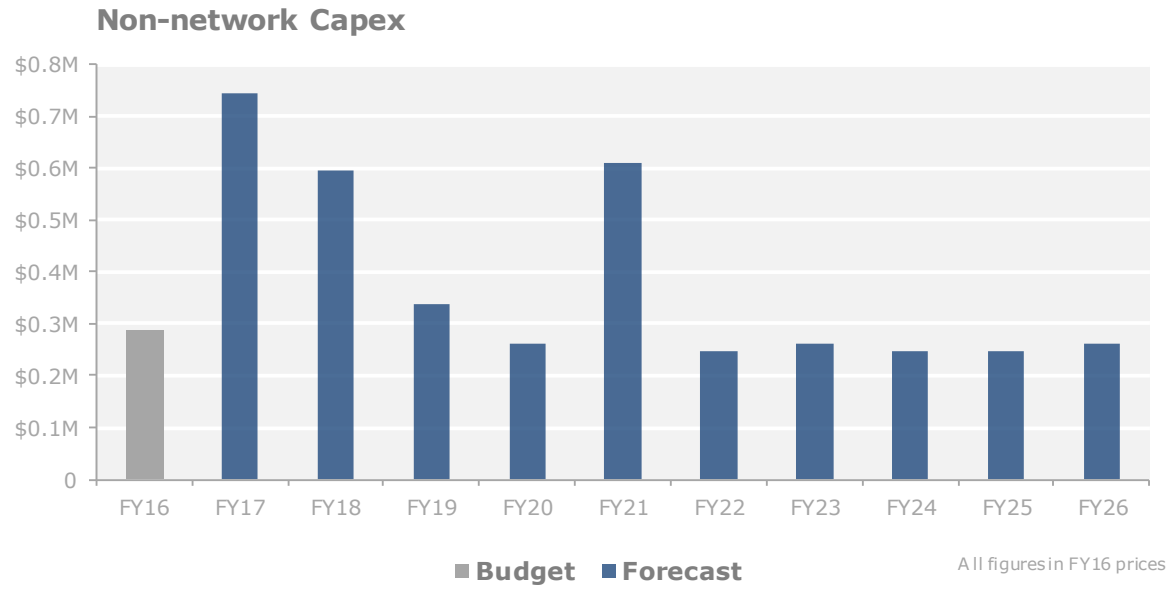
- Desktop and laptop hardware
- Monitors and screens
- Video conferencing equipment
- Other peripherals (e.g. printers and scanners).

Expenditure is driven by the need to provide staff with the tools necessary to carry out their roles efficiently and to leverage business improvements (such as new ICT systems) and increase staff mobility and collaboration.

### 7.1.4. Non-network Capex

Our forecast Non-network Capex for the planning period is shown in the following figure.

Figure 37: Non-network Capex during the Planning Period




As part of our transition programme we have invested in new IT capabilities and office refurbishments in the early years of the period.

### 7.1.5. Non-network Capex Expenditure Allocation Methodology

Non-network Capex is allocated between our transmission and distribution businesses based on factors such as size of asset base and staff headcount.

## 7.2. Business Support

People across our business play a central role in managing our assets. Ensuring we have enough people with the right competencies is essential if we are to achieve our asset management objectives over the planning period.

### 7.2.1. Business Support Expenditure

We directly employ about 150 people across our gas businesses (who also support our transmission assets). We support the employment of approximately 70 more field staff through our service providers. To support our asset management staff, we have a number of corporate functions.

These include customer management, finance, human resources, health and safety, legal and regulatory, and ICT. These functions either directly or indirectly support the distribution side of our business as set out in the examples below.

- **Finance**: financial management, management reporting and analysis and operations to support the business.
- **Human resources**: attracting and retaining capable and effective people, managing skills and competency development and ensuring a positive working environment.
- **Health and safety**: leadership and coordination of safety across the company.
- **Legal and regulatory**: compliance with statutory requirements, including regulatory and environmental obligations.

This expenditure is largely driven by the human resource requirements. A large portion relates to our direct staff costs. The other main elements are insurance, legal, audit and assurance fees (primarily to support regulatory compliance), office accommodation costs and travel costs.

Our forecasts have been developed from the bottom up for each individual business unit by the executive manager responsible for that business unit. Each individual executive manager has assessed the resource requirements for their business unit/s.

- **Salaries and wages**: the majority of the costs are related to internal staff salaries and wages for permanent positions. The majority of these positions are considered ongoing roles that will be required in the future. Over the planning period some positions have been forecast to be removed as systems and process improvements are made. Also some positions have been forecast to be added as we transition to a standalone business and respond to future capability requirements.
- **Staff costs**: the next major driver is staff costs which include training costs, travel, meals and accommodation, recruitment costs and mobile phones. These costs are driven by headcount and to some degree technology.
- **Professional and legal advice**: we use professional advice for a wide range of purposes, including supplementing our internal capabilities in our legal, tax, internal audit, regulatory, and ICT teams with specialist skills and advice as required.

As a regional employer we may struggle to attract specialist professionals, particularly from overseas, who are less familiar with our locations. This means we need to remain competitive with our benefits packages.

These investments in people are essential if we are to operate as an effective company and ensuring that our workforce is appropriately skilled and qualified.

### ICT Opex

ICT Opex covers ICT costs associated with operating our business. More specifically it covers software licensing, software support, data and hosting, and network running costs. These costs are driven from the need to support corporate and network operations with appropriate technology services. It is driven by the following factors:

- Increased technology capability requirements as a standalone business
- System complexity
- Increases in the number of staff and contractors
- Software audit requirements from vendors are met ensuring that we comply with vendor end user licensing agreements
- Ensures access to appropriate levels of software support from vendors and access to bug fixes and maintenance packs
- Lifecycle stage of ICT assets and data needs of the business

The software industry as a whole is moving to subscription ‘pay-as-you-go’ models due to cloud-delivered software and technologies. It is likely in the 2018 -2022 timeframe we will use more cloud based software as service subscriptions meaning expenditure previously classified as Capex will increasingly be occurred as Opex.

Our forecasts are based on the most accurate information we have been able to obtain from suppliers and service providers and is based on the current technologies available and scale to meet our needs.

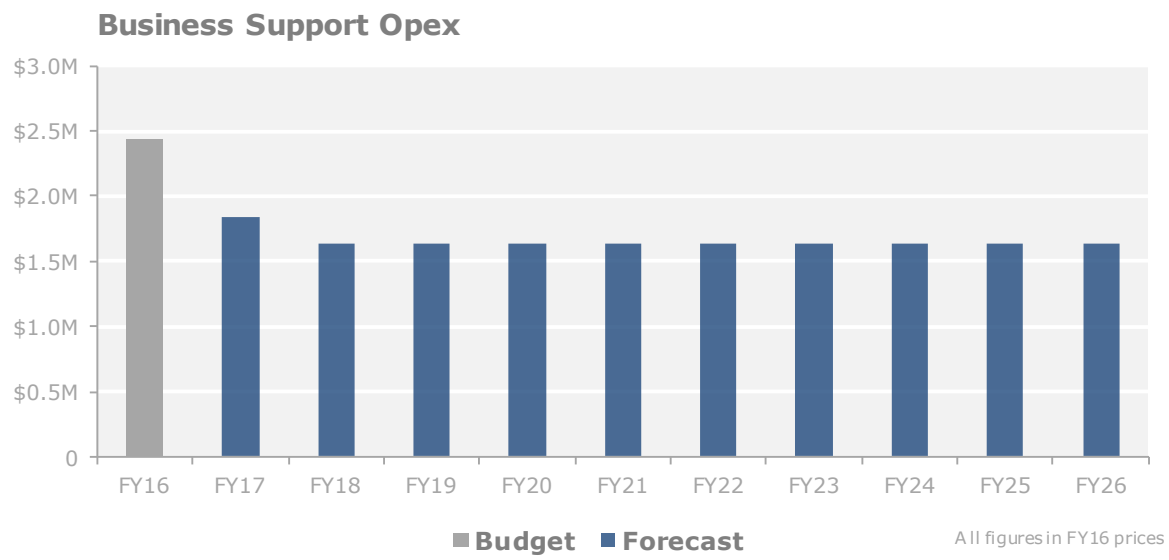
### 7.2.2. Business Support Expenditure Over the Planning Period

Our Business Support Opex forecast includes expenditure related to the functions supporting our gas distribution business. It includes indirect staff costs and external specialist advice. The other material elements are office accommodation costs; legal; and insurance costs.

A portion of our Business Support Opex is allocated to our gas transmission business in accordance with our cost allocation policy.

Our forecast for the planning period is shown in the following chart.

Figure 38: Business Support Opex during the Planning Period




Expenses related to our transition programme affect our expenditures in FY16 and FY17. From FY18 we expect to stabilise this expenditure over the period.

### 7.2.3. Business Support Allocation Methodology

The allocation of Business Support costs to our transmission and distribution businesses is based on a combination of three factors. The first, which is applied to expenditure that has a relationship with the assets (such as ICT systems) is an allocation based on size of asset base. The second, which is related more to supporting the people in our business (such as building costs) is proportioned on the basis of the relative headcount working in each particular business. The third allocation applies to other or miscellaneous spend and is an average of the first two methodologies.

# 8. EXPENDITURE OVERVIEW

This chapter sets out a summary of our forecast expenditure on our gas distribution network over the planning period. It is structured to align with our expenditure categories and with information provided throughout the AMP.

The forecasts presented here provide a consolidated view of our proposed expenditure. It provides further commentary and context on our planned investments including key assumptions used in developing our forecasts.

The discussion focuses on providing high-level commentary and context for the forecasts. Each section includes cross references to chapters with more detailed information. To avoid duplication we have not repeated discussions in previous chapters.

**Note on Expenditure Charts and Tables**

The charts in this chapter depict budgeted expenditure (grey column) for FY16 (2015/2016) and our forecasts (blue columns) for the remainder of the period.

Expenditure is presented according to our internal categories. It is also provided in Information Disclosure categories in Schedules 11a and 11b, in Appendix B.

All expenditure figures are denominated in constant value terms using FY16 New Zealand dollars.

## 8.1. INPUTS AND ASSUMPTIONS

This section describes the inputs and assumptions used to forecast our Capex and Opex over the planning period.

### 8.1.1. FORECASTING INPUTS AND ASSUMPTIONS

Our forecasts rely on a number of inputs and assumptions. These include:

- Escalation to nominal dollars
- Capital contributions
- Finance during construction

#### Escalation

Forecasts in this chapter are in constant value terms. In preparing Schedules 11a and 11b we have escalated our real forecasts to produce nominal forecasts for Information Disclosure.

While we expect to face a range of input price pressures over the planning period we have based our escalation approach on the consumer price index (CPI). This has been done to align forecast inflation with the initial ‘exposure’ financial model for the gas DPP. Therefore, for the purposes of this AMP we have assumed changes are limited to CPI rather than adopting more specific indices or modelling trends in network components or commodity indices. Similarly, we have not sought to reflect trends in the labour market.

#### Capital Contributions

Customer connections and asset relocations expenditure included in the body of the AMP are net amounts i.e. capital contributions have been netted out from the forecast. Details of expected capital contributions can be found in Schedule 11a in Appendix B.

### Finance During Construction (FDC)

Our Capex forecasts exclude FDC (or cost of financing). We have included a forecast of FDC based on expected commissioning dates in Schedule 11a in Appendix B.

## 8.2. EXPENDITURE SUMMARY

This section summarises our total Capex and Opex forecasts for the planning period.

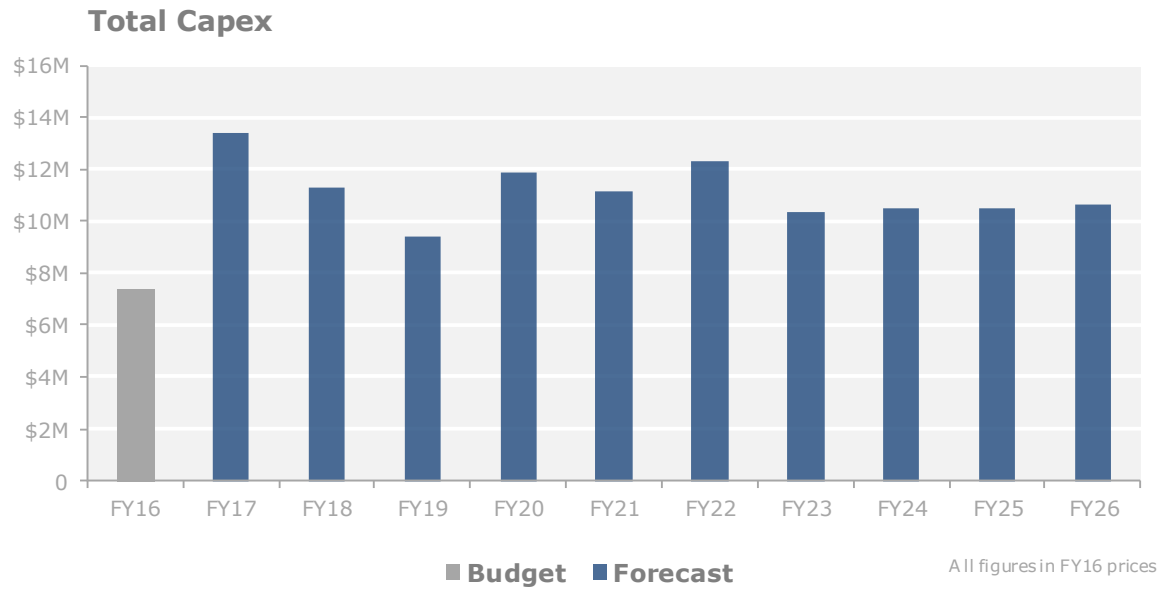
### 8.2.1. TOTAL CAPEX

Total Capex includes expenditure in the following categories.

- System development Capex: discussed in Chapter 5
- Lifecycle management Capex: discussed in Chapter 6
- Investment in non-network assets: discussed in Chapter 7

Our total forecast Capex for the planning period is shown in the following chart.

**Figure 39: Total Capex during the Planning Period**




Our Capex profile reflects the underlying network needs discussed in this AMP. Key drivers for the expenditure trend include:

- **Network growth**: is the main driver for expenditure variance across the period. Reinforcement works including projects in Waitoa and Cambridge leading to increases in FY17/18 and FY22 respectively. These are discussed further in Section 8.3.
- **Renewals:** expenditure during FY17 and FY18 includes a number of programmes and initiatives including DRS upgrades and increased volumes of pre-1985 pipe replacement. This renewal expenditure mainly occurs in FY22 and FY23. These are discussed further in Section 8.5.
- **Non-network**: expenditure in FY17 includes a portion of total expenditure on IT systems and building refurbishment costs associated with our transition programme. These are discussed further in Section 8.7.
- **Works carryover**: our forecast for FY17 includes approximately $1 million Capex carried over from FY16. A reduced level of work was undertaken in FY16 due to activities related to the asset sale.

We expect this profile, particularly later in the period, to change as we further refine our modelling and improve our forecasting approaches. This will be reflected in subsequent updates to the AMP.

The following table sets out the expenditure per year. These are consistent with our Schedule 11a disclosure included in Appendix B.

Table 19: Total Capex during the planning period ($000 in real 2016)

| Year | FY16 | FY17 | FY18 | FY19 | FY20 | FY21 | FY22 | FY23 | FY24 | FY25 | FY26 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Capex** | 7,403 | 13,381 | 11,325 | 9,403 | 11,873 | 11,152 | 12,278 | 10,350 | 10,475 | 10,529 | 10,665 |

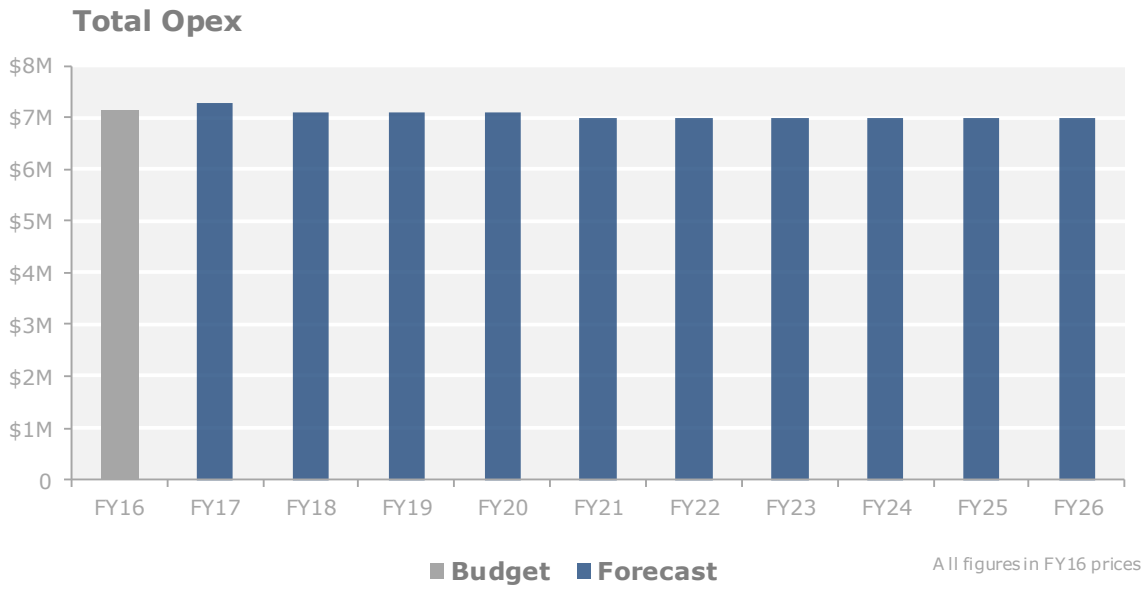
### 8.2.2. Total Opex

Our Opex forecast includes expenditure relating to the following activities categories.

- Maintenance related expenditure discussed in Chapter 6
- System operations and network support discussed in Chapter 6
- Business support activities discussed in Chapter 7

Our total forecast Opex for the planning period is shown in the following chart.

Figure 40: Total Opex during the Planning Period




Our Opex for the period is generally forecast using FY17 as a typical year. Individual forecasts have specific adjustments based on expected activity and costs over the period. Transitional expenditure has been removed and a trending approach applied to inform the forecast over the remainder of the period.

A number of activities will require increased expenditure to ensure we meet our asset management objectives. However, we will look to find operational efficiencies to fund these activities without increasing overall spend.

The following table sets out the expenditure per year. These are consistent with our Schedule 11b disclosure included in Appendix B.

Table 20: Total Opex during the planning period ($000 in real 2016)

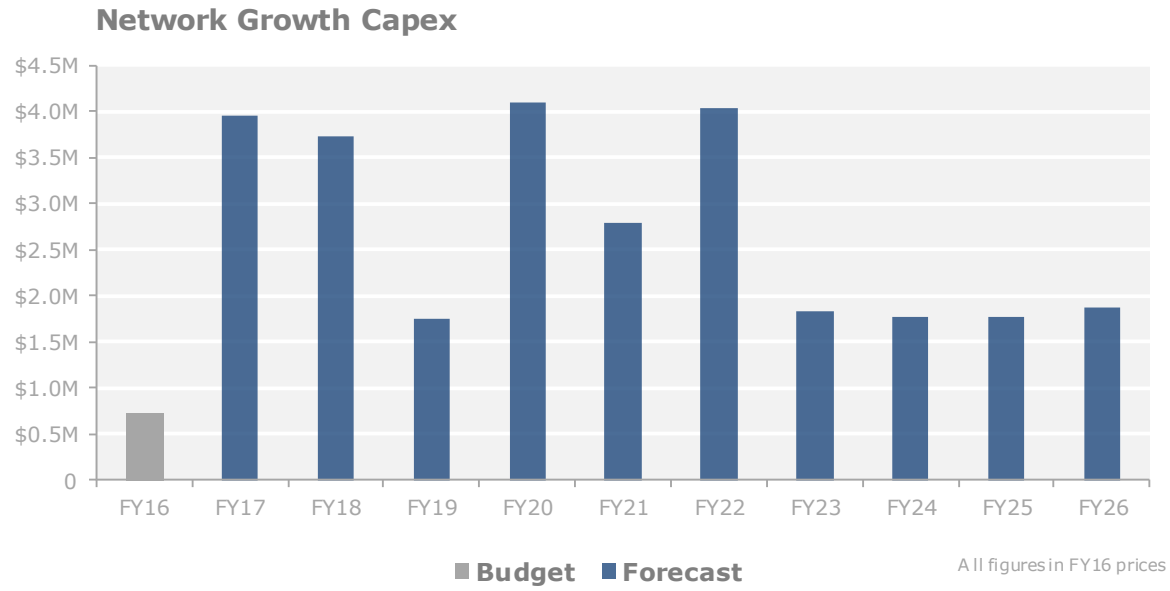
| Year | FY16 | FY17 | FY18 | FY19 | FY20 | FY21 | FY22 | FY23 | FY24 | FY25 | FY26 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Opex** | 7,123 | 7,291 | 7,092 | 7,093 | 7,095 | 6,993 | 6,995 | 6,996 | 6,997 | 6,999 | 7,000 |

## 8.3. NETWORK GROWTH CAPEX

In this section we summarise our forecast asset investments to address expected network growth. Detail on the included projects is provided in Chapter 5.

Our forecast Capex for the planning period is shown in the following chart.

Figure 41: Network Growth Capex during the Planning Period




Reflecting the project based nature of this expenditure, the profile for the period is impacted by a number of large one-off projects. In addition to these large projects we expect an underlying 'baseline' level of works. The main works driving the profile include:

- Multiple reinforcement projects scheduled for FY17
- Reinforcement works in the Waitoa region (FY18)
- Reinforcement works in Gisborne (FY20)
- Reinforcement works in Cambridge (FY21-FY22)

The following table sets out the expenditure per year. These are consistent with our Schedule 11a disclosures included in Appendix B.

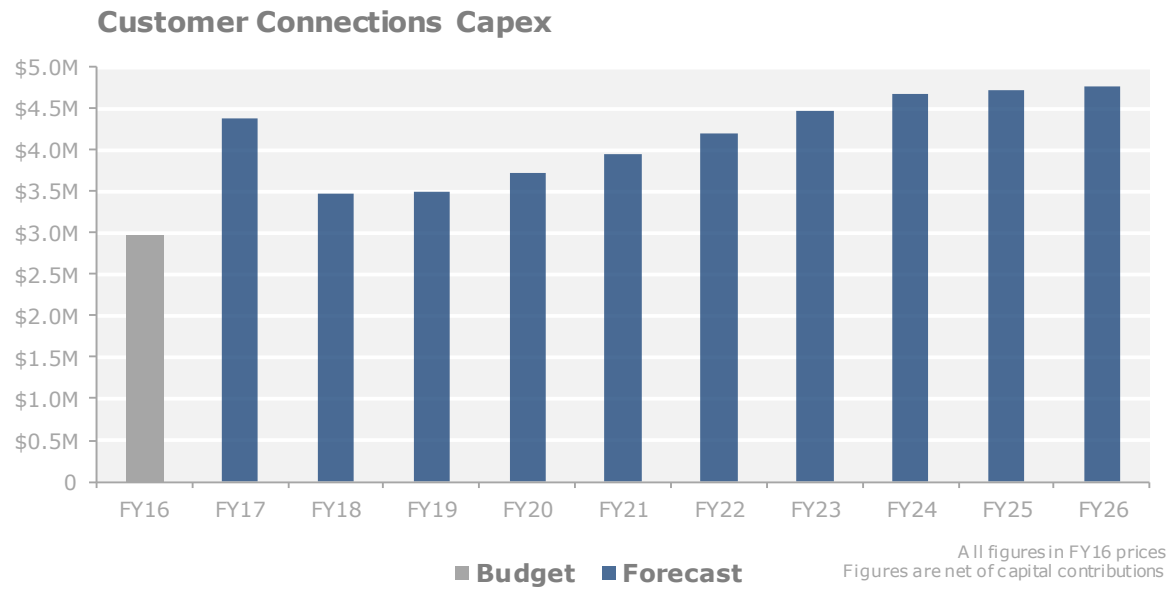
Table 21: Network Growth Capex during the Planning Period ($000 in real 2016)

| YEAR | FY16 | FY17 | FY18 | FY19 | FY20 | FY21 | FY22 | FY23 | FY24 | FY25 | FY26 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Capex** | 733 | 3,957 | 3,723 | 1,756 | 4,096 | 2,795 | 4,040 | 1,825 | 1,770 | 1,770 | 1,860 |

## 8.4. CUSTOMER CONNECTIONS CAPEX

In this section we summarise our expected investments to enable customer connections. Further detail on this expenditure is provided in Chapter 5.

Figure 42: Net Customer Connection Capex during the Planning Period




Consistent with historical trends and our ICP connection forecast we are forecasting an increasing trend of customer connection Capex over the period. In addition, there are large subdivision connection projects and some carryover work from FY16 that leads to the increase in FY17.

The following table sets out the net expenditure by year. These are consistent with our Schedule 11a disclosure included in Appendix B.

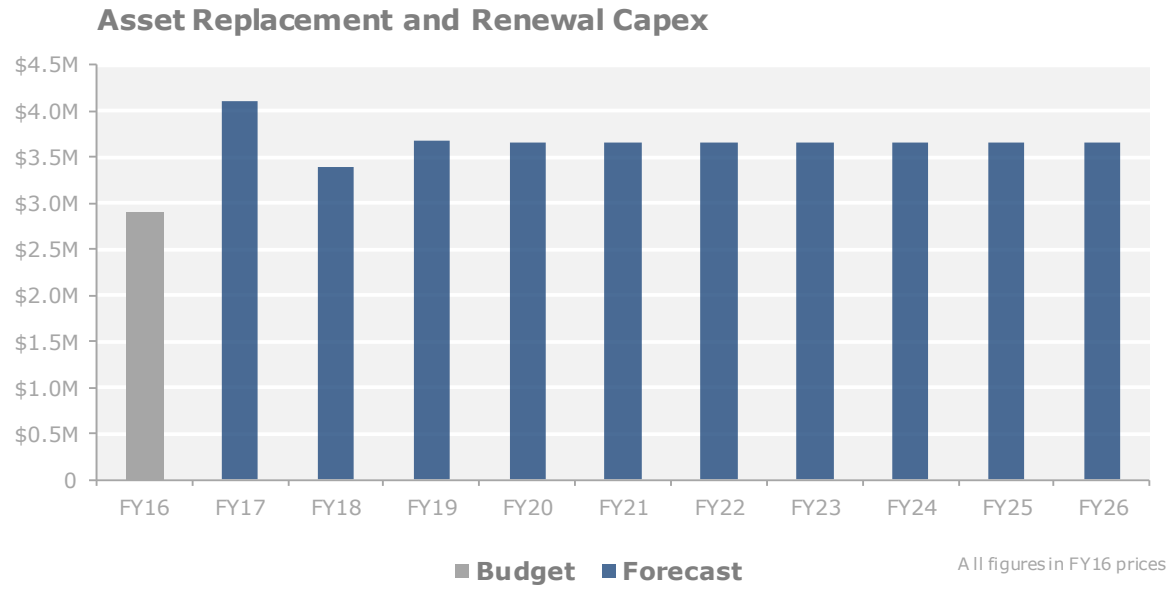
Table 22: Net Customer Connection Capex during the Planning Period ($000 in real 2016)

| Year | FY16 | FY17 | FY18 | FY19 | FY20 | FY21 | FY22 | FY23 | FY24 | FY25 | FY26 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Capex** | 2,981 | 4,381 | 3,475 | 3,491 | 3,718 | 3,951 | 4,203 | 4,477 | 4,671 | 4,724 | 4,756 |

## 8.5. Replacement and Renewal Capex

In this section we summarise our expected investments to replace and renew our asset fleets. Detail on the included work and associated drivers is provided in Chapter 6.

Figure 43: Replacement and Renewal Capex during the Planning Period



Replacement Capex includes replacing assets with like-for-like or new modern equivalents. Renewals Capex is expenditure that extends an asset's useful life or increases its functionality. These investments are generally managed as a series of programmes focused on a particular asset fleet.

As discussed in Chapter 6, one of the key drivers for ARR on the distribution network is the replacement of PE pipe installed prior to 1985. Over the planning period we will progressively increase our investment levels to address this safety issue.

In addition there are the following main projects and programmes over the period.

- Mechanical coupling and small pipe replacement on the Hamilton MP4 steel network to address leakage risk due to corrosion (i.e. of the fitting and/or pipe) or movement of the pipe within the coupler
- Hamilton CP replacement programme to restore CP to parts of the MP4 steel service pipes
- Replacement of a plug type riser valve that is prone to seizing and gas escapes

The following table sets out the expenditure by year. These are consistent with our Schedule 11a disclosure included in Appendix B.

Table 23: Replacement and Renewal Capex during the Planning Period ($000 in real 2016)

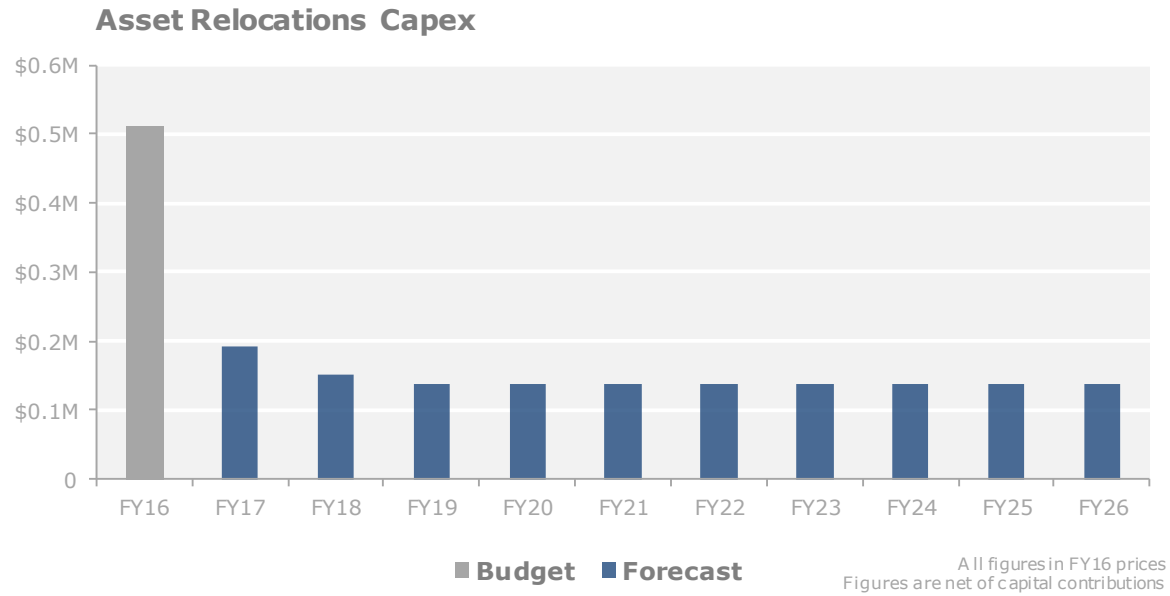
| Year | FY16 | FY17 | FY18 | FY19 | FY20 | FY21 | FY22 | FY23 | FY24 | FY25 | FY26 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Capex** | 2,891 | 4,105 | 3,380 | 3,680 | 3,660 | 3,660 | 3,650 | 3,650 | 3,650 | 3,650 | 3,650 |

## 8.6. Asset Relocations Capex

In this section we summarise our expected investments to relocate assets on behalf of third parties. Further detail on this expenditure is provided in Chapter 6.

Our forecast Capex for the planning period is shown in the following chart.

Figure 44: Net Asset Relocations Capex during the Planning Period




Consistent with average historical trends we are forecasting a relatively constant trend of asset relocations Capex over the period.

The following table sets out the net expenditure per year. These are consistent with our Schedule 11a disclosure included in Appendix B.

Table 24: Net Asset Relocations Capex during the Planning Period ($000 in real 2016)

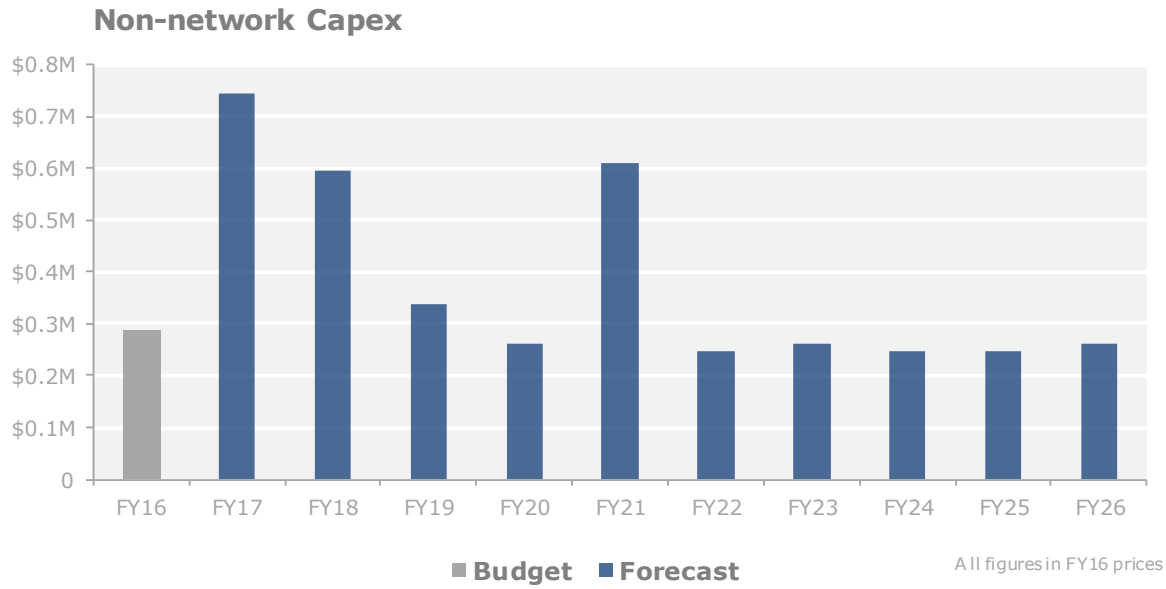
| YEAR | FY16 | FY17 | FY18 | FY19 | FY20 | FY21 | FY22 | FY23 | FY24 | FY25 | FY26 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Capex** | 511 | 193 | 152 | 137 | 137 | 137 | 137 | 137 | 137 | 137 | 137 |

## 8.7. NON-NETWORK CAPEX

In this section we summarise our expected investments in non-network assets to support our asset management activities. Detail on the included projects is provided in Chapter 7.

Our forecast Capex for the planning period is shown in the following chart.

Figure 45: Non-network Capex during the Planning Period




Non-network Capex is allocated between our transmission and distribution businesses based on factors such as size of asset base and staff headcount. Over the planning period we expect to invest in lifecycle-based asset renewals for ICT equipment and office assets. As part of our transition programme we have invested in new ICT capabilities and office refurbishments.

The following table sets out the expenditure per year. These are consistent with our Schedule 11a disclosure included in Appendix B.

Table 25: Non-network Capex during the Planning Period ($000 in real 2016)

| YEAR | FY16 | FY17 | FY18 | FY19 | FY20 | FY21 | FY22 | FY23 | FY24 | FY25 | FY26 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Capex** | 287 | 745 | 595 | 338 | 262 | 610 | 248 | 262 | 247 | 248 | 262 |

## 8.8. NETWORK OPEX

In this section we summarise the Network Opex we expect to incur over the planning period. To align with Information Disclosure, we use the following expenditure categories.[26]

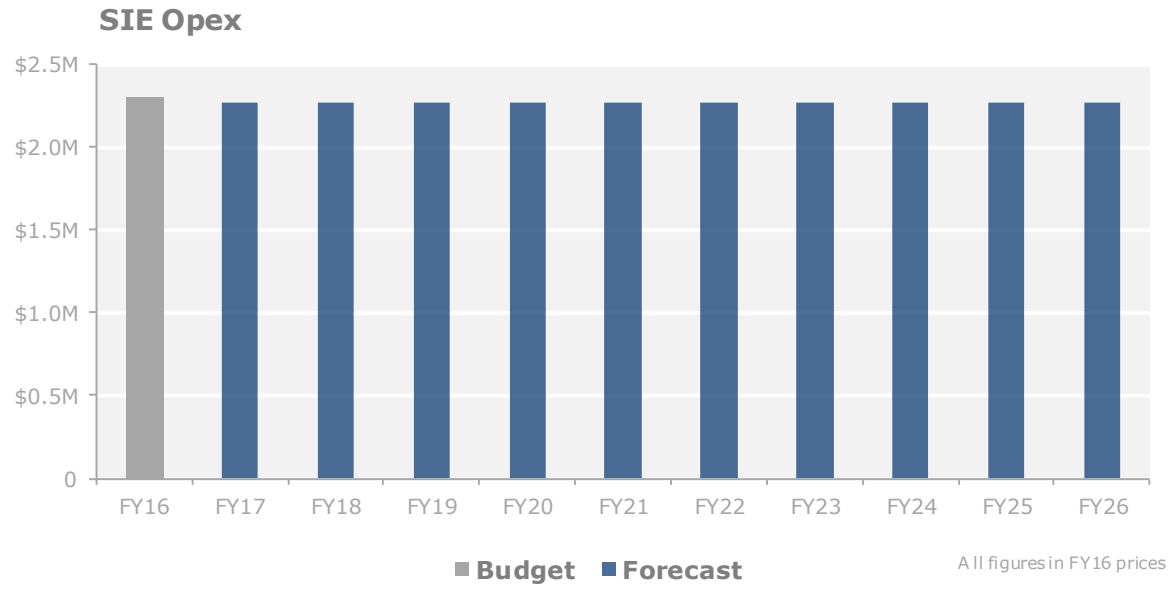
- Service interruptions, incidents and emergencies (SIE)
- Routine and corrective maintenance and inspection (RCI)

Detail on the activities included in these categories is provided in Chapter 6.

### 8.8.1. SERVICE INTERRUPTIONS, INCIDENTS AND EMERGENCIES

Our SIE Opex forecast for the planning period is shown in the following chart.

Figure 46: SIE Opex during the Planning Period




We expect the cost of undertaking reactive maintenance (SIE) to be largely stable over the period. This is consistent with our arrangements with our service provider. We expect to see higher work volumes as the network expands in line with our ICP growth projections. However, we have not increased this expenditure over the period as we believe we can achieve delivery efficiencies.

The following table sets out the expenditure per year. These are consistent with our Schedule 11b disclosures included in Appendix B.

Table 26: SIE Opex during the planning period ($000 in real 2016)

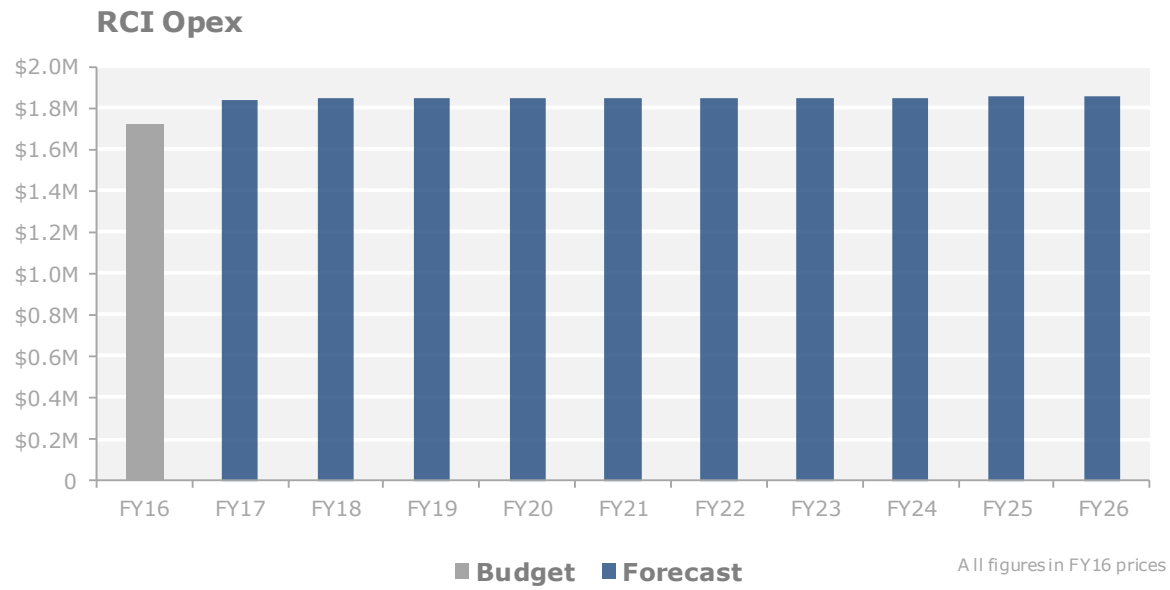
| YEAR | FY16 | FY17 | FY18 | FY19 | FY20 | FY21 | FY22 | FY23 | FY24 | FY25 | FY26 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Opex** | 2,306 | 2,271 | 2,271 | 2,271 | 2,271 | 2,271 | 2,271 | 2,271 | 2,271 | 2,271 | 2,271 |

[26] We currently do not assign expenditure to the Asset Replacement and Renewal Opex category.

### 8.8.2. ROUTINE AND CORRECTIVE MAINTENANCE AND INSPECTION (RCI)

Our RCI Opex forecast for the planning period is shown in the following chart.

Figure 47: RCI Opex during the Planning Period




We expect the cost of undertaking scheduled maintenance to be largely stable over the period. This is consistent with our arrangements with our service provider. We expect to see additional cost drivers and upward cost pressures over the period.

- We are transitioning towards higher compliance with AS/NZS 4645. This will require a review of all our maintenance standards and practices as we move away from the historical NZS 5258 and is will to require a set of new activities that will be incorporated into our maintenance approach
- Work volumes will increase as the network expands in line with our ICP growth projections.

However, we have not materially increased our expenditure forecast over the period as we believe we can achieve delivery efficiencies.

The following table sets out the expenditure per year. These are consistent with our Schedule 11b disclosure included in Appendix B.

Table 27: RCI Opex during the planning period ($000 in real 2016)

| YEAR | FY16 | FY17 | FY18 | FY19 | FY20 | FY21 | FY22 | FY23 | FY24 | FY25 | FY26 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Opex** | 1,722 | 1,841 | 1,843 | 1,844 | 1,845 | 1,847 | 1,848 | 1,850 | 1,851 | 1,853 | 1,854 |

## 8.9. NON-NETWORK OPEX

In this section we summarise the Non-network Opex we expect to incur over the planning period. To align with Information Disclosure, we use the following expenditure categories.

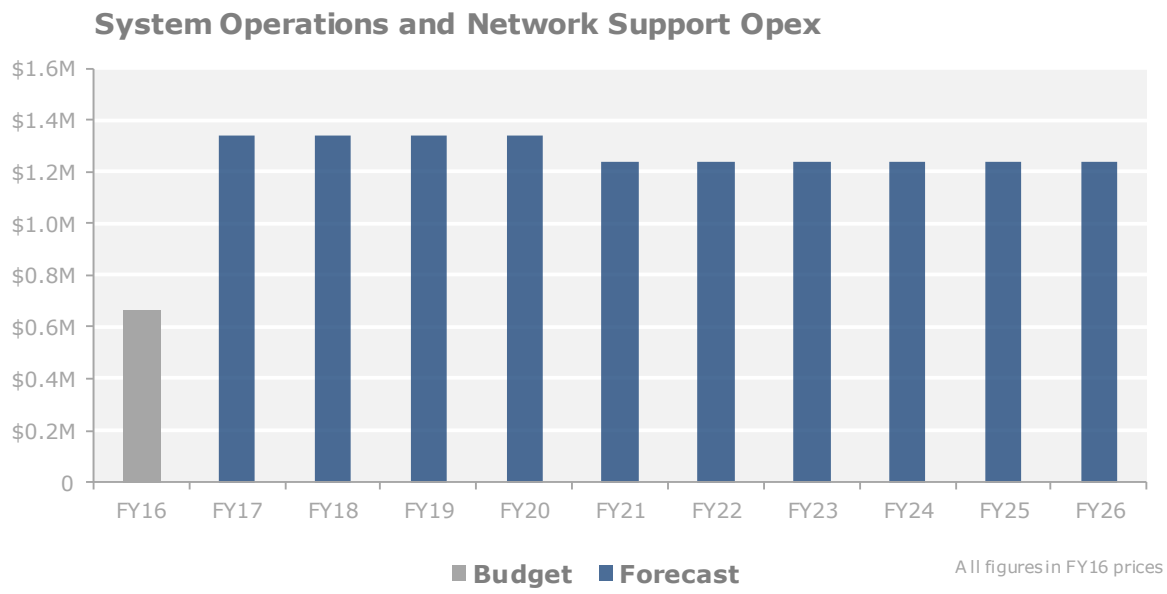
- System Operations and Network Support
- Business Support

Detail on the activities included in these categories is provided in Chapters 6 and 7.

### 8.9.1. SYSTEM OPERATIONS AND NETWORK SUPPORT

Our System Operations and Network Support Opex forecast for the planning period is shown in the following chart.

Figure 48: System Operations and Network Support Opex during the Planning Period




Our overall costs for Non-network Opex will be consistent with average historical spend. However, expenditure in this category will increase significantly (with an equivalent reduction in Business Support) following our re-categorisation of these costs. From FY17 we expect this expenditure to stabilise.

The following table sets out the expenditure per year. These are consistent with our Schedule 11b disclosures included in Appendix B.

Table 28: System Operations and Network Support Opex during the planning period ($000 in real 2016)

| YEAR | FY16 | FY17 | FY18 | FY19 | FY20 | FY21 | FY22 | FY23 | FY24 | FY25 | FY26 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Opex** | 664 | 1,339 | 1,339 | 1,339 | 1,339 | 1,236 | 1,236 | 1,236 | 1,236 | 1,236 | 1,236 |

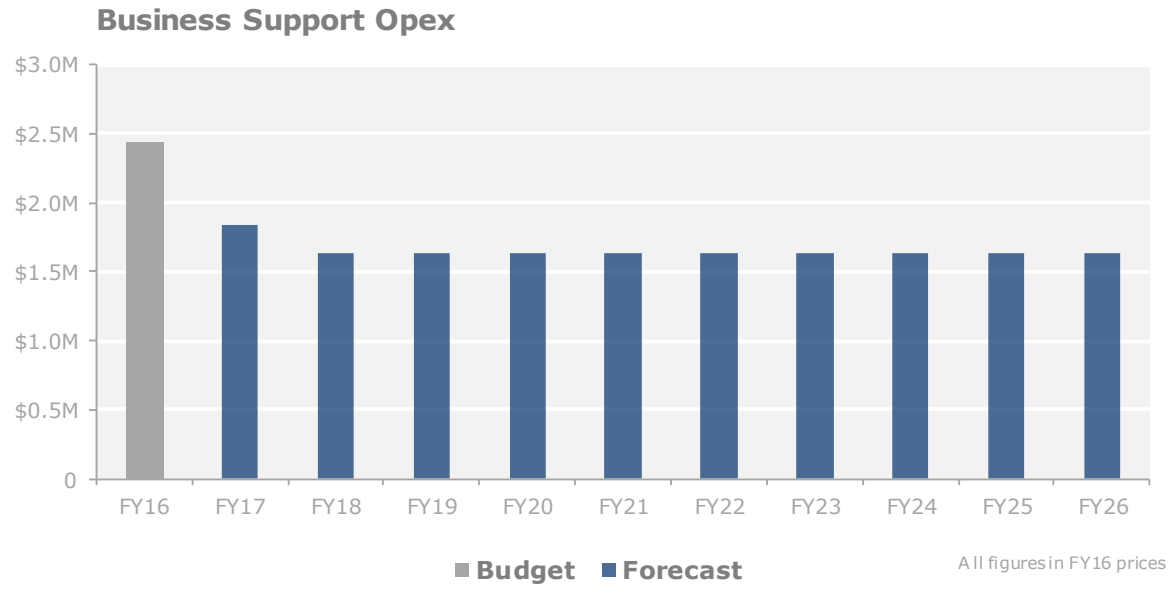
### 8.9.2. BUSINESS SUPPORT

Business Support includes expenditure related to the functions that support our gas distribution business. It includes direct staff costs and external specialist advice. The other material elements are office accommodation costs; legal; and insurance costs.

A portion of our Business Support Opex is allocated to our gas transmission business in accordance with our cost allocation policy.

Our forecast for the planning period is shown in the following chart.

Figure 49: Business Support Opex during the Planning Period




Expenses related to our transition programme in FY16. Some elements of this will persist into FY17, including additional commercial fees. From FY18 we expect this expenditure to stabilise for the remainder of the period.

The following table sets out the expenditure per year. These are consistent with our Schedule 11b disclosure included in Appendix B.

Table 29: Business Support Opex during the Planning Period ($000 in real 2016)

| YEAR | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Opex** | 2,431 | 1,840 | 1,640 | 1,640 | 1,640 | 1,640 | 1,640 | 1,640 | 1,640 | 1,640 | 1,640 |

# Appendices

# A. GLOSSARY

| Term | Definition |
|---|---|
| **AMMAT** | Asset Management Maturity Assessment Tool |
| **AMP** | Asset Management Plan |
| **ARR** | Asset Replacement and Renewal |
| **ASO** | Automatic Shut-Off |
| **CAIDI** | Customer Average Interruption Duration Index |
| **CAPEX** | Capital Expenditure – expenditure used to create new or upgrade physical assets in the network |
| **COO** | Chief Operating Officer |
| **CP** | Cathodic Protection |
| **CPI** | Consumer Price Index |
| **CRM** | Customer Relationship Management |
| **DFA** | Delegated Financial Authority |
| **DPP** | Default Price-quality Path |
| **DRS** | District Regulating Station |
| **EAM** | Enterprise Asset Management |
| **EHMP** | Electrical Hazard Management Plan |
| **FDC** | Finance During Construction |
| **FSA** | Formal Safety Assessment |
| **FSP** | Field Service Provider |
| **GDB** | Gas Distribution Business |
| **GIC** | Gas Industry Company – New Zealand gas industry regulatory body |
| **GIS** | Geographical Information System |
| **GMS** | Gas Measurement System – Commonly referred to as a gas meter |
| **HDPE** | High Density Polyethylene |
| **HSE** | Health, Safety and Environment |
| **IC** | Impressed Current (corrosion protection system) |
| **ICP** | Installation Control Point – The connection point from a customer to the First Gas network |
| **ICT** | Information and Communications Technology |
| **IP** | Intermediate Pressure (700 - 2000 kPa) |
| **IS** | Information Systems |
| **IT** | Information Technology |
| **KPI** | Key Performance Indicator |
| **LP** | Low Pressure (0 - 7 kPa) |
| **MAOP** | Maximum Allowable Operating Pressure |
| **MinOP** | Minimum Operating Pressure |

| Term | Definition |
|---|---|
| **MP** | Medium Pressure (7 – 700 kPa) |
| **NOP** | Nominal Operating Pressure |
| **NRAMS** | Non Routing Activity Management System |
| **NTSB** | National Transportation Safety Board |
| **OPEX** | Operational Expenditure - The ongoing costs directly associated with running the Gas Distribution Network. This includes costs both directly related to the network (e.g. routine and corrective maintenance) and non-network related expenditure (e.g. business support). |
| **OSD** | OSD Limited |
| **PE** | Polyethylene pipe material |
| **PIMS** | Pipeline Integrity Management System |
| **PJ** | Petajoule (unit of energy) = $10^{15}$ Joules = 1,000 TJ |
| **PRE** | Publically Reported Escapes |
| **RAB** | Regulatory Asset Base – The measure of the net value of network assets used in price regulation |
| **RCI** | Routine and Corrective maintenance and Inspection |
| **RTE** | Response Time to Emergencies |
| **SAIDI** | System Average Interruption Duration Index |
| **SAIFI** | System Average Interruption Frequency Index |
| **SCADA** | Supervisory Control and Data Acquisition |
| **scmh** | Standard Cubic Meters Per Hour (unit of gas flow rate) |
| **SIE** | Service interruptions, Incidents and Emergencies |
| **TJ** | Terajoule (unit of energy) = $10^{12}$ Joules |
| **UPSO** | Under Pressure Shut-Off |

# B. INFORMATION DISCLOSURE SCHEDULES

This appendix includes the following Information Disclosure Schedules.

- Schedule 11a – report on forecast Capital Expenditure
- Schedule 11b – report on forecast Operational Expenditure
- Schedule 12a – report on Asset Condition
- Schedule 12b – report on Forecast Utilisation
- Schedule 12c – report on Forecast Demand
- Schedule 14a – Commentary on Escalation

Note: our AMMAT review (Schedule 13) is included as Appendix C.

# B.1. SCHEDULE 11A – FORECAST CAPEX

| | |
|---|---|
| *Company Name* | **First Gas Limited** |
| *AMP Planning Period* | **1 October 2016 – 30 September 2026** |

**SCHEDULE 11a: REPORT ON FORECAST CAPITAL EXPENDITURE**

This schedule requires a breakdown of forecast expenditure on assets for the current disclosure year and a 10 year planning period. The forecasts should be consistent with the supporting information set out in the AMP. The forecast is to be expressed in both constant price and nominal dollar terms. Also required is a forecast of the value of commissioned assets (i.e., the value of RAB additions)

GDBs must provide explanatory comment on the difference between constant price and nominal dollar forecasts of expenditure on assets in Schedule 14a (Mandatory Explanatory Notes).

This information is not part of audited disclosure information.

| sch ref | | | Current Year CY | CY+1 | CY+2 | CY+3 | CY+4 | CY+5 | CY+6 | CY+7 | CY+8 | CY+9 | CY+10 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | | for year ended | 30 Sep 16 | 30 Sep 17 | 30 Sep 18 | 30 Sep 19 | 30 Sep 20 | 30 Sep 21 | 30 Sep 22 | 30 Sep 23 | 30 Sep 24 | 30 Sep 25 | 30 Sep 26 |
| 9 | **11a(i): Expenditure on Assets Forecast** | | $000 (nominal dollars) | | | | | | | | | | |
| 10 | | Consumer connection | 3,522 | 4,791 | 3,868 | 3,966 | 4,307 | 4,666 | 5,061 | 5,496 | 5,847 | 6,031 | 6,193 |
| 11 | | System growth | 733 | 3,977 | 3,807 | 1,832 | 4,359 | 3,034 | 4,474 | 2,061 | 2,039 | 2,080 | 2,229 |
| 12 | | Asset replacement and renewal | 2,891 | 4,126 | 3,456 | 3,839 | 3,895 | 3,973 | 4,042 | 4,123 | 4,205 | 4,289 | 4,375 |
| 13 | | Asset relocations | 940 | 976 | 894 | 798 | 814 | 830 | 847 | 864 | 881 | 899 | 917 |
| 14 | | Reliability, safety and environment: | | | | | | | | | | | |
| 15 | | Quality of supply | | | | | | | | | | | |
| 16 | | Legislative and regulatory | | | | | | | | | | | |
| 17 | | Other reliability, safety and environment | | | | | | | | | | | |
| 18 | | **Total reliability, safety and environment** | - | - | - | - | - | - | - | - | - | - | - |
| 19 | | **Expenditure on network assets** | 8,086 | 13,869 | 12,025 | 10,435 | 13,375 | 12,504 | 14,423 | 12,543 | 12,972 | 13,299 | 13,714 |
| 20 | | Expenditure on non-network assets | 287 | 749 | 608 | 353 | 279 | 662 | 275 | 296 | 284 | 292 | 314 |
| 21 | | **Expenditure on assets** | 8,373 | 14,618 | 12,633 | 10,788 | 13,653 | 13,165 | 14,698 | 12,839 | 13,256 | 13,591 | 14,028 |
| 22 | | | | | | | | | | | | | |
| 23 | *plus* | Cost of financing | - | 581 | 431 | 333 | 453 | 523 | 705 | 676 | 699 | 716 | 739 |
| 24 | *less* | Value of capital contributions | 970 | 1,170 | 1,054 | 979 | 1,018 | 1,059 | 1,103 | 1,149 | 1,189 | 1,217 | 1,245 |
| 25 | *plus* | Value of vested assets | - | - | - | - | - | - | - | - | - | - | - |
| 26 | | **Capital expenditure forecast** | 7,403 | 14,028 | 12,011 | 10,142 | 13,089 | 12,630 | 14,300 | 12,366 | 12,766 | 13,089 | 13,522 |
| 27 | | | | | | | | | | | | | |
| 28 | | Assets commissioned | 7,585 | 13,507 | 11,800 | 9,829 | 13,616 | 10,653 | 17,347 | 12,120 | 11,618 | 11,918 | 16,980 |
| 29 | | | | | | | | | | | | | |
| 30 | | | Current Year CY | CY+1 | CY+2 | CY+3 | CY+4 | CY+5 | CY+6 | CY+7 | CY+8 | CY+9 | CY+10 |
| 31 | | for year ended | 30 Sep 16 | 30 Sep 17 | 30 Sep 18 | 30 Sep 19 | 30 Sep 20 | 30 Sep 21 | 30 Sep 22 | 30 Sep 23 | 30 Sep 24 | 30 Sep 25 | 30 Sep 26 |
| 32 | | | $000 (in constant prices) | | | | | | | | | | |
| 33 | | Consumer connection | 3,522 | 4,767 | 3,783 | 3,801 | 4,047 | 4,298 | 4,570 | 4,866 | 5,075 | 5,132 | 5,167 |
| 34 | | System growth | 733 | 3,957 | 3,723 | 1,756 | 4,096 | 2,795 | 4,040 | 1,825 | 1,770 | 1,770 | 1,860 |
| 35 | | Asset replacement and renewal | 2,891 | 4,105 | 3,380 | 3,680 | 3,660 | 3,660 | 3,650 | 3,650 | 3,650 | 3,650 | 3,650 |
| 36 | | Asset relocations | 940 | 971 | 875 | 765 | 765 | 765 | 765 | 765 | 765 | 765 | 765 |
| 37 | | Reliability, safety and environment: | | | | | | | | | | | |
| 38 | | Quality of supply | - | - | - | - | - | - | | | | | |
| 39 | | Legislative and regulatory | - | - | - | - | - | - | | | | | |
| 40 | | Other reliability, safety and environment | - | - | - | - | - | - | | | | | |
| 41 | | **Total reliability, safety and environment** | - | - | - | - | - | - | - | - | - | - | - |
| 42 | | **Expenditure on network assets** | 8,086 | 13,800 | 11,761 | 10,002 | 12,568 | 11,518 | 13,025 | 11,106 | 11,260 | 11,317 | 11,442 |
| 43 | | Expenditure on non-network assets | 287 | 745 | 595 | 338 | 262 | 610 | 248 | 262 | 247 | 248 | 262 |
| 44 | | **Expenditure on assets** | 8,373 | 14,545 | 12,356 | 10,341 | 12,830 | 12,127 | 13,274 | 11,367 | 11,507 | 11,566 | 11,703 |
| 45 | **Subcomponents of expenditure on assets (where known)** | | | | | | | | | | | | |
| 46 | | Research and development | | | | | | | | | | | |

| | | Current Year CY | CY+1 | CY+2 | CY+3 | CY+4 | CY+5 | CY+6 | CY+7 | CY+8 | CY+9 | CY+10 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| for year ended | | 30 Sep 16 | 30 Sep 17 | 30 Sep 18 | 30 Sep 19 | 30 Sep 20 | 30 Sep 21 | 30 Sep 22 | 30 Sep 23 | 30 Sep 24 | 30 Sep 25 | 30 Sep 26 |
| **Difference between nominal and constant price forecasts** | | $000 | | | | | | | | | | |
| Consumer connection | | - | 24 | 85 | 164 | 260 | 368 | 490 | 630 | 772 | 899 | 1,026 |
| System growth | | - | 20 | 84 | 76 | 263 | 239 | 434 | 236 | 269 | 310 | 369 |
| Asset replacement and renewal | | - | 21 | 76 | 159 | 235 | 313 | 392 | 473 | 555 | 639 | 725 |
| Asset relocations | | - | 5 | 20 | 33 | 49 | 65 | 82 | 99 | 116 | 134 | 152 |
| Reliability, safety and environment: | | | | | | | | | | | | |
| Quality of supply | | - | - | - | - | - | - | - | - | - | - | - |
| Legislative and regulatory | | - | - | - | - | - | - | - | - | - | - | - |
| Other reliability, safety and environment | | - | - | - | - | - | - | - | - | - | - | - |
| **Total reliability, safety and environment** | | - | - | - | - | - | - | - | - | - | - | - |
| **Expenditure on network assets** | | - | 69 | 264 | 433 | 807 | 986 | 1,398 | 1,438 | 1,712 | 1,982 | 2,272 |
| Expenditure on non-network assets | | - | 4 | 13 | 15 | 17 | 52 | 27 | 34 | 38 | 43 | 52 |
| **Expenditure on assets** | | - | 73 | 278 | 447 | 824 | 1,038 | 1,424 | 1,472 | 1,750 | 2,025 | 2,324 |

| | | Current Year CY | CY+1 | CY+2 | CY+3 | CY+4 | CY+5 |
|---|---|---|---|---|---|---|---|
| **11a(ii): Consumer Connection** | for year ended | 30 Sep 16 | 30 Sep 17 | 30 Sep 18 | 30 Sep 19 | 30 Sep 20 | 30 Sep 21 |
| *Consumer types defined by GDB** | | $000 (in constant prices) | | | | | |
| Mains Extensions/Subdivsions | | 2,091 | 2,492 | 1,584 | 1,680 | 1,775 | 1,878 |
| Service Connections - Residential | | 1,346 | 2,001 | 1,923 | 1,843 | 1,992 | 2,139 |
| Service Connections - Commercial | | 84 | 232 | 234 | 235 | 235 | 236 |
| Customer Easements | | - | 42 | 43 | 43 | 44 | 45 |
| | | - | - | - | - | - | - |
| * include additional rows if needed | | | | | | | |
| **Consumer connection expenditure** | | 3,522 | 4,767 | 3,783 | 3,801 | 4,047 | 4,298 |
| *less* Capital contributions funding consumer connection | | 541 | 386 | 308 | 310 | 329 | 347 |
| **Consumer connection less capital contributions** | | 2,981 | 4,381 | 3,475 | 3,491 | 3,718 | 3,951 |
| **11a(iii): System Growth** | | | | | | | |
| **Intermediate pressure** | | | | | | | |
| Main pipe | | - | 1,380 | 100 | 100 | 3,031 | 1,970 |
| Service pipe | | - | - | - | - | - | - |
| Stations | | - | 985 | 785 | 570 | 330 | 150 |
| Line valve | | - | - | - | - | - | - |
| Special crossings | | - | - | - | - | - | - |
| **Intermediate Pressure total** | | - | 2,365 | 885 | 670 | 3,361 | 2,120 |
| **Medium pressure** | | | | | | | |
| Main pipe | | 733 | 988 | 2,478 | 1,086 | 735 | 420 |
| Service pipe | | - | - | - | - | - | - |
| Stations | | - | 304 | 360 | - | - | 255 |
| Line valve | | - | - | - | - | - | - |
| Special crossings | | - | - | - | - | - | - |
| **Medium Pressure total** | | 733 | 1,292 | 2,838 | 1,086 | 735 | 675 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 92 | | **Low Pressure** | | | | | | |
| 93 | | Main pipe | - | 300 | - | - | - | - |
| 94 | | Service pipe | - | - | - | - | - | - |
| 95 | | Line valve | - | - | - | - | - | - |
| 96 | | Special crossings | - | - | - | - | - | - |
| 97 | | **Low Pressure total** | - | 300 | - | - | - | - |
| 98 | | **Other network assets** | | | | | | |
| 99 | | Monitoring and control systems | | | | | | |
| 100 | | Cathodic protection systems | | | | | | |
| 101 | | Other assets (other than above) | | | | | | |
| 102 | | **Other network assets total** | - | - | - | - | - | - |
| 103 | | | | | | | | |
| 104 | | **System growth expenditure** | 733 | 3,957 | 3,723 | 1,756 | 4,096 | 2,795 |
| 105 | *less* | Capital contributions funding system growth | | | | | | |
| 106 | | **System growth less capital contributions** | 733 | 3,957 | 3,723 | 1,756 | 4,096 | 2,795 |
| 107 | | | | | | | | |
| 108 | | | | | | | | |
| 109 | | | *Current Year CY* | *CY+1* | *CY+2* | *CY+3* | *CY+4* | *CY+5* |
| | | for year ended | **30 Sep 16** | **30 Sep 17** | **30 Sep 18** | **30 Sep 19** | **30 Sep 20** | **30 Sep 21** |
| 110 | **11a(iv): Asset Replacement and Renewal** | | | | | | | |
| 111 | | **Intermediate pressure** | **$000 (in constant prices)** | | | | | |
| 112 | | Main pipe | - | 20 | 20 | 20 | 20 | 20 |
| 113 | | Service pipe | - | 230 | 150 | 60 | 60 | 60 |
| 114 | | Stations | 765 | 1,141 | 545 | 500 | 220 | 220 |
| 115 | | Line valve | 125 | 50 | 50 | 50 | 50 | 50 |
| 116 | | Special crossings | 294 | - | - | - | - | - |
| 117 | | **Intermediate Pressure total** | 1,184 | 1,441 | 765 | 630 | 350 | 350 |
| 118 | | **Medium pressure** | | | | | | |
| 119 | | Main pipe | 1,232 | 1,550 | 1,950 | 2,450 | 3,060 | 3,060 |
| 120 | | Service pipe | 36 | - | - | - | - | - |
| 121 | | Station | - | 369 | - | - | - | - |
| 122 | | Line valve | 49 | - | - | - | - | - |
| 123 | | Special crossings | - | - | - | - | - | - |
| 124 | | **Medium Pressure total** | 1,317 | 1,919 | 1,950 | 2,450 | 3,060 | 3,060 |
| 125 | | **Low Pressure** | | | | | | |
| 126 | | Main pipe | - | - | - | - | - | - |
| 127 | | Service pipe | - | - | - | - | - | - |
| 128 | | Line valve | - | - | - | - | - | - |
| 129 | | Special crossings | - | - | - | - | - | - |
| 130 | | **Low Pressure total** | - | - | - | - | - | - |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 131 | **Other network assets** | | | | | | |
| 132 | Monitoring and control systems | - | - | - | - | - | - |
| 133 | Cathodic protection systems | 159 | - | - | - | - | - |
| 134 | Other assets (other than above) | 231 | 745 | 665 | 600 | 250 | 250 |
| 135 | **Other network assets total** | 390 | 745 | 665 | 600 | 250 | 250 |
| 136 | | | | | | | |
| 137 | **Asset replacement and renewal expenditure** | 2,891 | 4,105 | 3,380 | 3,680 | 3,660 | 3,660 |
| 138 | *less* Capital contributions funding asset replacement and renewal | | | | | | |
| 139 | **Asset replacement and renewal less capital contributions** | 2,891 | 4,105 | 3,380 | 3,680 | 3,660 | 3,660 |
| 140 | | | | | | | |

## 11a(v): Asset Relocations

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 142 | *Project or programme** | | | | | | |
| 143 | | | | | | | |
| 144 | | | | | | | |
| 145 | | | | | | | |
| 146 | | | | | | | |
| 147 | | | | | | | |
| 148 | ** include additional rows if needed* | | | | | | |
| 149 | All other projects or programmes - asset relocations | 940 | 971 | 875 | 765 | 765 | 765 |
| 150 | **Asset relocations expenditure** | 940 | 971 | 875 | 765 | 765 | 765 |
| 151 | *less* Capital contributions funding asset relocations | 429 | 778 | 723 | 628 | 628 | 628 |
| 152 | **Asset relocations less capital contributions** | 511 | 193 | 152 | 137 | 137 | 137 |
| 153 | | | | | | | |

## 11a(vi): Quality of Supply

| | | *Current Year CY* | *CY+1* | *CY+2* | *CY+3* | *CY+4* | *CY+5* |
|---|---|---|---|---|---|---|---|
| 154 | for year ended | **30 Sep 16** | **30 Sep 17** | **30 Sep 18** | **30 Sep 19** | **30 Sep 20** | **30 Sep 21** |
| 155 | | | | | | | |
| 156 | | | | | | | |
| 157 | *Project or programme** | **$000 (in constant prices)** | | | | | |
| 158 | | | | | | | |
| 159 | | | | | | | |
| 160 | | | | | | | |
| 161 | | | | | | | |
| 162 | | | | | | | |
| 163 | ** include additional rows if needed* | | | | | | |
| 164 | All other projects or programmes - quality of supply | | | | | | |
| 165 | **Quality of supply expenditure** | - | - | - | - | - | - |
| 166 | *less* Capital contributions funding quality of supply | | | | | | |
| 167 | **Quality of supply less capital contributions** | - | - | - | - | - | - |
| 168 | | | | | | | |

### 11a(vii): Legislative and Regulatory

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | *Project or programme* | | | | | | |
| | [Description of material project or programme] | | | | | | |
| | [Description of material project or programme] | | | | | | |
| | [Description of material project or programme] | | | | | | |
| | [Description of material project or programme] | | | | | | |
| | [Description of material project or programme] | | | | | | |
| | ** include additional rows if needed* | | | | | | |
| | All other projects or programmes - legislative and regulatory | | | | | | |
| | **Legislative and regulatory expenditure** | - | - | - | - | - | - |
| *less* | Capital contributions funding legislative and regulatory | | | | | | |
| | **Legislative and regulatory less capital contributions** | - | - | - | - | - | - |

### 11a(viii): Other Reliability, Safety and Environment

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | *Project or programme** | | | | | | |
| | [Description of material project or programme] | | | | | | |
| | [Description of material project or programme] | | | | | | |
| | [Description of material project or programme] | | | | | | |
| | [Description of material project or programme] | | | | | | |
| | [Description of material project or programme] | | | | | | |
| | ** include additional rows if needed* | | | | | | |
| | All other projects or programmes - other reliability, safety and environment | | | | | | |
| | **Other reliability, safety and environment expenditure** | - | - | - | - | - | - |
| *less* | Capital contributions funding other reliability, safety and environment | | | | | | |
| | **Other Reliability, safety and environment less capital contributions** | - | - | - | - | - | - |

### 11a(ix): Non-Network Assets

**Routine expenditure**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | *Project or programme** | | | | | | |
| | [Description of material project or programme] | | | | | | |
| | [Description of material project or programme] | | | | | | |
| | [Description of material project or programme] | | | | | | |
| | [Description of material project or programme] | | | | | | |
| | [Description of material project or programme] | | | | | | |
| | ** include additional rows if needed* | | | | | | |
| | All other projects or programmes - routine expenditure | 201 | - | - | - | - | - |
| | **Routine expenditure** | 201 | - | - | - | - | - |

**Atypical expenditure**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | *Project or programme** | | | | | | |
| | ICT | - | 445 | 295 | 308 | 232 | 580 |
| | | - | - | - | - | - | - |
| | | - | - | - | - | - | - |
| | | - | - | - | - | - | - |
| | | - | - | - | - | - | - |
| | ** include additional rows if needed* | | | | | | |
| | All other projects or programmes - atypical expenditure | 86 | 300 | 300 | 30 | 30 | 30 |
| | **Atypical expenditure** | 86 | 745 | 595 | 338 | 262 | 610 |
| | | | | | | | |
| | **Expenditure on non-network assets** | 287 | 745 | 595 | 338 | 262 | 610 |

## B.2. SCHEDULE 11B – FORECAST OPEX

| | |
|---|---|
| Company Name | First Gas Limited |
| AMP Planning Period | 1 October 2016 – 30 September 2026 |

### SCHEDULE 11b: REPORT ON FORECAST OPERATIONAL EXPENDITURE

This schedule requires a breakdown of forecast operational expenditure for the disclosure year and a 10 year planning period. The forecasts should be consistent with the supporting information set out in the AMP. The forecast is to be expressed in both constant price and nominal dollar terms.
GDBs must provide explanatory comment on the difference between constant price and nominal dollar operational expenditure forecasts in Schedule 14a (Mandatory Explanatory Notes).
This information is not part of audited disclosure information.

| sch ref | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | | Current year CY | CY+1 | CY+2 | CY+3 | CY+4 | CY+5 | CY+6 | CY+7 | CY+8 | CY+9 | CY+10 |
| 8 | for year ended | 30 Sep 16 | 30 Sep 17 | 30 Sep 18 | 30 Sep 19 | 30 Sep 20 | 30 Sep 21 | 30 Sep 22 | 30 Sep 23 | 30 Sep 24 | 30 Sep 25 | 30 Sep 26 |
| 9 | **Operational Expenditure Forecast** | $000 (in nominal dollars) | | | | | | | | | | |
| 10 | Service interruptions, incidents and emergencies | 2,306 | 2,282 | 2,322 | 2,369 | 2,416 | 2,465 | 2,514 | 2,564 | 2,616 | 2,668 | 2,721 |
| 11 | Routine and corrective maintenance and inspection | 1,722 | 1,850 | 1,884 | 1,924 | 1,964 | 2,005 | 2,047 | 2,089 | 2,133 | 2,177 | 2,223 |
| 12 | Asset replacement and renewal | - | - | - | - | - | - | - | - | - | - | - |
| 13 | **Network opex** | 4,028 | 4,132 | 4,206 | 4,292 | 4,380 | 4,470 | 4,561 | 4,654 | 4,749 | 4,845 | 4,944 |
| 14 | System operations and network support | 664 | 1,346 | 1,369 | 1,397 | 1,425 | 1,342 | 1,369 | 1,396 | 1,424 | 1,452 | 1,481 |
| 15 | Business support | 2,431 | 1,849 | 1,677 | 1,711 | 1,745 | 1,780 | 1,816 | 1,852 | 1,889 | 1,927 | 1,965 |
| 16 | **Non-network opex** | 3,095 | 3,195 | 3,046 | 3,107 | 3,170 | 3,122 | 3,184 | 3,248 | 3,313 | 3,379 | 3,447 |
| 17 | **Operational expenditure** | 7,123 | 7,327 | 7,251 | 7,400 | 7,550 | 7,592 | 7,745 | 7,902 | 8,061 | 8,224 | 8,391 |
| 18 | | Current year CY | CY+1 | CY+2 | CY+3 | CY+4 | CY+5 | CY+6 | CY+7 | CY+8 | CY+9 | CY+10 |
| 19 | for year ended | 30 Sep 16 | 30 Sep 17 | 30 Sep 18 | 30 Sep 19 | 30 Sep 20 | 30 Sep 21 | 30 Sep 22 | 30 Sep 23 | 30 Sep 24 | 30 Sep 25 | 30 Sep 26 |
| 20 | | $000 (in constant prices) | | | | | | | | | | |
| 21 | Service interruptions, incidents and emergencies | 2,306 | 2,271 | 2,271 | 2,271 | 2,271 | 2,271 | 2,271 | 2,271 | 2,271 | 2,271 | 2,271 |
| 22 | Routine and corrective maintenance and inspection | 1,722 | 1,841 | 1,843 | 1,844 | 1,845 | 1,847 | 1,848 | 1,850 | 1,851 | 1,853 | 1,854 |
| 23 | Asset replacement and renewal | - | - | - | - | - | - | - | - | - | - | - |
| 24 | **Network opex** | 4,028 | 4,112 | 4,113 | 4,115 | 4,116 | 4,117 | 4,119 | 4,120 | 4,122 | 4,123 | 4,125 |
| 25 | System operations and network support | 664 | 1,339 | 1,339 | 1,339 | 1,339 | 1,236 | 1,236 | 1,236 | 1,236 | 1,236 | 1,236 |
| 26 | Business support | 2,431 | 1,840 | 1,640 | 1,640 | 1,640 | 1,640 | 1,640 | 1,640 | 1,640 | 1,640 | 1,640 |
| 27 | **Non-network opex** | 3,095 | 3,179 | 2,979 | 2,979 | 2,979 | 2,876 | 2,876 | 2,876 | 2,876 | 2,876 | 2,876 |
| 28 | **Operational expenditure** | 7,123 | 7,291 | 7,092 | 7,093 | 7,095 | 6,993 | 6,995 | 6,996 | 6,997 | 6,999 | 7,000 |
| 29 | **Subcomponents of operational expenditure (where known)** | | | | | | | | | | | |
| 30 | Research and development | | | | | | | | | | | |
| | Insurance | | | | | | | | | | | |
| 32 | | | | | | | | | | | | |
| 33 | | Current year CY | CY+1 | CY+2 | CY+3 | CY+4 | CY+5 | CY+6 | CY+7 | CY+8 | CY+9 | CY+10 |
| 34 | for year ended | 30 Sep 16 | 30 Sep 17 | 30 Sep 18 | 30 Sep 19 | 30 Sep 20 | 30 Sep 21 | 30 Sep 22 | 30 Sep 23 | 30 Sep 24 | 30 Sep 25 | 30 Sep 26 |
| 35 | **Difference between nominal and real forecasts** | $000 | | | | | | | | | | |
| 36 | Service interruptions, incidents and emergencies | - | 11 | 51 | 98 | 146 | 194 | 244 | 294 | 345 | 398 | 451 |
| 37 | Routine and corrective maintenance and inspection | - | 9 | 41 | 80 | 119 | 158 | 198 | 239 | 281 | 324 | 368 |
| 38 | Asset replacement and renewal | - | - | - | - | - | - | - | - | - | - | - |
| 39 | **Network opex** | - | 21 | 92 | 178 | 264 | 352 | 442 | 533 | 627 | 722 | 819 |
| 40 | System operations and network support | - | 7 | 30 | 58 | 86 | 106 | 133 | 160 | 188 | 216 | 245 |
| 41 | Business support | - | 9 | 37 | 71 | 105 | 140 | 176 | 212 | 249 | 287 | 326 |
| 42 | **Non-network opex** | - | 16 | 67 | 129 | 191 | 246 | 309 | 372 | 437 | 504 | 571 |
| 43 | **Operational expenditure** | - | 36 | 159 | 307 | 456 | 599 | 751 | 906 | 1,064 | 1,225 | 1,390 |

## B.3. SCHEDULE 12A – ASSET CONDITION

| | |
|---|---|
| *Company Name* | First Gas Limited |
| *AMP Planning Period* | 1 October 2016 – 30 September 2026 |

### SCHEDULE 12a: REPORT ON ASSET CONDITION

This schedule requires a breakdown of asset condition by asset class as at the start of the forecast year. The data accuracy assessment relates to the percentage values disclosed in the asset condition columns. Also required is a forecast of the percentage of units to be replaced in the next 5 years. All information should be consistent with the information provided in the AMP and the expenditure on assets forecast in Schedule 11a.

*sch ref*

| | | | | | Asset condition at start of planning period (percentage of units by grade) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | Operating Pressure | Asset category | Asset class | Units | Grade 1 | Grade 2 | Grade 3 | Grade 4 | Grade unknown | Data accuracy (1–4) | % of asset forecast to be replaced in next 5 years |
| 9 | Intermediate Pressure | Main pipe | IP PE main pipe | km | - | - | - | - | - | N/A | - |
| 10 | Intermediate Pressure | Main pipe | IP steel main pipe | km | - | - | - | 100.00% | - | 3 | - |
| 11 | Intermediate Pressure | Main pipe | IP other main pipe | km | - | - | - | - | - | N/A | - |
| 12 | Intermediate Pressure | Service pipe | IP PE service pipe | km | - | - | - | - | - | N/A | - |
| 13 | Intermediate Pressure | Service pipe | IP steel service pipe | km | - | - | - | 100.00% | - | 3 | - |
| 14 | Intermediate Pressure | Service pipe | IP other service pipe | km | - | - | - | - | - | N/A | - |
| 15 | Intermediate Pressure | Stations | Intermediate pressure DRS | No. | - | 4.81% | 46.15% | 49.04% | - | 4 | 6.85 |
| 16 | Intermediate Pressure | Line valve | IP line valves | No. | - | 6.67% | 65.83% | 9.58% | 17.92% | 3 | - |
| 17 | Intermediate Pressure | Special crossings | IP crossings | No. | - | 8.70% | 86.96% | 4.35% | - | 3 | 7.32 |
| 18 | Medium Pressure | Main pipe | MP PE main pipe | km | - | | | 100.00% | | 3 | 0.68 |
| 19 | Medium Pressure | Main pipe | MP steel main pipe | km | - | - | 100.00% | - | - | 3 | - |
| 20 | Medium Pressure | Main pipe | MP other main pipe | km | - | - | - | - | - | N/A | - |
| 21 | Medium Pressure | Service pipe | MP PE service pipe | km | - | | 100.00% | | | 3 | 0.51 |
| 22 | Medium Pressure | Service pipe | MP steel service pipe | km | - | 100.00% | - | - | - | 3 | - |
| 23 | Medium Pressure | Service pipe | MP other service pipe | km | - | - | - | - | - | N/A | - |
| 24 | Medium Pressure | Stations | Medium pressure DRS | No. | - | - | 41.67% | 58.33% | - | 4 | - |
| 25 | Medium Pressure | Line valve | MP line valves | No. | 0.10% | 6.55% | 76.30% | 7.90% | 9.15% | 3 | 0.10 |
| 26 | Medium Pressure | Special crossings | MP special crossings | No. | - | - | 93.22% | 5.08% | 1.69% | 3 | 7.32 |
| 27 | Low Pressure | Main pipe | LP PE main pipe | km | - | - | - | 100.00% | - | 3 | - |
| 28 | Low Pressure | Main pipe | LP steel main pipe | km | - | - | - | - | - | N/A | - |
| 29 | Low Pressure | Main pipe | LP other main pipe | km | - | - | - | - | - | N/A | - |
| 30 | Low Pressure | Service pipe | LP PE service pipe | km | - | | 100.00% | | | 3 | - |
| 31 | Low Pressure | Service pipe | LP steel service pipe | km | - | - | 100.00% | - | - | 3 | - |
| 32 | Low Pressure | Service pipe | LP other service pipe | km | - | - | - | - | - | N/A | - |
| 33 | Low Pressure | Line valve | LP line valves | No. | - | - | 100.00% | - | - | 3 | - |
| 34 | Low Pressure | Special crossings | LP special crossings | No. | - | - | - | - | - | N/A | - |
| 35 | All | Monitoring and control systems | Remote terminal units | No. | - | - | - | 100.00% | - | 3 | - |
| 36 | All | Cathodic protection systems | Cathodic protection | No. | 2.94% | 5.88% | 85.29% | 5.88% | - | 4 | 8.40 |

# B.4. SCHEDULE 12B – FORECAST UTILISATION

| | |
|---|---|
| *Company Name* | **First Gas Limited** |
| *AMP Planning Period* | **1 October 2016 – 30 September 2026** |

**SCHEDULE 12b: REPORT ON FORECAST UTILISATION**

This Schedule requires a breakdown of current and forecast utilisation (for heavily utilised pipelines) consistent with the information provided in the AMP and the demand forecast in schedule S12c.

*sch ref*

**Forecast Utilisation of Heavily Utilised Pipelines**

**Utilisation**

| Region | Network | Pressure system | Nominal operating pressure (NOP) (kPa) | Minimum operating pressure (MinOP) (kPa) | Total capacity at MinOP (scmh) | Remaining capacity at MinOP (scmh) | Unit | *Current Year CY* y/e 30 Sep 16 | *CY+1* y/e 30 Sep 17 | *CY+2* y/e 30 Sep 18 | *CY+3* y/e 30 Sep 19 | *CY+4* y/e 30 Sep 20 | *CY+5* y/e 30 Sep 21 | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Kapiti | Paraparaumu | PR Paraparaumu IP20 | 1,900 | 950 | 1,731 | 165 | scmh | 1566 | 1652 | 1682 | 1712 | 1742 | 1772 | Remaining capacity at MinOP is available in the Raumati South area. |
| | | | | | | | kPa | 1043 | 1006 | 991.9 | 977.3 | 962.6 | 947.1 | |
| Kapiti | Paraparaumu | PR Paraparaumu MP4 | 400 | 200 | 1,644 | 78 | scmh | 1566 | 1652 | 1682 | 1712 | 1742 | 1772 | Stated remaining capacity at MinOP is available in the Paraparaumu beach area, but remaining capacity does not vary largely across the entire network. |
| | | | | | | | kPa | 240 | 230.1 | 226.4 | 222.6 | 218.9 | 214.9 | |
| Central Plateau | Rotorua | RO Rotorua MP4 | 400 | 200 | 2,868 | 8 | scmh | 2860 | 2716 | 2716 | 2716 | 2716 | 2716 | Remaining capacity at MinOP is available in the vicinity of the Pukehangi and Sunnybrook areas. |
| | | | | | | | kPa | 217.4 | 231.2 | 231.2 | 231.2 | 231.2 | 231.2 | |
| Waikato | Waitoa | WT Waotpa MP4 | 400 | 200 | 528 | 25 | scmh | 503 | 550 | 565.55 | 581.51 | 597.23 | 613.2 | Remaining capacity at MinOp is available in the Waharoa area. |
| | | | | | | | kPa | 232 | 198.8 | 186.2 | 172.5 | 158 | 142 | |
| | | | | | | | scmh | | | | | | | |
| | | | | | | | kPa | | | | | | | |
| | | | | | | | scmh | | | | | | | |
| | | | | | | | kPa | | | | | | | |
| | | | | | | | scmh | | | | | | | |
| | | | | | | | kPa | | | | | | | |
| | | | | | | | scmh | | | | | | | |
| | | | | | | | kPa | | | | | | | |
| | | | | | | | scmh | | | | | | | |
| | | | | | | | kPa | | | | | | | |
| | | | | | | | scmh | | | | | | | |
| | | | | | | | kPa | | | | | | | |

** Current year utilisation figures may be estimates. Year 1–5 figures show the utilisation forecast to occur given the expected system configuration for each year, including the effect of any new investment in the pressure system.*

**Disclaimer for supply enquiries**

The information in this table contains modelled estimates of utilisation and capacity. Any interested party seeking to invest in supply from First Gas Limited's distribution networks should contact their retailer and confirm availability of capacity.

**Notes and assumptions**

1. A 'heavily utilised' pressure system is a pressure system where the modelled flow rate, at system peak during 2015, is greater than or equal to 500 scmh, and its utilisation (pressure drop) is greater than or equal to 40% from the nominal operating pressure (NOP). The utilisation of a pressure system is calculated using the formula: [1 – (system minimum pressure / nominal operating pressure)] *100%.
2. The remaining capacity of a 'heavily utilised' pressure system is obtained by examining the modelled flows at various extremity points in each pressure system, and the level at which the minimum operating pressure (MinOP) is reached. First Gas Limited's security standards set the MinOP at 50% of the rated pressure (which equates to approximately 82% of the pipeline capacity) for a pressure system (based on standard operating pressures). The minimum modelled flow rate, analysed at one extremity point, is used to calculate the remaining capacity of the entire pressure system being studied.
3. A forecast model of a pressure system is obtained by applying either its forecast flow rate or an annual growth rate in each forecast year; and scaling its loads evenly to give the system total flow. The resulting minimum system pressure is simulated on this basis.
4. The forecast system flow is populated using the respective network system as tabulated in Appendix E of the First Gas Distribution Asset Management Plan 2016 - 2026.
5. The forecast system flow for the Paraparaumu network system is based on an annual growth rate of 1.6%, as tabulated in Appendix E of the First Gas Distribution Asset Management Plan 2016 - 2026.
6. The forecast system flow for the Rotorua network system is based on an annual growth rate of 0.0%; i.e.: zero-growth, as tabulated in Appendix E of the First Gas Distribution Asset Management Plan 2016 - 2026.
7. The forecast system flow for the Waitoa network system, which includes all IP20, MP7 and MP4 loads, is based on an annual growth rate of 2.6%, as tabulated in Appendix E of the First Gas Distribution Asset Management Plan 2016 - 2026.
8. Stated annual growth rates are averaged across a 10-year planning period. Owing to seasonality factors influencing the forecasting model the discrete forecast system flows may not mirror the 10-year averaged growth rate incrementally.
9. Details of performance, capacity and system reinforcement are described in Chapter 5 - System Development of the First Gas Distribution Asset Management Plan 2016 - 2026.
10. Schedule 12b provides a snapshot in time of the pressure system capacity, at the date of its preparation, and it should be noted that the figures will change over time. Schedule 12b is provided on the basis that it be used for consumer guidance only.
11. The capacity limits specified in Schedule 12b for each 'heavily utilised' pressure system highlight only the most constrained part of the pressure system. At that specific location the MinOP is lowest; in reality more capacity may be available at other locations within the pressure or network system.
12. Consumers considering using gas or wanting more capacity should always contact First Gas Limited to confirm availability. In these cases, First Gas Limited will prepare a dedicated model that will provide an accurate assessment of available gas capacity at the specified location.
13. Due to resource constraints, the network models used to compile Schedule 12b are updated on a 3 year rolling cycle, meaning that the model update, forecast and validation of some models may not have been updated since 2013.
14. It has been assumed that the load forecasting documented in the AMP is correct, and that all assumptions and risks associated with this forecasting have been reviewed and approved as part of a separate exercise associated with signing off the AMP.

## B.5. SCHEDULE 12C – FORECAST DEMAND

| | |
|---|---|
| *Company Name* | **First Gas Limited** |
| *AMP Planning Period* | **1 October 2016 – 30 September 2026** |

### SCHEDULE 12c: REPORT ON FORECAST DEMAND

This schedule requires a forecast of new connections (by consumer type), peak demand and energy volumes for the disclosure year and a 5 year planning period. The forecasts should be consistent with the supporting information set out in the AMP as well as the assumptions used in developing the expenditure forecasts in Schedule 11a and Schedule 11b and the capacity and utilisation forecasts in Schedule 12b.

*sch ref*

### 12c(i) Consumer Connections

**Number of ICPs connected in year by consumer type**

| *Consumer types defined by GDB* | *Current year CY* **30 Sep 16** | *CY+1* **30 Sep 17** | *CY+2* **30 Sep 18** | *CY+3* **30 Sep 19** | *CY+4* **30 Sep 20** | *CY+5* **30 Sep 21** |
|---|---|---|---|---|---|---|
| Residential | 956 | 953 | 916 | 878 | 949 | 1,019 |
| Commercial | 106 | 104 | 105 | 105 | 106 | 106 |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| **Total** | 1,062 | 1,057 | 1,021 | 983 | 1,055 | 1,125 |

### 12c(ii): Gas Delivered

| | *Current year CY* **30 Sep 16** | *CY+1* **30 Sep 17** | *CY+2* **30 Sep 18** | *CY+3* **30 Sep 19** | *CY+4* **30 Sep 20** | *CY+5* **30 Sep 21** |
|---|---|---|---|---|---|---|
| Number of ICPs at year end (at year end) | 62,321 | 62,804 | 63,251 | 63,660 | 64,141 | 64,692 |
| Maximum daily load (GJ per day) | 35,097 | 35,569 | 36,046 | 36,530 | 37,021 | 37,518 |
| Maximum monthly load (GJ per month) | 949,506 | 946,293 | 943,090 | 939,898 | 936,717 | 933,547 |
| Number of directly billed ICPs (at year end) | - | - | - | - | - | - |
| Total gas conveyed (GJ per annum) | 9,061,819 | 9,486,218 | 9,443,973 | 9,554,147 | 9,664,730 | 9,761,378 |
| Average daily delivery (GJ per day) | 24,759 | 25,990 | 25,874 | 26,176 | 26,406 | 26,744 |
| | | | | | | |
| Load factor | 79.53% | 83.54% | 83.45% | 84.71% | 85.98% | 87.14% |

## B.6. SCHEDULE 14A

We explain our approach to forecast escalation in Section 8.1.1 of the AMP. This provides an explanation for differences between nominal and constant price capital expenditure forecasts (Schedule 11a) and operational expenditure (Schedule 11b).

# C. AMMAT DISCLOSURE

## SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY

This schedule requires information on the EDB'S self-assessment of the maturity of its asset management practices.

| Question No. | Function | Question | Score | Evidence—Summary |
|---|---|---|---|---|
| 3 | Asset management policy | To what extent has an asset management policy been documented, authorised and communicated? | 2 | Asset Management Policy has been reviewed and approved by the First Gas Board. At this stage it has been not been communicated to all relevant stakeholders. |
| 10 | Asset management strategy | What has the organisation done to ensure that its asset management strategy is consistent with other appropriate organisational policies and strategies, and the needs of stakeholders? | 1 | An Asset Management Strategy has not been formally developed. This will be developed following completion of the AMP.<br><br>First Gas has met with internal and external stakeholders to discuss the Asset Strategy and discussed with external stakeholders what their requirements are in terms of Security and Reliability of supply. These discussions will inform the strategy development process. |
| 11 | Asset management strategy | In what way does the organisation's asset management strategy take account of the lifecycle of the assets, asset types and asset systems over which the organisation has stewardship? | 1 | Asset Management Strategy has not been developed. This will be developed following completion of the AMP. The strategy is well understood and forms the basis for the AMP. |
| 26 | Asset management plan(s) | How does the organisation establish and document its asset management plan(s) across the life cycle activities of its assets and asset systems? | 3 | First Gas has developed an Asset Management Plan for the Distribution Network. This plan covers the Distribution Network holistically. It includes the full asset lifecycle. Plans for critical assets are identified in the AMP. The plan meets the objectives of the Asset Management Policy. |

## SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

| | | | | |
|---|---|---|---|---|
| 27 | Asset management plan(s) | How has the organisation communicated its plan(s) to all relevant parties to a level of detail appropriate to the receiver's role in their delivery? | 3 | The AMP is communicated to all relevant personnel through the First Gas website. Key stakeholders will be issued with a copy of the AMP for reference. |
| 29 | Asset management plan(s) | How are designated responsibilities for delivery of asset plan actions documented? | 3 | First Gas AMP places responsibility for delivery of the AMP with the Chief Operating Officer. The Chief Operating Officer delegates the responsibility of the sections of the AMP through the organisation. These responsibilities and documented in First Gas position descriptions as appropriate. |
| 31 | Asset management plan(s) | What has the organisation done to ensure that appropriate arrangements are made available for the efficient and cost effective implementation of the plan(s)?<br><br>(Note this is about resources and enabling support) | 3 | First Gas has arrangements in place to cover the requirements of the planning, delivery and execution of our works plan. |
| 33 | Contingency planning | What plan(s) and procedure(s) does the organisation have for identifying and responding to incidents and emergency situations and ensuring continuity of critical asset management activities? | 3 | First Gas has appropriate emergency plan(s) and procedure(s) in place to respond to incidents and to ensure continuity of critical asset management activities consistent with policies and asset management objectives. Training and external agency alignment is in place.<br>EMP is tested in emergency exercises regularly. These include emergency service involvement. |

## SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

| | | | | |
|---|---|---|---|---|
| 37 | Structure, authority and responsibilities | What has the organisation done to appoint member(s) of its management team to be responsible for ensuring that the organisation's assets deliver the requirements of the asset management strategy, objectives and plan(s)? | 3 | First Gas has appointed a person who has responsibility for ensuring that the organization's assets deliver the requirements of the asset management strategy, objectives and plan(s). They have been given the necessary authority to achieve this. |
| 40 | Structure, authority and responsibilities | What evidence can the organisation's top management provide to demonstrate that sufficient resources are available for asset management? | 2 | First Gas has a process for determining what resources are required for asset management activities and in most cases these are available but in some instances resources remain insufficient. |
| 42 | Structure, authority and responsibilities | To what degree does the organisation's top management communicate the importance of meeting its asset management requirements? | 2 | Some areas of First Gas management communicates the importance of meeting its asset management requirements but only to parts of the organisation. |
| 45 | Outsourcing of asset management activities | Where the organisation has outsourced some of its asset management activities, how has it ensured that appropriate controls are in place to ensure the compliant delivery of its organisational strategic plan, and its asset management policy and strategy? | 2 | First Gas has controls in place for the engagement of third party suppliers/contractors that ensure the provision of services is in line with First Gas objectives. |
| 48 | Training, awareness and competence | How does the organisation develop plan(s) for the human resources required to undertake asset management activities - including the development and delivery of asset management strategy, process(es), objectives and plan(s)? | 3 | First Gas has training needs of personnel well developed and implemented. There are some known holes in training implementation, however these areas are being rectified. |
| 49 | Training, awareness and competence | How does the organisation identify competency requirements and then plan, provide and record the training necessary to achieve the competencies? | 2 | First Gas aligns training requirements with established competencies in gas network technical operation and maintenance. A training and development plan exists to ensure that personnel involved with the operation and maintenance of the asset are appropriately trained. These have been validated through internal and external audits. |

## SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

| | | | | |
|---|---|---|---|---|
| 50 | Training, awareness and competence | How does the organization ensure that persons under its direct control undertaking asset management related activities have an appropriate level of competence in terms of education, training or experience? | 3 | First Gas aligns training requirements with established competencies in technical operation and maintenance. A training and development plan exists to ensure that personnel involved with the operation and maintenance of the asset are appropriately trained. The validation of competency forms part of the NZ7901 accreditation. |
| 53 | Communication, participation and consultation | How does the organisation ensure that pertinent asset management information is effectively communicated to and from employees and other stakeholders, including contracted service providers? | 3 | Two way communication is in place between all relevant parties, ensuring that information is effectively communicated to match the requirements of asset management strategy, plan(s) and process(es). Pertinent asset information requirements are regularly reviewed. |
| 59 | Asset Management System documentation | What documentation has the organisation established to describe the main elements of its asset management system and interactions between them? | 2 | The First Gas AMP describes the main elements of the asset management system. This covers the main elements. |
| 62 | Information management | What has the organisation done to determine what its asset management information system(s) should contain in order to support its asset management system? | 3 | First Gas use Maximo, Qmap, NRams and Meridian as Asset Management Information systems. These systems contain data to support the whole asset lifecycle. This includes information originating from both internal and external sources. |
| 63 | Information management | How does the organisation maintain its asset management information system(s) and ensure that the data held within it (them) is of the requisite quality and accuracy and is consistent? | 2 | First Gas has developed controls that will ensure the data held is of the requisite quality and accuracy. Audits are undertaken. First Gas uses a number of interrelated systems to retain asset information. Maximo - maintenance and event management, Qmap for procedures, NRAMs for non routine asset planning and Meridian for asset information. Controls are in place and being further developed to ensure the accuracy of the data is consistent and maintained. |

## SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

| | | | | |
|---|---|---|---|---|
| 64 | Information management | How has the organisation's ensured its asset management information system is relevant to its needs? | 2 | First Gas has recently upgraded its information management system. Prior to this, First Gas investigated the products in the market place and consulted other asset owners to assess the capabilities of these systems against the need of the business. The systems were implemented 'out of the box' and now an assessment of the further needs of the business is being established to close gaps as these are identified. |
| 69 | Risk management process(es) | How has the organisation documented process(es) and/or procedure(s) for the identification and assessment of asset and asset management related risks throughout the asset life cycle? | 3 | First Gas has a risk management procedure that is implemented across the business. New assets and modifications to assets are assessed for operational risk through a formalised HAZOP process. All risk assessments are documented and actions included in the asset information systems. |
| 79 | Use and maintenance of asset risk information | How does the organisation ensure that the results of risk assessments provide input into the identification of adequate resources and training and competency needs? | 3 | Where risk assessments identify actions, these are incorporated into the asset information system with an action owner and timeframe for close out. This is monitored by management and audited to ensure proper close out. Where resource or training needs are identified, the appropriate actions are raised and actioned within a designated timeframe. |
| 82 | Legal and other requirements | What procedure does the organisation have to identify and provide access to its legal, regulatory, statutory and other asset management requirements, and how is requirements incorporated into the asset management system? | 3 | First Gas works closely with the Worksafe, Commerce Commission and industry bodies to maintain an awareness of changes in legislation. The General Manager Regulatory and Commercial is responsible for ensuring changes are incorporated into the business. |

## SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

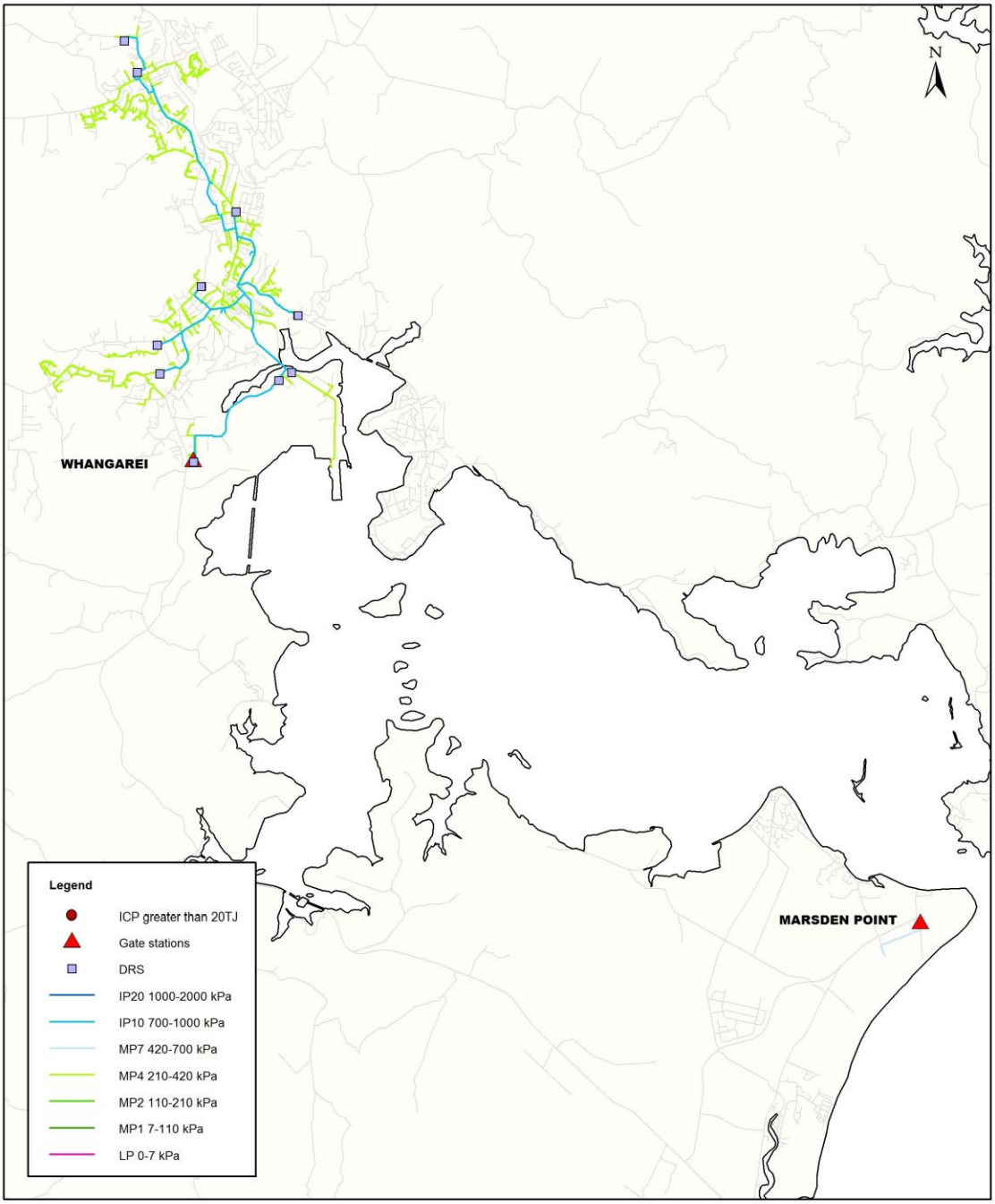
| | | | | |
|---|---|---|---|---|
| 88 | Life Cycle Activities | How does the organisation establish implement and maintain process(es) for the implementation of its asset management plan(s) and control of activities across the creation, acquisition or enhancement of assets. This includes design, modification, procurement, construction and commissioning activities? | 3 | First Gas has established processes and procedures for the design, construction, maintenance and operation, and modification of assets across their lifecycle. |
| 91 | Life Cycle Activities | How does the organisation ensure that process(es) and/or procedure(s) for the implementation of asset management plan(s) and control of activities during maintenance (and inspection) of assets are sufficient to ensure activities are carried out under specified conditions, are consistent with asset management strategy and control cost, risk and performance? | 3 | First Gas has documented review processes in place for all critical documentation. The review process includes the auditing of the documents and processes by an internal auditor to ensure that the processes work. Action derived from these audits are incorporated into the asset information system for completion by a document owner. |
| 95 | Performance and condition monitoring | How does the organisation measure the performance and condition of its assets? | 2 | First Gas has set performance indicators to monitor and measure the performance of the asset management system. These indicators are described and reported in the asset management plan on an annual basis and monitored by First Gas management monthly. These are currently being reviewed following the transition to First Gas. |
| 99 | Investigation of asset-related failures, incidents and nonconformities | How does the organisation ensure responsibility and the authority for the handling, investigation and mitigation of asset-related failures, incidents and emergency situations and non conformances is clear, unambiguous, understood and communicated? | 3 | First Gas has fully developed processes for the handling, investigation of asset related failures, incident and emergency situations. This is documented in the position descriptions for those leading these processes. Mitigation strategies developed from investigations and assigned an owners and included in the asset information system for action. These processes have been audited during the NZ7901 Audit. |

## SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

| | | | | |
|---|---|---|---|---|
| 105 | Audit | What has the organisation done to establish procedure(s) for the audit of its asset management system (process(es))? | 3 | First Gas is required to undertake an external audit of the Asset Management System to maintain NZ7901 accreditation.<br>First Gas employs an internal auditor for the sole purpose of ensure internal processes associated with the asset management system are met and any deficiencies identified and remediated. |
| 109 | Corrective & Preventative action | How does the organisation instigate appropriate corrective and/or preventive actions to eliminate or prevent the causes of identified poor performance and non conformance? | 3 | Where poor performance or an non conformance is identified, an investigator is assigned to perform an investigation of the issue. The aim of the investigation is to determine the root cause and develop actions to remediate the poor performance. The issue is assigned an owner who is responsible to ensure the actions are implemented. An audit is carried out on completed investigations by the internal auditor to ensure that the actions have been adequately closed out. |
| 113 | Continual Improvement | How does the organisation achieve continual improvement in the optimal combination of costs, asset related risks and the performance and condition of assets and asset systems across the whole life cycle? | 3 | Continuous improvement is applied across the entire asset lifecycle. Systems are in place to improve the condition, reliability and performance of the assets based on asset condition, commercial drivers and perceived risk to security and reliability. Capital and Operational budget allocations for renewal are assigned and approved by management. |
| 115 | Continual Improvement | How does the organisation seek and acquire knowledge about new asset management related technology and practices, and evaluate their potential benefit to the organisation? | 3 | First Gas actively promotes engagement with stakeholders and industry groups to share information on technology practices. Where improvements are identified they are reviewed at a concept level and if they provide a benefit they are implemented as appropriate. |

# D. NETWORK MAPS

This appendix provides outlines of our distribution network, including location of mains pipes, gate and pressure regulation stations. The maps also show ICPs with an individual energy demand above 20TJ, and hence have a significant impact on network operations and asset management.



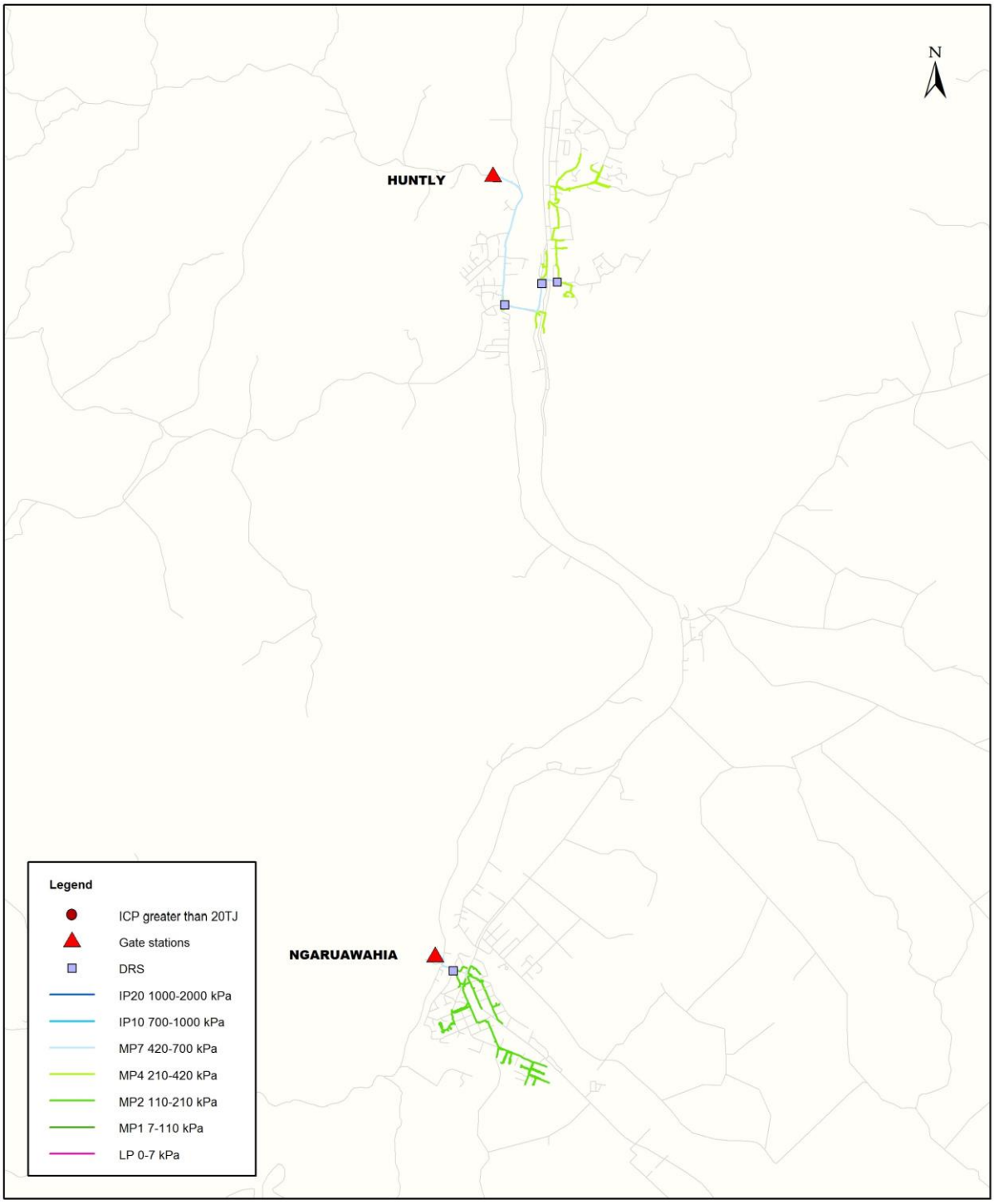

**GAS DISTRIBUTION MAPS**
**NORTHLAND REGION**

Firstgas

GENERAL NOTES:
1. Cadastral information sourced from CoreLogic.
2. Topographical information sourced from LINZ Data Service under the Creative Commons Attribution 3.0 New Zealand licence.
3. Coordinates are in terms of New Zealand Map Grid 1949 projection.
4. Date of Issue: 12/09/2016



Drawing Reference: GIS-G0215-002-01




# GAS DISTRIBUTION MAPS
# WAIKATO REGION

GENERAL NOTES:
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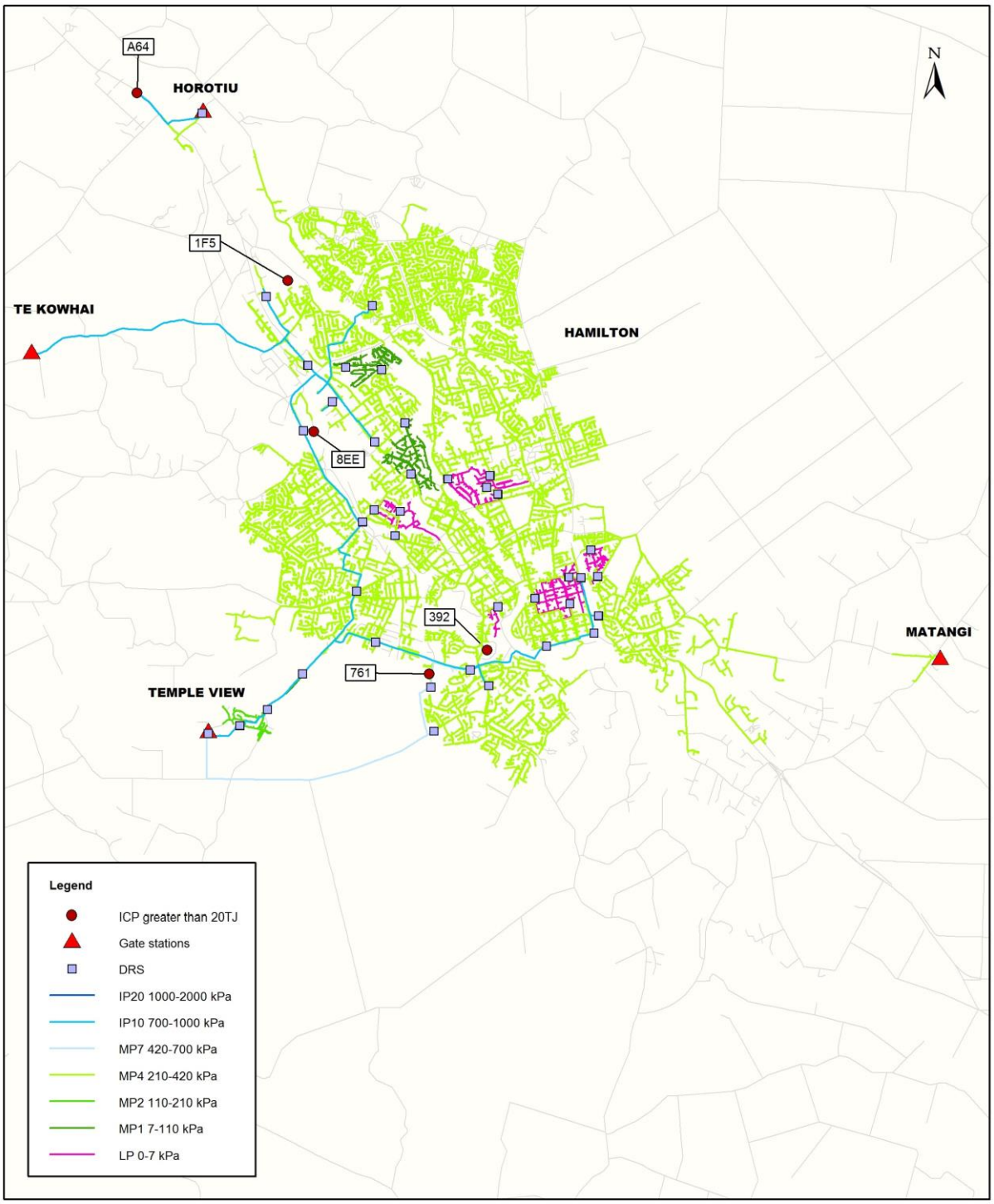
4. Date of Issue: 12/09/2016



**Drawing Reference: GIS-G0215-003-01**




# GAS DISTRIBUTION MAPS
# WAIKATO REGION

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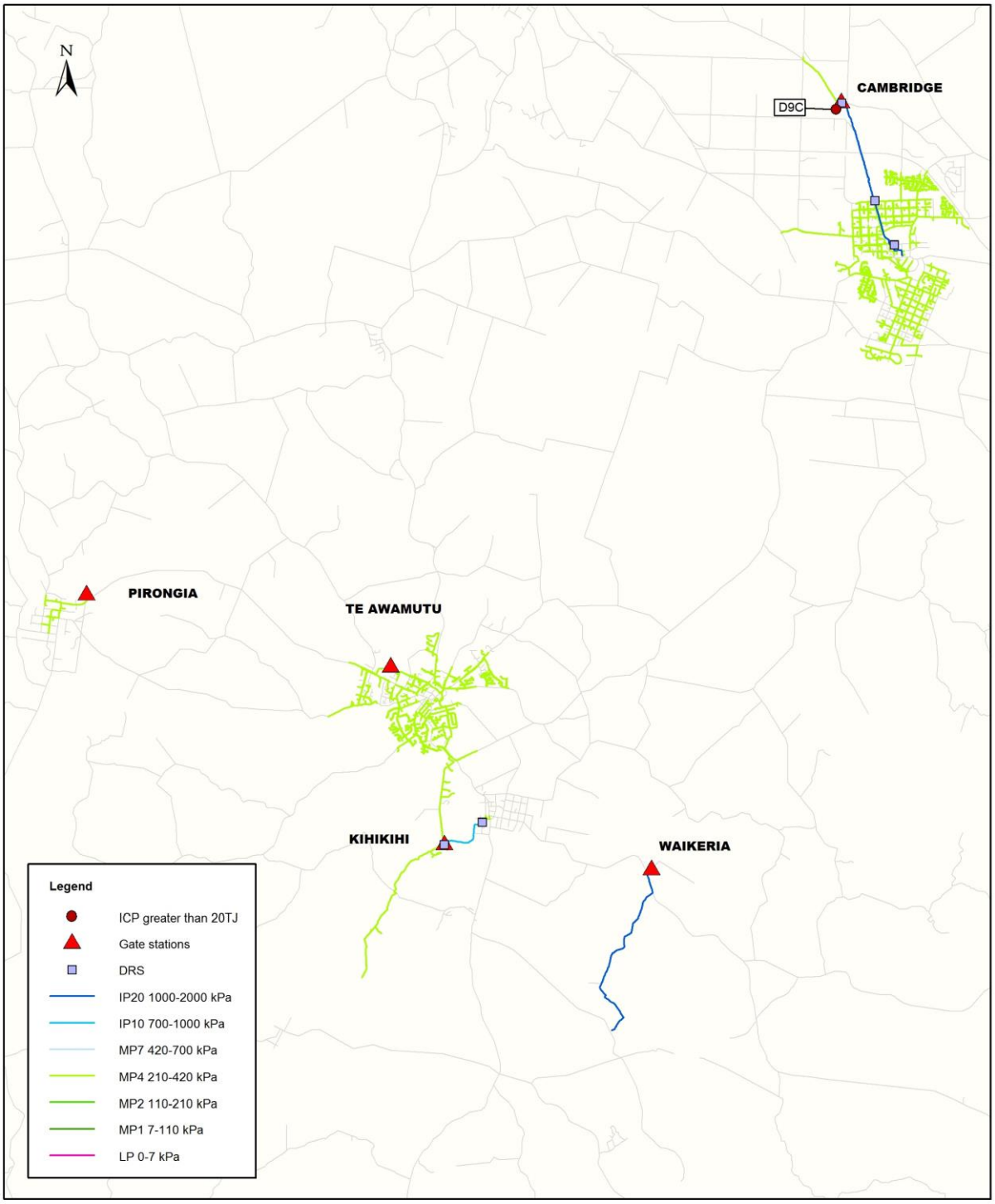
**Drawing Reference: GIS-G0215-003-02**




# GAS DISTRIBUTION MAPS
# WAIKATO REGION

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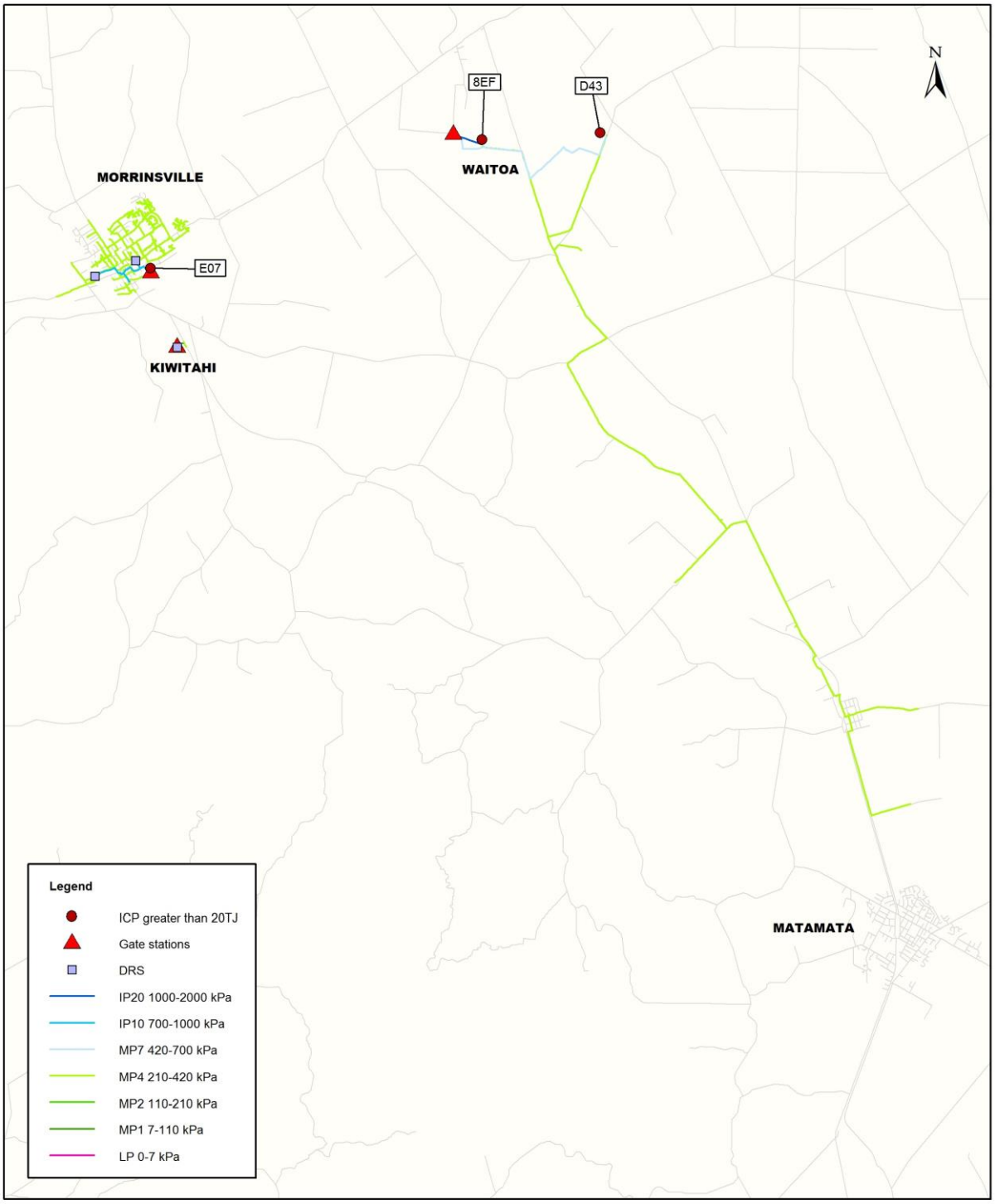
4. Date of Issue: 12/09/2016



**Drawing Reference: GIS-G0215-003-03**

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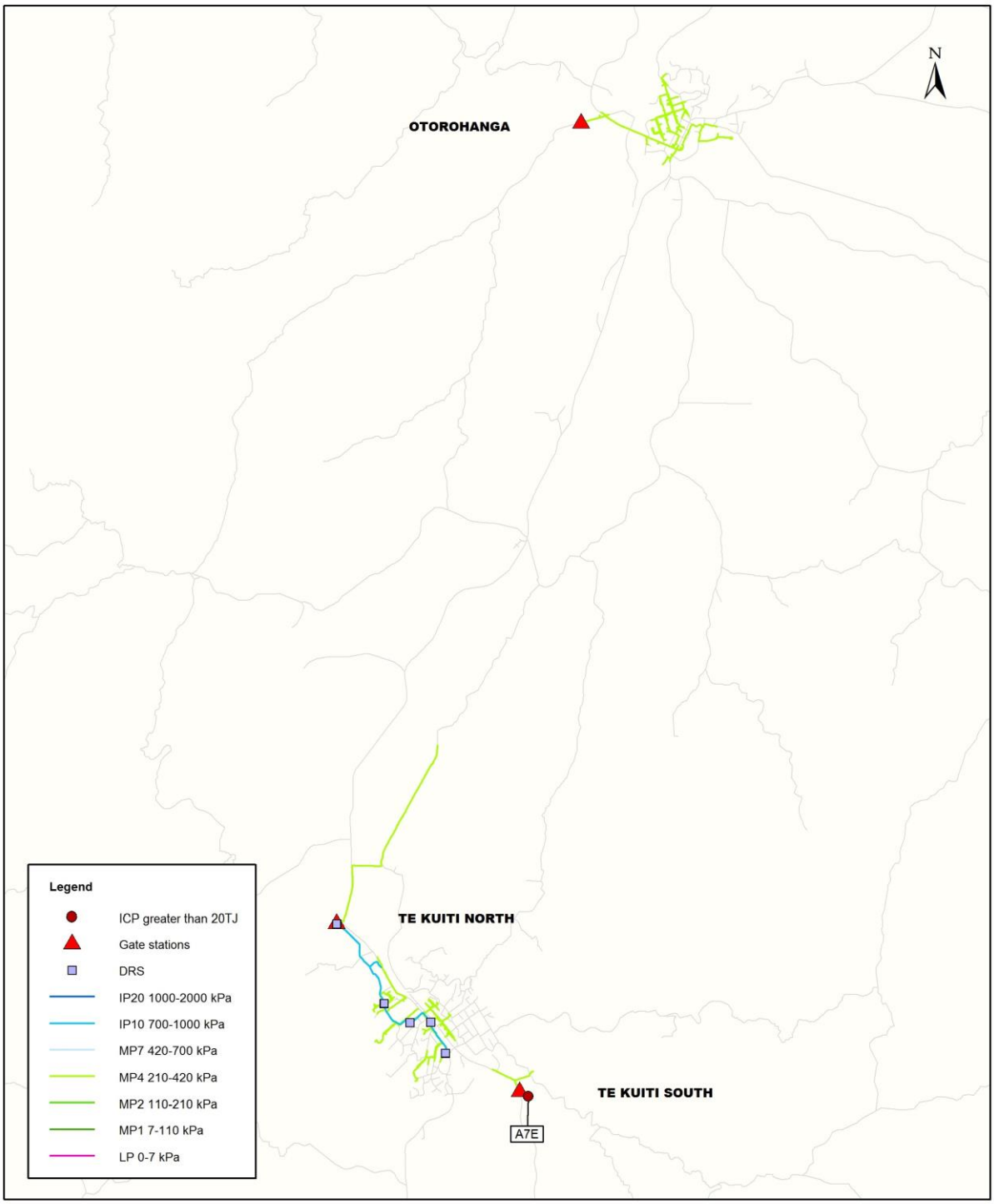
**Drawing Reference: GIS-G0215-003-04**

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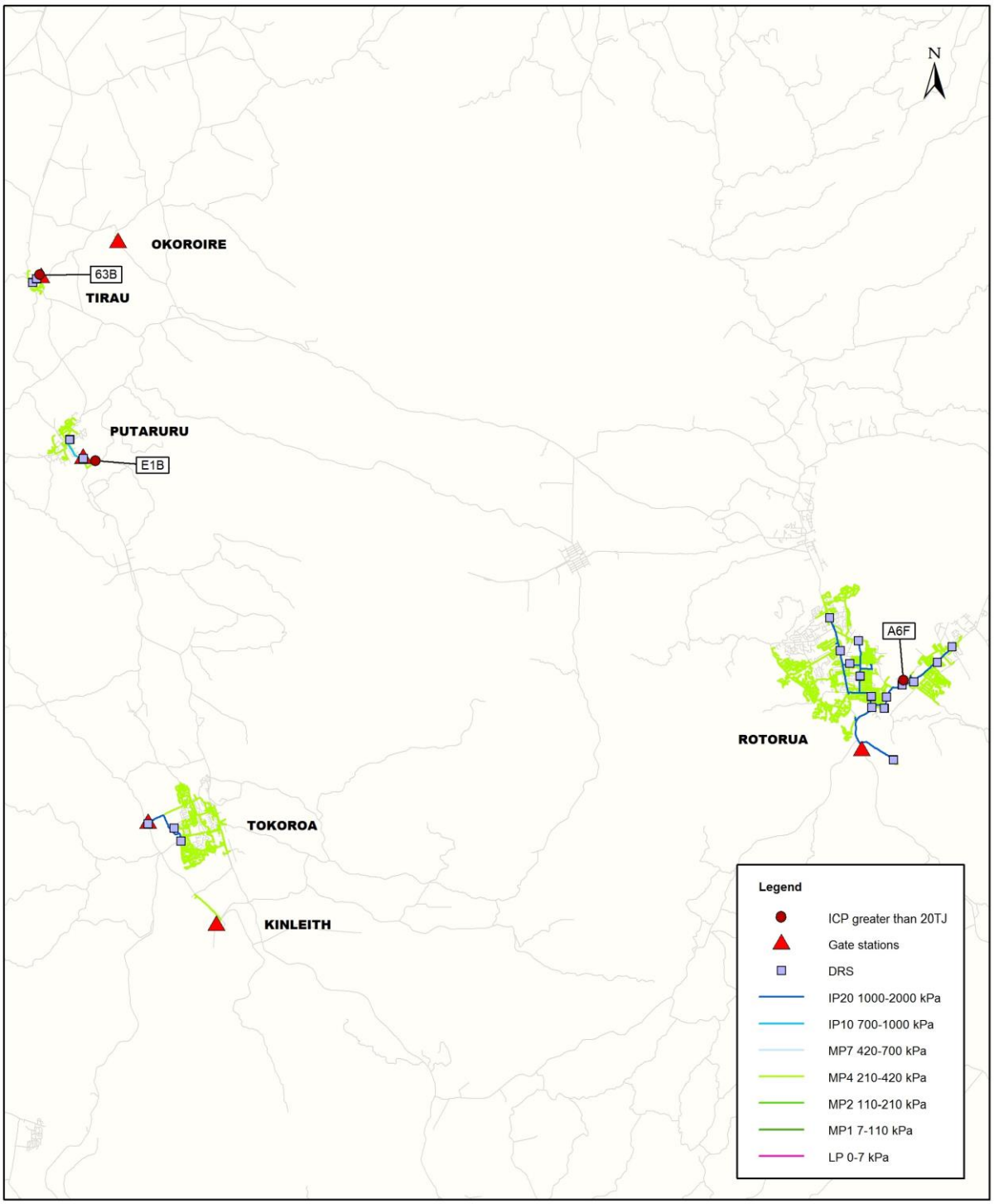


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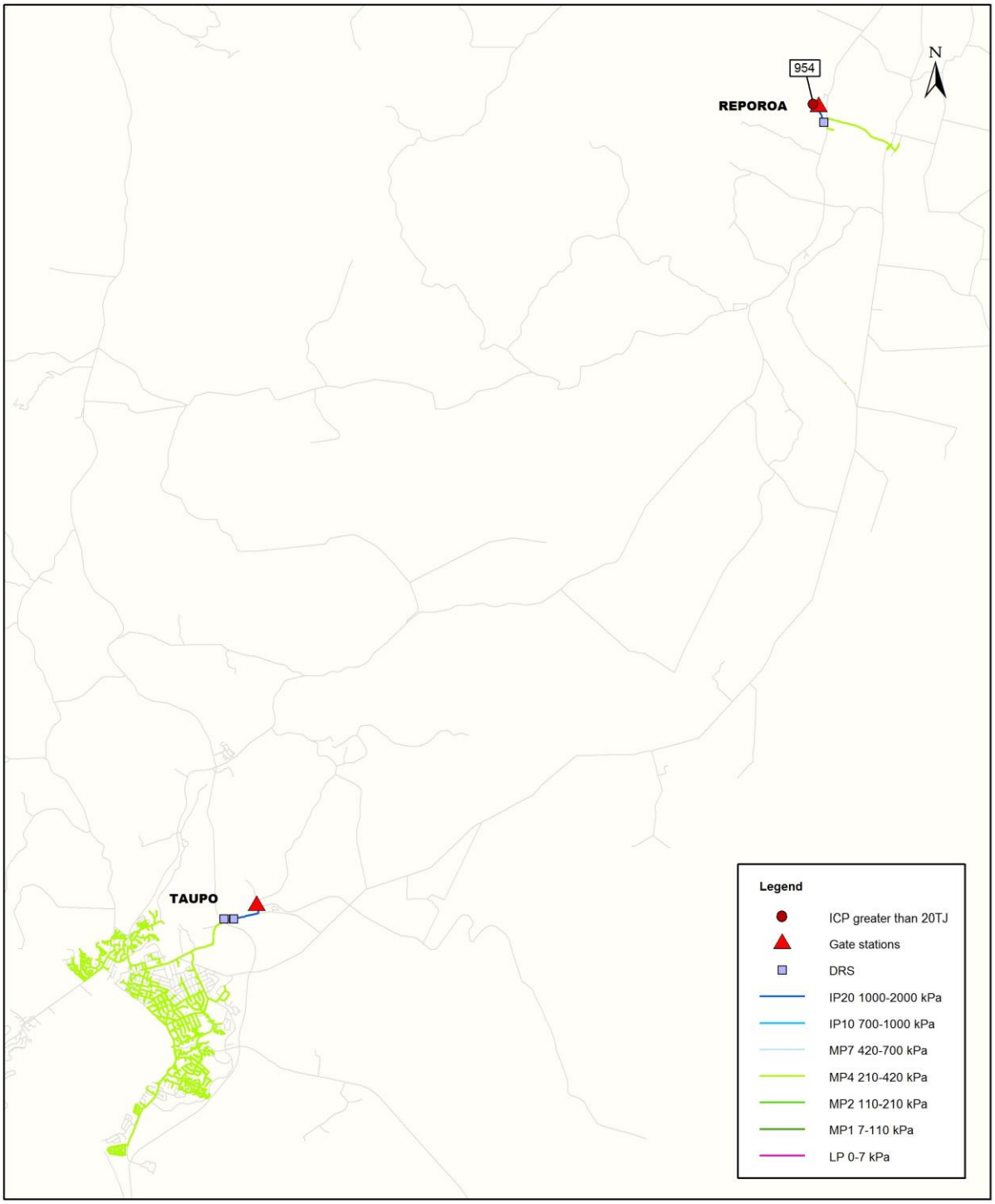
**Drawing Reference: GIS-G0215-004-01**

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# CENTRAL PLATEAU REGION

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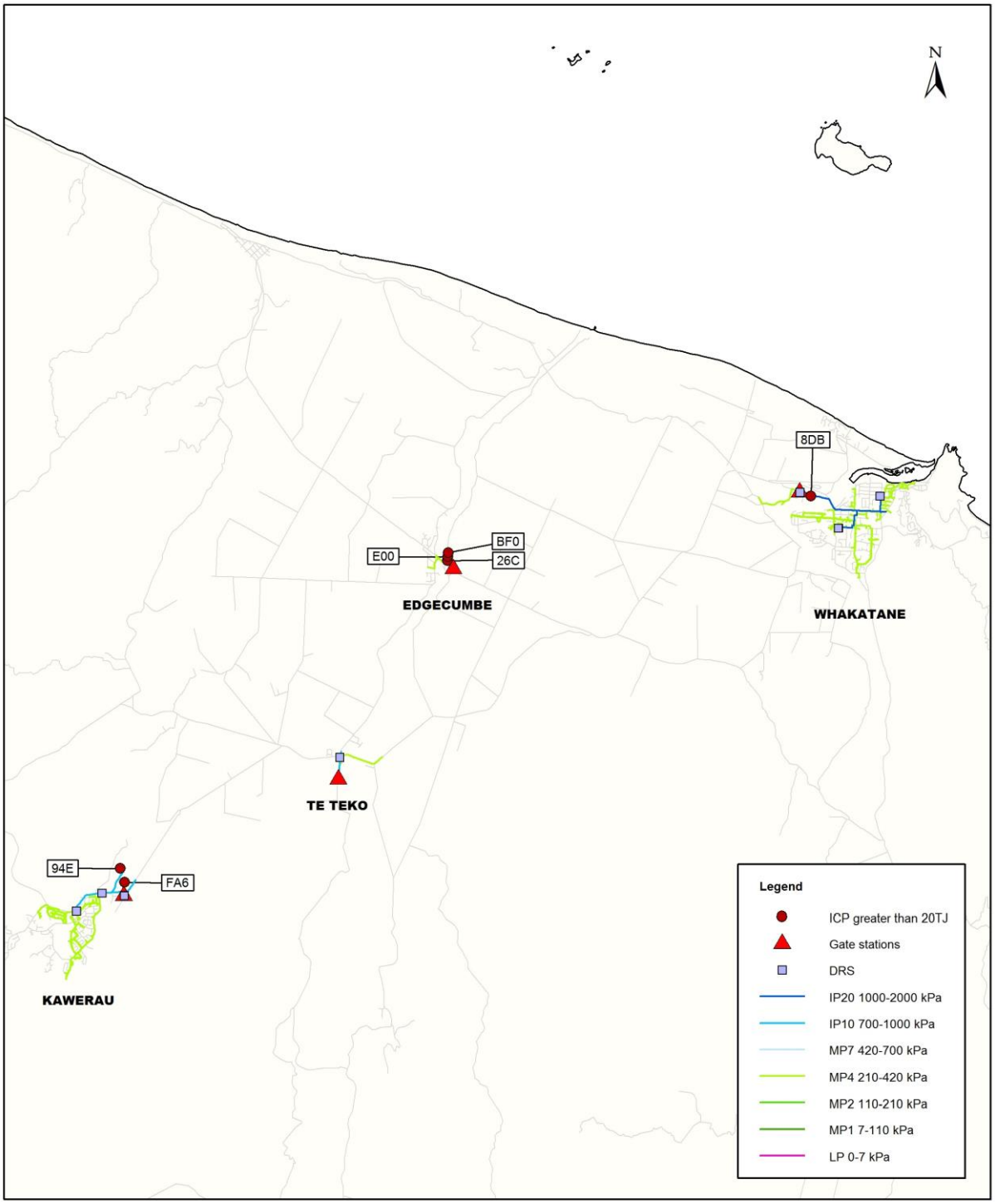
**Drawing Reference: GIS-G0215-004-02**

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# BAY OF PLENTY REGION

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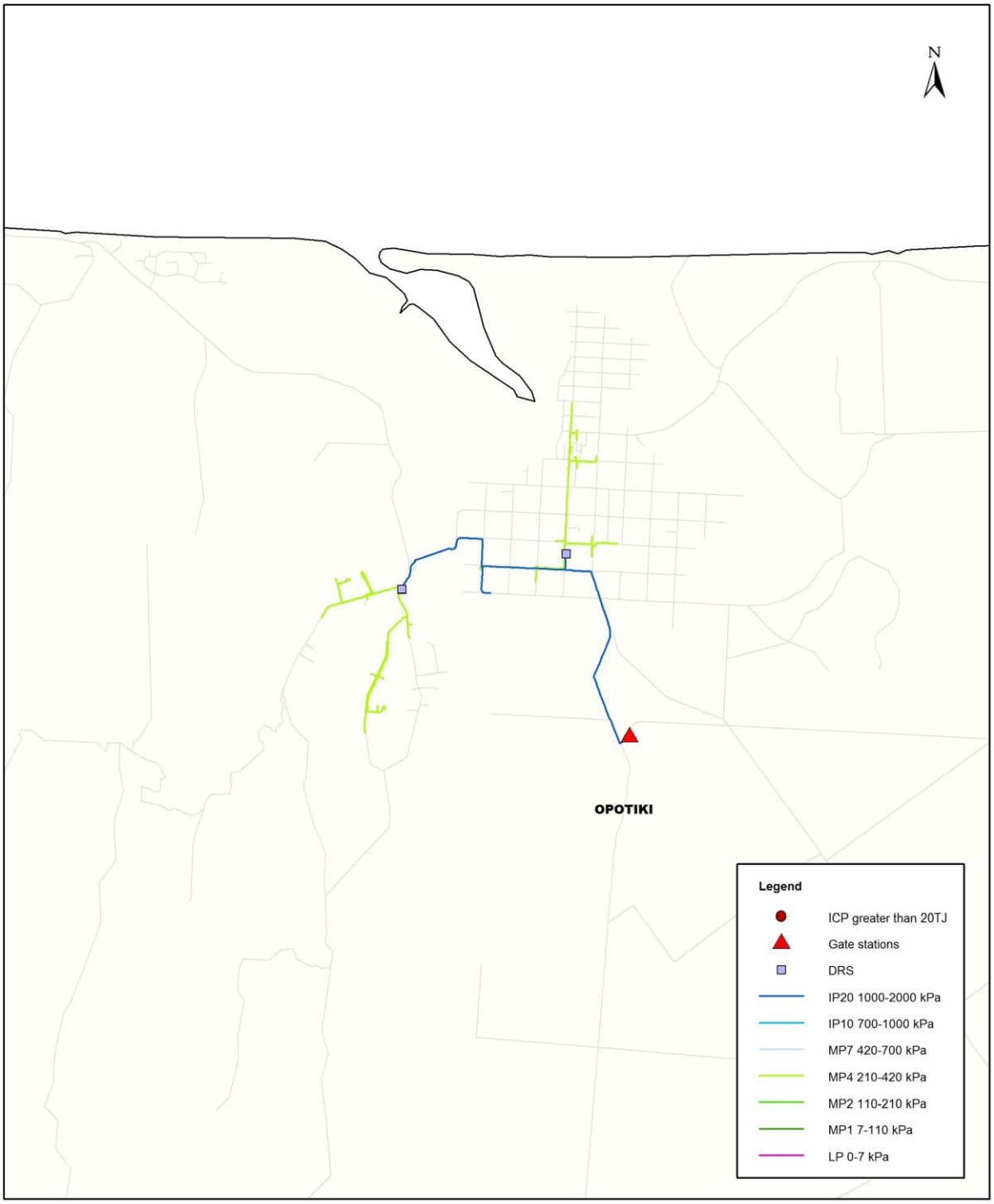
**Drawing Reference: GIS-G0215-005-01**

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# BAY OF PLENTY REGION

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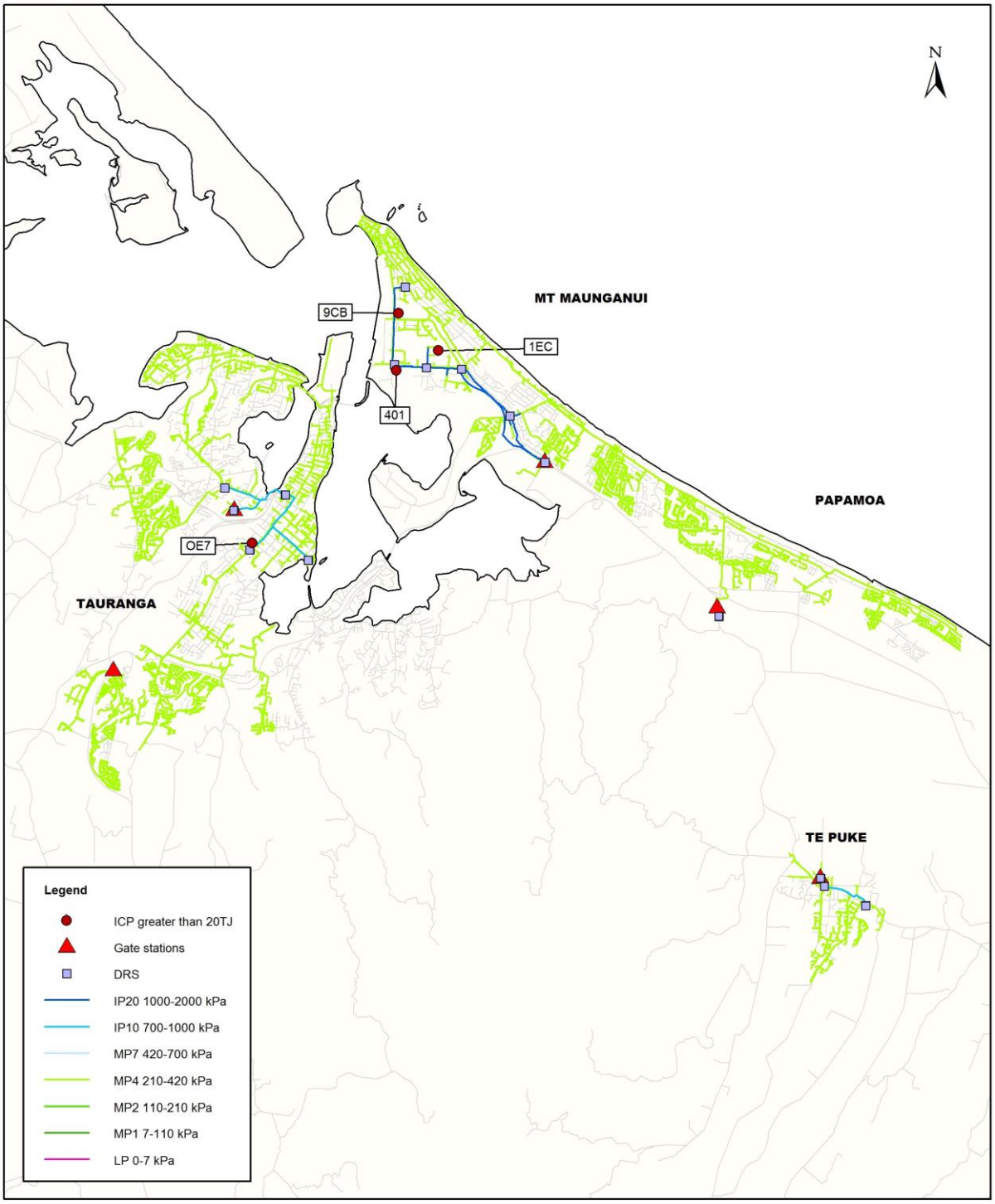


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# BAY OF PLENTY REGION

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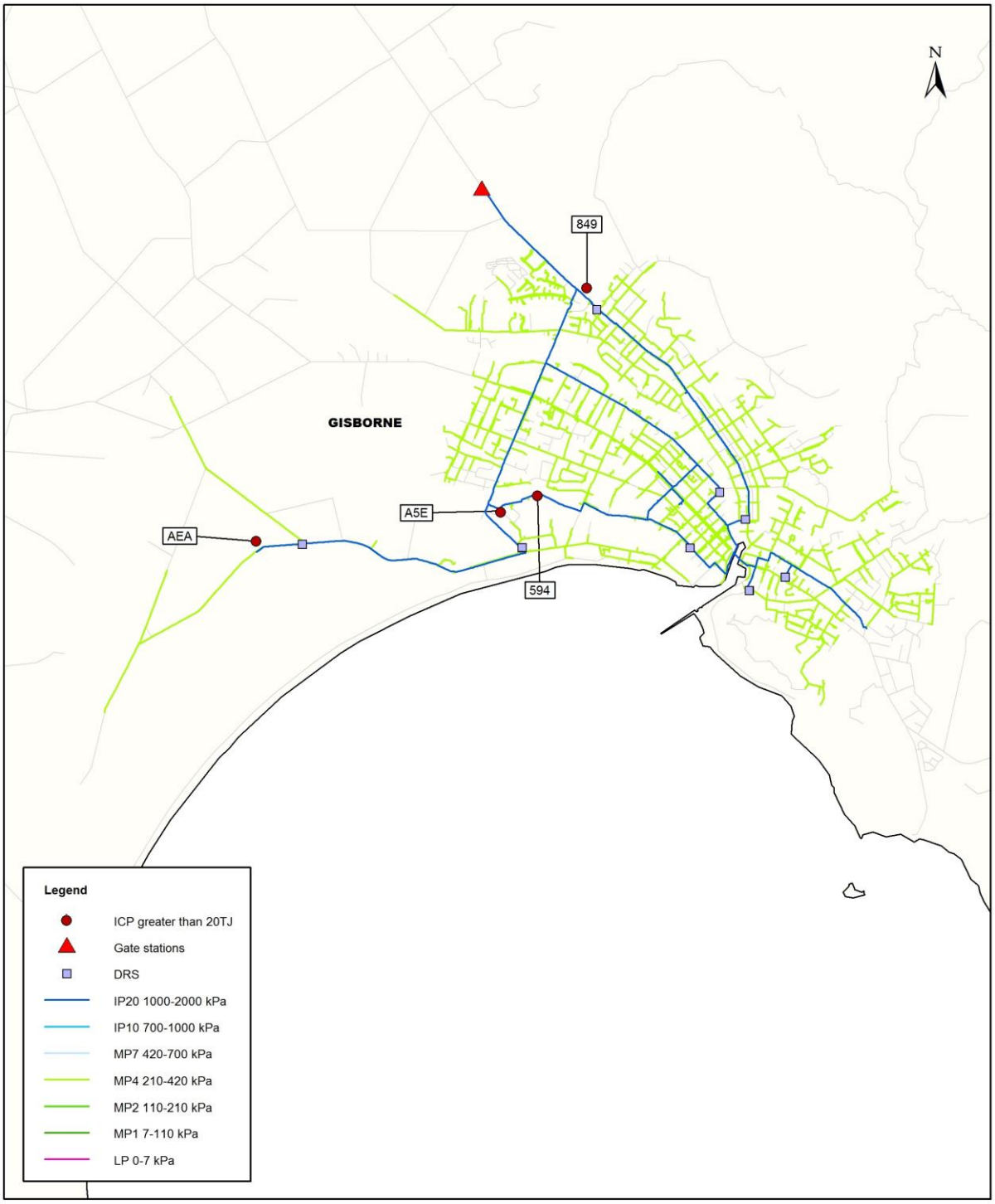
**Drawing Reference: GIS-G0215-005-03**

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# GISBORNE REGION

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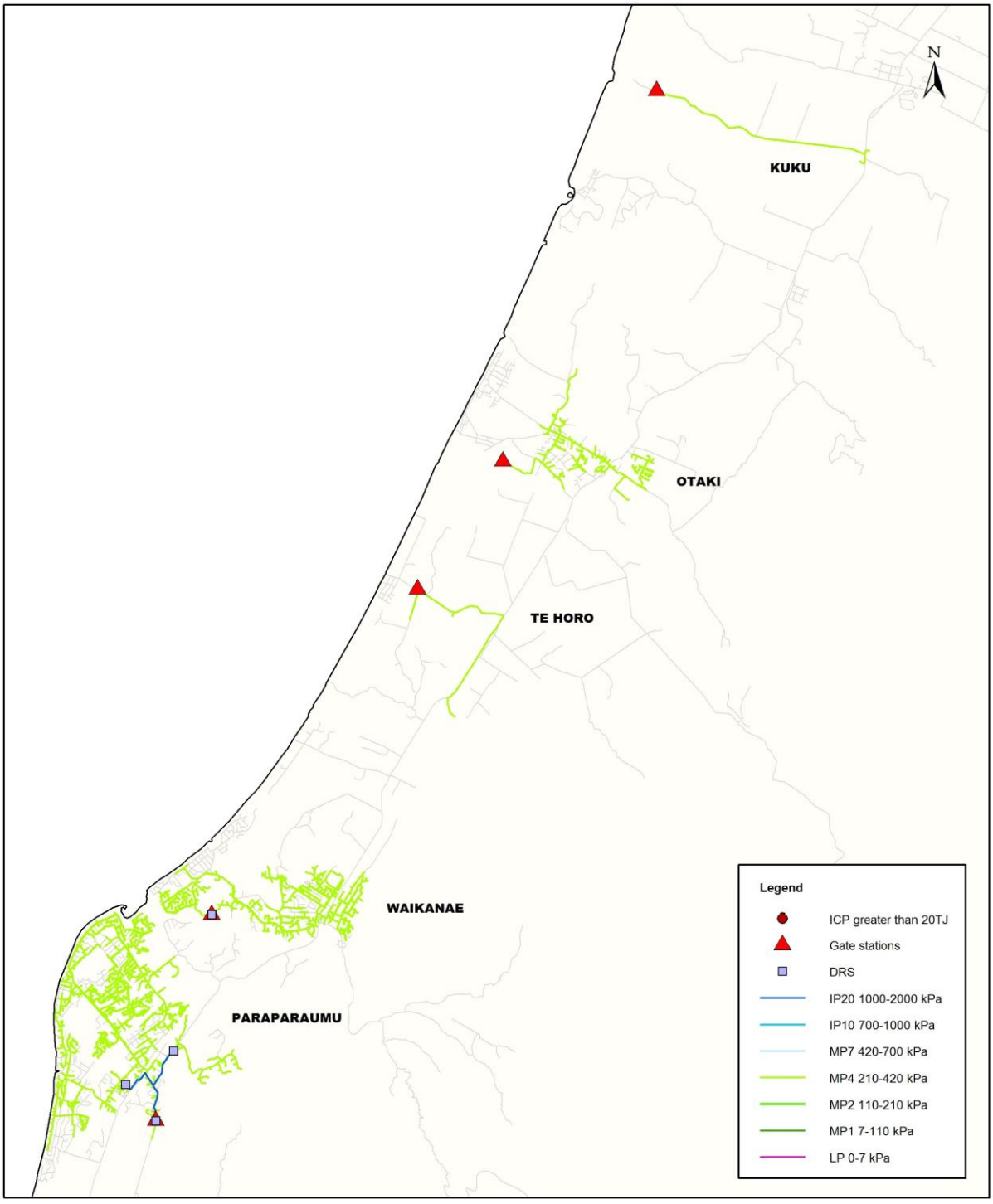
**Drawing Reference: GIS-G0215-006-01**




# GAS DISTRIBUTION MAPS
# KAPITI REGION

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**Drawing Reference: GIS-G0215-007-01**

# E. LOAD FORECASTS

This appendix sets out the projected annual and total growth rates at each of our existing gate stations, as are applied in our network models.

Table A1: Gate station Growth

| Region | Network System | Gate station / Network System | 2010 Actual | 2011 Actual | 2012 Actual | 2013 Actual | 2014 Actual | 2015 Actual | 2016 Forecast | 2017 Forecast | 2018 Forecast | 2019 Forecast | 2020 Forecast | 2021 Forecast | 2022 Forecast | 2023 Forecast | 2024 Forecast | 2025 Forecast | 2026 Forecast | Annual growth | Total growth |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Northland | Marsden Point | Marsden Point Gate Station | 207 | 198 | 168 | 211 | 199 | 211 | 211 | 211 | 211 | 211 | 211 | 211 | 211 | 211 | 211 | 211 | 211 | 211 | 0.0% |
| Northland | Whangarei | Whangarei Gate Station | 1,028 | 1,066 | 984 | 954 | 978 | 1,041 | 1,041 | 1,041 | 1,041 | 1,041 | 1,041 | 1,041 | 1,041 | 1,041 | 1,041 | 1,041 | 1,041 | 1,041 | 0.0% |
| Waikato | Cambridge | Cambridge Network System (excl. load of Hautapu DF) | 1,084 | 1,037 | 985 | 1,002 | 1,144 | 1,560 | 1,560 | 1,560 | 1,560 | 1,560 | 1,560 | 1,560 | 1,560 | 1,560 | 1,560 | 1,560 | 1,560 | 1,560 | 0.0% |
| Waikato | Cambridge | Cambridge (Hautapu DF) | 2,425 | 2,419 | 2,448 | 2,537 | 2,872 | 2,738 | 2,993 | 3,122 | 3,252 | 3,381 | 3,510 | 3,640 | 3,769 | 3,898 | 4,028 | 4,157 | 4,286 | 3.9% | 38.9% |
| Waikato | Cambridge | Cambridge Gate Station (non co-incident) | 3,509 | 3,456 | 3,433 | 3,539 | 4,016 | 4,298 | 4,667 | 4,796 | 4,926 | 5,055 | 5,184 | 5,314 | 5,443 | 5,572 | 5,702 | 5,831 | 5,960 | 2.5% | 24.9% |
| Waikato | Cambridge | Cambridge Gate Station (co-incident) | 2,951 | 2,928 | 3,047 | 3,063 | 3,201 | 3,093 | 3,080 | 3,125 | 3,169 | 3,214 | 3,258 | 3,303 | 3,347 | 3,392 | 3,436 | 3,481 | 3,525 | 1.3% | 13.0% |
| Waikato | Hamilton | Hamilton - Te Kowhai Gate Station | 5,169 | 5,509 | 4,978 | 5,693 | 5,043 | 6,029 | 6,029 | 6,029 | 6,029 | 6,029 | 6,029 | 6,029 | 6,029 | 6,029 | 6,029 | 6,029 | 6,029 | 0.0% | 0.0% |
| Waikato | Hamilton | Hamilton - Temple View Gate Station | 9,064 | 9,557 | 9,698 | 9,268 | 13,150 | 10,437 | 10,878 | 11,129 | 11,380 | 11,632 | 11,884 | 12,135 | 12,386 | 12,637 | 12,889 | 13,141 | 13,392 | 2.1% | 20.8% |
| Waikato | Hamilton | Hamilton Network System (non co-incident) | 14,233 | 15,066 | 14,676 | 14,961 | 18,193 | 16,466 | 16,514 | 16,765 | 17,016 | 17,268 | 17,520 | 17,771 | 18,022 | 18,273 | 18,525 | 18,777 | 19,028 | 1.4% | 13.7% |
| Waikato | Hamilton | Hamilton Network System (co-incident) | 13,987 | 14,829 | 14,676 | 14,363 | 15,489 | 15,792 | 15,066 | 15,126 | 15,186 | 15,247 | 15,307 | 15,368 | 15,428 | 15,489 | 15,549 | 15,609 | 15,670 | 0.4% | 3.6% |
| Waikato | Horotiu | Horotiu Gate Station | 1,044 | 960 | 983 | 971 | 1,028 | 1,066 | 1,066 | 1,066 | 1,066 | 1,066 | 1,066 | 1,066 | 1,066 | 1,066 | 1,066 | 1,066 | 1,066 | 0.0% | 0.0% |
| Waikato | Huntly | Huntly Gate Station | 547 | 679 | 581 | 491 | 558 | 563 | 563 | 563 | 563 | 563 | 563 | 563 | 563 | 563 | 563 | 563 | 563 | 0.0% | 0.0% |
| Waikato | Kiwitahi | Kiwitahi Gate Station | 144 | 156 | 154 | 153 | 165 | 173 | 154 | 157 | 160 | 163 | 167 | 170 | 173 | 176 | 179 | 183 | 186 | 1.9% | 18.8% |

| Region | Network System | Gate Station / Network System | 2010 Actual | 2011 Actual | 2012 Actual | 2013 Actual | 2014 Actual | 2015 Actual | 2016 Forecast | 2017 Forecast | 2018 Forecast | 2019 Forecast | 2020 Forecast | 2021 Forecast | 2022 Forecast | 2023 Forecast | 2024 Forecast | 2025 Forecast | 2026 Forecast | Annual growth | Total growth |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Waikato | Matangi | Matangi Gate Station | No data | | | | | | | | | | | | | | | | | 0.0% | |
| Waikato | Morrinsville | Morrinsville Gate Station | 515 | 447 | 459 | 477 | 442 | 467 | 497 | 497 | 497 | 497 | 497 | 497 | 497 | 497 | 497 | 497 | 497 | 0.0% | 0.0% |
| Waikato | Ngaruawahia | Ngaruawahia Gate Station | 64 | 68 | 67 | 67 | 63 | 71 | 72 | 73 | 74 | 75 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 1.4% | 13.9% |
| Waikato | Otorohanga | Otorohanga Gate Station | 174 | 156 | 163 | 152 | 131 | 142 | 163 | 164 | 164 | 165 | 165 | 166 | 166 | 167 | 167 | 168 | 168 | 0.3% | 3.1% |
| Waikato | Hamilton | Hamilton Network System (non co-incident) | 14,233 | 15,066 | 14,676 | 14,961 | 18,193 | 16,466 | 16,514 | 16,765 | 17,016 | 17,268 | 17,520 | 17,771 | 18,022 | 18,273 | 18,525 | 18,777 | 19,028 | 1.4% | 13.7% |
| Waikato | Pirongia | Pirongia Gate Station | 29 | 27 | 30 | 27 | 27 | 30 | 43 | 44 | 46 | 47 | 48 | 50 | 51 | 53 | 54 | 56 | 57 | | |
| Waikato | Te Awamutu | Te Awamutu North - No.2 Gate Station | 631 | 487 | 613 | 439 | 470 | 591 | 753 | 769 | 786 | 802 | 819 | 836 | 852 | 869 | 885 | 902 | 918 | 2.0% | 19.8% |
| Waikato | Te Awamutu | Kihikihi Gate Station | 1,229 | 653 | 692 | 800 | 748 | 707 | 854 | 854 | 854 | 854 | 854 | 854 | 854 | 854 | 854 | 854 | 854 | 0.0% | 0.0% |
| Waikato | Te Awamutu | Te Awamutu Network System (non co-incident) | 1,860 | 1,140 | 1,304 | 1,239 | 1,218 | 1,297 | 1,607 | 1,623 | 1,640 | 1,656 | 1,673 | 1,690 | 1,706 | 1,723 | 1,739 | 1,756 | 1,772 | 0.9% | 9.3% |
| Waikato | Te Awamutu | Te Awamutu Network System (co-incident) | 1,229 | 1,067 | 1,276 | 1,105 | 1,124 | 1,281 | 1,532 | 1,532 | 1,532 | 1,532 | 1,532 | 1,532 | 1,532 | 1,532 | 1,532 | 1,532 | 1,532 | 0.0% | 0.0% |
| Waikato | Te Kuiti North | Te Kuiti North Gate Station | 368 | 291 | 241 | 317 | 196 | 229 | 159 | 159 | 159 | 159 | 159 | 159 | 159 | 159 | 159 | 159 | 159 | 0.0% | 0.0% |
| Waikato | Te Kuiti South | Te Kuiti South Gate Station | 910 | 910 | 933 | 968 | 996 | 1,044 | 978 | 987 | 996 | 1,004 | 1,013 | 1,022 | 1,031 | 1,039 | 1,048 | 1,057 | 1,066 | 0.8% | 8.1% |
| Waikato | Te Rapa | Te Rapa (Inactive distribution network) | No data | | | | | | | | | | | | | | | | | | |
| Waikato | Waikeria | Waikeria Gate Station | 256 | 401 | 206 | 197 | 217 | 207 | 102 | 102 | 102 | 102 | 102 | 102 | 102 | 102 | 102 | 102 | 102 | 0.0% | 0.0% |
| Waikato | Waitoa | Waitoa Gate Station | 2,004 | 2,082 | 2,119 | 1,892 | 1,936 | 2,079 | 2,273 | 2,338 | 2,404 | 2,469 | 2,535 | 2,601 | 2,666 | 2,732 | 2,798 | 2,863 | 2,929 | 2.6% | 26.0% |
| Central Plateau | Rotorua | Rotorua Gate Station | 3,547 | 3,763 | 3,587 | 3,417 | 3,438 | 3,690 | 3,505 | 3,505 | 3,505 | 3,505 | 3,505 | 3,505 | 3,505 | 3,505 | 3,505 | 3,505 | 3,505 | 0.0% | 0.0% |
| Central Plateau | Taupo | Taupo Gate Station | 1,228 | 1,246 | 1,186 | 1,176 | 1,178 | 1,222 | 1,222 | 1,222 | 1,222 | 1,222 | 1,222 | 1,222 | 1,222 | 1,222 | 1,222 | 1,222 | 1,222 | 0.0% | 0.0% |
| Central Plateau | Kinleith | Kinleith Gate Station | 242 | 261 | 252 | 265 | 299 | 306 | 274 | 276 | 278 | 281 | 283 | 285 | 288 | 290 | 292 | 294 | 297 | 0.7% | 7.3% |

| Region | Network System | Gate Station / Network System | 2010 Actual | 2011 Actual | 2012 Actual | 2013 Actual | 2014 Actual | 2015 Actual | 2016 Forecast | 2017 Forecast | 2018 Forecast | 2019 Forecast | 2020 Forecast | 2021 Forecast | 2022 Forecast | 2023 Forecast | 2024 Forecast | 2025 Forecast | 2026 Forecast | Annual growth | Total growth |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Central Plateau | Okoroire Springs | Okoroire Springs Gate Station | No data | | | | | | | | | | | | | | | | | | |
| Central Plateau | Putaruru | Putaruru Gate Station | 531 | 505 | 507 | 504 | 482 | 507 | 502 | 502 | 502 | 502 | 502 | 502 | 502 | 502 | 502 | 502 | 502 | 0.0% | 0.0% |
| Central Plateau | Tirau | Tirau Gate Station | 57 | 56 | 55 | 48 | 60 | 67 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 0.0% | 0.0% |
| Central Plateau | Tokoroa | Tokoroa Gate Station | 812 | 805 | 803 | 849 | 860 | 1,007 | 1,004 | 1,015 | 1,027 | 1,038 | 1,050 | 1,061 | 1,073 | 1,084 | 1,096 | 1,107 | 1,118 | 1.0% | 10.3% |
| Bay of Plenty | Edgecumbe | Edgecumbe MP4 Pressure System | 10 | 10 | 10 | 10 | 10 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 0.0% | 0.0% |
| Bay of Plenty | Edgecumbe | Edgecumbe IP20 Pressure System | 5,769 | 5,987 | 5,903 | 5,743 | 6,282 | 6,099 | 5,801 | 5,805 | 5,809 | 5,813 | 5,817 | 5,821 | 5,825 | 5,829 | 5,832 | 5,836 | 5,840 | 0.1% | 0.6% |
| Bay of Plenty | Edgecumbe | Edgecumbe Gate Station (non-co-incident) | 5,779 | 5,997 | 5,913 | 5,753 | 6,292 | 6,113 | 5,815 | 5,819 | 5,823 | 5,827 | 5,831 | 5,835 | 5,839 | 5,843 | 5,846 | 5,850 | 5,854 | 0.1% | 0.6% |
| Bay of Plenty | Edgecumbe | Edgecumbe Gate Station (co-incident) | 5,769 | 5,991 | 5,903 | 5,743 | 6,282 | 6,109 | 6,488 | 6,714 | 6,941 | 7,167 | 7,394 | 7,620 | 7,846 | 8,073 | 8,300 | 8,526 | 8,752 | 3.1% | 31.4% |
| Bay of Plenty | Kawerau | Kawerau Network System (excl. loads of ex-Caxton & ex-Tasman) | 139 | 134 | 141 | 137 | 137 | 136 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 151 | 0.0% | 0.0% |
| Bay of Plenty | Kawerau | Kawerau (ex-Caxton) (20TJ site in IP network) | 2,282 | 1,172 | 779 | 792 | 779 | 793 | 673 | 673 | 673 | 673 | 673 | 673 | 673 | 673 | 673 | 673 | 673 | 0.0% | 0.0% |
| Bay of Plenty | Kawerau | Kawerau (ex-Tasman) (20TJ site in IP network) | 1,940 | 2,033 | 2,067 | 2,076 | 2,067 | 2,195 | 2,049 | 2,051 | 2,053 | 2,055 | 2,057 | 2,059 | 2,061 | 2,063 | 2,065 | 2,067 | 2,069 | 0.1% | 0.9% |
| Bay of Plenty | Kawerau | Kawerau Gate Station (non-co-incident) | 4,361 | 3,339 | 2,986 | 3,006 | 2,984 | 3,125 | 2,873 | 2,875 | 2,877 | 2,879 | 2,881 | 2,883 | 2,885 | 2,887 | 2,889 | 2,891 | 2,893 | 0.1% | 0.6% |
| Bay of Plenty | Kawerau | Kawerau Gate Station (co-incident) | 4,056 | 3,207 | 2,732 | 2,797 | 2,728 | 2,911 | 2,878 | 2,898 | 2,918 | 2,938 | 2,958 | 2,978 | 2,998 | 3,018 | 3,039 | 3,059 | 3,079 | 0.6% | 6.3% |
| Bay of Plenty | Mt Maunganui | Mt Maunganui Gate Station | 2,677 | 3,195 | 3,087 | 3,124 | 3,118 | 3,070 | 2,665 | 2,665 | 2,665 | 2,665 | 2,665 | 2,665 | 2,665 | 2,665 | 2,665 | 2,665 | 2,665 | 0.0% | 0.0% |

| Region | Network System | Gate Station / Network System | 2010 Actual | 2011 Actual | 2012 Actual | 2013 Actual | 2014 Actual | 2015 Actual | 2016 Forecast | 2017 Forecast | 2018 Forecast | 2019 Forecast | 2020 Forecast | 2021 Forecast | 2022 Forecast | 2023 Forecast | 2024 Forecast | 2025 Forecast | 2026 Forecast | Annual growth | Total growth |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bay of Plenty | Mt Maunganui | Papamoa Gate Station | 831 | 867 | 792 | 776 | 790 | 812 | 1,037 | 1,071 | 1,105 | 1,139 | 1,174 | 1,208 | 1,242 | 1,276 | 1,311 | 1,345 | 1,379 | 3.0% | 29.7% |
| Bay of Plenty | Mt Maunganui | Mt Maunganui Network System (non co-incident) | 3,508 | 4,062 | 3,879 | 3,900 | 3,908 | 3,882 | 3,702 | 3,736 | 3,770 | 3,804 | 3,839 | 3,873 | 3,907 | 3,941 | 3,976 | 4,010 | 4,044 | 0.8% | 8.3% |
| Bay of Plenty | Mt Maunganui | Mt Maunganui Network System (co-incident) | 3,190 | 3,795 | 3,624 | 3,480 | 3,567 | 3,698 | 3,464 | 3,464 | 3,464 | 3,464 | 3,464 | 3,464 | 3,464 | 3,464 | 3,464 | 3,464 | 3,464 | 0.0% | 0.0% |
| Bay of Plenty | Opotiki | Opotiki Gate Station | 125 | 163 | 210 | 150 | 156 | 314 | 187 | 187 | 187 | 187 | 187 | 187 | 187 | 187 | 187 | 187 | 187 | 0.0% | 0.0% |
| Bay of Plenty | Tauranga | Tauranga Station | 1,967 | 2,051 | 1,745 | 1,740 | 1,781 | 1,698 | 1,733 | 1,733 | 1,733 | 1,733 | 1,733 | 1,733 | 1,733 | 1,733 | 1,733 | 1,733 | 1,733 | 0.0% | 0.0% |
| Bay of Plenty | Tauranga | Pyes Pa Station | 290 | 787 | 777 | 537 | 702 | 766 | 787 | 855 | 922 | 990 | 1,057 | 1,125 | 1,192 | 1,260 | 1,327 | 1,395 | 1,462 | 7.7% | 77.3% |
| Bay of Plenty | Tauranga | Tauranga Network System (non co-incident) | 2,257 | 2,838 | 2,522 | 2,278 | 2,483 | 2,464 | 2,520 | 2,588 | 2,655 | 2,723 | 2,790 | 2,858 | 2,925 | 2,993 | 3,060 | 3,128 | 3,195 | 2.4% | 24.1% |
| Bay of Plenty | Tauranga | Tauranga Network System (co-incident) | 2,257 | 2,305 | 2,254 | 2,241 | 2,345 | 2,444 | 2,377 | 2,390 | 2,403 | 2,416 | 2,429 | 2,441 | 2,454 | 2,467 | 2,480 | 2,492 | 2,505 | 0.5% | 4.8% |
| Bay of Plenty | Te Puke | Te Puke Gate Station | 439 | 400 | 456 | 416 | 439 | 439 | 360 | 360 | 360 | 360 | 360 | 360 | 360 | 360 | 360 | 360 | 360 | 0.0% | 0.0% |
| Bay of Plenty | Te Teko | Te Teko Gate Station | No data | | | | | | | | | | | | | | | | | | |
| Bay of Plenty | Whakatane | Whakatane Network System | 533 | 573 | 540 | 592 | 540 | 639 | 959 | 959 | 959 | 959 | 959 | 959 | 959 | 959 | 959 | 959 | 959 | 0.0% | 0.0% |
| Bay of Plenty | Whakatane | Whakatane (20TJ site - CHH) | 2,851 | 3,072 | 3,241 | 3,324 | 3,710 | 3,475 | 3,347 | 3,425 | 3,503 | 3,581 | 3,659 | 3,737 | 3,814 | 3,892 | 3,970 | 4,048 | 4,126 | 2.1% | 20.9% |
| Bay of Plenty | Whakatane | Whakatane Gate Station (non co-incident) | 3,384 | 3,645 | 3,781 | 3,916 | 4,250 | 4,114 | 4,306 | 4,384 | 4,462 | 4,540 | 4,618 | 4,696 | 4,773 | 4,851 | 4,929 | 5,007 | 5,085 | 1.6% | 16.3% |
| Bay of Plenty | Whakatane | Whakatane Gate Station (co-incident) | 3,061 | 3,190 | 3,410 | 3,351 | 3,993 | 3,719 | 3,276 | 3,279 | 3,283 | 3,286 | 3,290 | 3,293 | 3,297 | 3,301 | 3,304 | 3,308 | 3,311 | 0.1% | 1.0% |
| Gisborne | Gisborne | Gisborne Gate Station | 3,111 | 2,961 | 3,489 | 2,829 | 3,297 | 3,938 | 3,633 | 3,725 | 3,817 | 3,910 | 4,002 | 4,094 | 4,186 | 4,278 | 4,370 | 4,462 | 4,554 | 2.3% | 22.8% |
| Kapiti | Kuku | Kuku Gate Station | No data | | | | | | | | | | | | | | | | | | |
| Kapiti | Otaki | Otaki Gate Station | 272 | 274 | 270 | 276 | 251 | 266 | 273 | 276 | 279 | 282 | 284 | 287 | 290 | 292 | 295 | 298 | 300 | 0.9% | 9.2% |

| Region | Network System | Gate Station / Network System | 2010 Actual | 2011 Actual | 2012 Actual | 2013 Actual | 2014 Actual | 2015 Actual | 2016 Forecast | 2017 Forecast | 2018 Forecast | 2019 Forecast | 2020 Forecast | 2021 Forecast | 2022 Forecast | 2023 Forecast | 2024 Forecast | 2025 Forecast | 2026 Forecast | Annual growth | Total growth |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Kapiti | Paraparaumu | Paraparaumu Gate Station | 1,485 | 1,710 | 1,493 | 1,551 | 1,485 | 1,566 | 1,652 | 1,682 | 1,712 | 1,742 | 1,772 | 1,802 | 1,832 | 1,862 | 1,892 | 1,922 | 1,952 | 1.6% | 16.3% |
| Kapiti | Te Horo | Te Horo Gate Station | No data | | | | | | | | | | | | | | | | | | |
| Kapiti | Waikanae | Waikanae Gate Station | 641 | 1,129 | 807 | 603 | 577 | 597 | 697 | 706 | 716 | 725 | 735 | 744 | 754 | 763 | 773 | 782 | 792 | 1.2% | 12.2% |

# F. NETWORK DEVELOPMENT PROGRAMME

This appendix sets out our long-term development plans for our larger gas distribution systems.

## F.1. WHANGAREI NETWORK SYSTEM

The Whangarei system is supplied from the gas transmission system at one gate station, located in South Whangarei. The Whangarei network system consists of one IP pressure system, five MP4 pressure system and 11 DRSs. About 1,200 consumers are connected to the Whangarei network system, most of whom are residential customers. Around 16% are commercial/industrial gas users, e.g. a hospital and bakeries.

| SYSTEM | PLANNED DEVELOPMENT |
|---|---|
| **Whangarei IP10** | Nil |
| **Union East Street MP4** | Nil |
| **Pipiwai Road MP4** | Nil |
| **Whangarei MP4** | Nil |
| **Dyer Street MP4** | Nil |
| **Port Whangarei MP4** | Nil |

## F.2. MARSDEN POINT NETWORK SYSTEM

The Marsden Point network system is supplied from the transmission system at one gate station, located in Mair Road. This network system consists of one MP7 pressure system and is supplying gas to one industrial consumer. No DRSs are installed in the Marsden Point network system.

| SYSTEM | PLANNED DEVELOPMENT |
|---|---|
| **Marsden Point MP7** | Nil |

## F.3. HUNTLY NETWORK SYSTEM

The Huntly network system is supplied from the transmission system at one gate station located in Hetherington Road. This network system comprises one MP7 pressure system, three MP4 pressure systems and three DRSs. About 110 consumers are connected to the Huntly network system, 69% of whom are residential consumers; the remainder being commercial and industrial users.

| SYSTEM | PLANNED DEVELOPMENT |
|---|---|
| **Huntly MP7** | Nil |
| **Huntly East MP4** | Nil |
| **Huntly Central MP4** | Nil |
| **Harris St MP4** | Nil |

## F.4. NGARUAWAHIA NETWORK SYSTEM

The Ngaruawahia network system is supplied from the transmission system from one gate station located in Brownlee Avenue. This network system comprises one MP7 pressure system, one MP2 pressure system and one DRS.

The Ngaruawahia MP7 pressure system is designed to operate at IP20 (MAOP 1,820kPa) but is currently operating at a lower pressure of 450kPa. The purpose of the lower operating pressure is to improve the accuracy of the transmission gate station meter and to minimise the effects of odorant fade in this network system.

About 160 consumers are connected to the Ngaruawahia network system. The consumers are predominately residential consumers; only around 4% are commercial/industrial gas users.

| SYSTEM | PLANNED DEVELOPMENT |
|---|---|
| **Ngaruawahia MP7** | Nil |
| **Ngaruawahia MP2** | Nil |

## F.5. HOROTIU NETWORK SYSTEM

The Horotiu network system is supplied from the transmission system at one gate station located in Horotiu Bridge Road. This network system comprises one IP10 pressure system, one MP4 pressure system and one DRS. A total of 6 gas consumers are connected to the Horotiu network system. They comprise 4 large commercial/industrial consumers and 2 residential consumers.

| SYSTEM | PLANNED DEVELOPMENT |
|---|---|
| **Horotiu IP10** | Nil |
| **Horotiu MP4** | No constraints have been identified and the system pressure is not forecast to fall below the MinOP criteria during the planning period. However, to support potential industrial and business growth in Horotiu, notably the development of Northgate Business Park, the following projects are planned:<br>– Extend approximately 350 metres of 100mm PE MP4 from the new DRS to the junction of Horotiu Bridge Road and SH1.<br>– Construct approximately 560 metres of 100mm PE MP4 along Horotiu Bridge Road between Washer Road and SH1. |

## F.6. HAMILTON NETWORK SYSTEM

The Hamilton network system is supplied from the transmission system at two gate stations, located at Te Kowhai in the North West and Temple View in the South West of Hamilton. The Hamilton network system comprises one IP10 pressure system, one MP7 pressure system, three MP4 pressure systems, one MP2 pressure system, three MP1 pressure systems, five LP pressure systems and 38 DRSs.

Approximately 28,000 consumers are connected to the Hamilton network system. They are predominantly residential consumers; only around 4% are commercial/industrial gas users.

| SYSTEM | PLANNED DEVELOPMENT |
|---|---|
| **Hamilton IP10** | No constraints have been identified and the system pressure is not forecast to fall below the MinOP criteria during the planning period. However, to enhance network security the following reinforcement are planned:<br>– Upgrading the existing IP pipeline from Te Kowhai gate station to Avalon Drive from 1,200kPa to 1,900kPa. Includes:<br>o Uprating of pipeline<br>o DRS130 and DRS145 upgrades<br>o New IP20/IP10 DRS<br>o Upgrades at Te Kowhai gate station<br>– Construct a new pipeline from DRS139 in Te Rapa to DRS100 in Hamilton East. |
| **Hamilton MP7** | Nil |
| **Hamilton West MP4** | No constraints have been identified and the system pressure is not forecast to fall below the MinOP criteria during the planning period. However, to enhance network security the following reinforcements are planned:<br>– Install approximately 150 metres of 50mm PE MP4 in Avalon Drive from #27 Avalon Drive to #1 Livingstone Avenue.<br>– Install approximately 100 metres of 50mm PE MP4 from #23 Roy Street to #26 Livingstone Avenue.<br>– Install a new IP10/MP4 DRS at a location in Te Kowhai Road between Exelby Road and Ruffell Road.<br>Note that DR-80123-HM supplies more than 60% of the total load. If DR-80123-HM failed, suburbs south of Grandview Road and north of Killarney Road / Tuhikaramea Road would fall below the minimum pressure criteria. |
| **Pukete MP4** | No constraints have been identified and the system pressure is not forecast to fall below the MinOP criteria during the planning period. However, to enhance network security the following reinforcements are planned:<br>– Construct approximately 650 metres of 80mm PE MP4 pipeline loop in Te Rapa Road from DR-80139-HM to Mahana Road; and<br>– Construct approximately 180 metres of 50mm PE MP4 in Te Papa Road from Bryant Road to #558 Te Rapa Road.<br>Contingency scenario analysis of the MP4 Pukete system suggests that if DR-80133-HM failed, supply south of Mears Road (apart from the connections in Te Papa Road) would be lost. Whilst DR-80129-HM provides significant load in the area, if it failed, DR-80130-HM would be able to supply adequate back up pressure. The only customer impacted is the Hamilton Waste Water Treatment Plant where metering pressure would drop below the specific minimum design pressure of 300kPa. However, the reduction in metering pressure is not anticipated to impact the operation of the treatment plant. |

| SYSTEM | PLANNED DEVELOPMENT |
|---|---|
| **Hamilton MP4** | No constraints have been identified and the system pressure is not forecast to fall below the MinOP criteria during the planning period. However, industrial and residential growth is expected to occur north of the network system which is solely supplied by DR-80145-HM. To address this, the following reinforcements are planned during the planning period:<br>– Construct approximately 400 metres of 100mm PE MP4 in Cambridge Road from the outlet of DR-80101-HM to Hillcrest Road and tie into the existing 80mm steel.<br>– Construct approximately 50 metres of 50mm PE MP4 at the intersection of Boundary Road and Heaphy Terrace and tie into the existing gas mains.<br>– Construct approximately 2,100 metres of 80mm PE MP4 in Gordonton Road between Wairere Drive and Thomas Road.<br>Contingency scenario analysis of the Hamilton MP4 pressure system suggests that DR-80145-HM is the only DRS at present supplying Hamilton North. Failure of this DRS would result in a significant loss of supply in the area. A reinforcement proposal to construct approximately 2,500 metres of 100mm PE MP4 to link DR-80130-HM to River Road (river crossing) is being considered. |
| **Temple View MP2** | Nil |
| **Tuhikaramea Road MP1** | Nil |
| **Hamilton North MP1** | Nil |
| **Hamilton South MP1** | Nil |
| **Fairfield LP** | Nil |
| **Frankton LP** | Nil |
| **Hamilton West LP** | Nil |
| **Hamilton East LP** | The forecast demand during the planning period is expected to result in the MinOP falling below the system pressure criteria. To address this issue, the following reinforcement project is planned during the planning period:<br>– Construct 1,150 metres of 100mm PE pipe at a number of key sites in the Hamilton East LP pressure system. |
| **Cameron Rd LP** | Nil |

## F.7. MATANGI NETWORK SYSTEM

The Matangi network system is supplied from the transmission system from one gate station located in Tauwhare Road. This network system comprises one MP4 pressure system.

The Matangi network system supplies 37 residential consumers. Flow data for the Matangi gate station is not currently available. As the system is considered low risk of breaching quality of supply, we do not intend to collect this information at this point in time. No DRS is installed in the Matangi network system.

| SYSTEM | PLANNED DEVELOPMENT |
|---|---|
| **Matangi MP4** | Nil |

## F.8. MORRINSVILLE NETWORK SYSTEM

The Morrinsville network system is supplied from the transmission system from one gate station located in the south of Morrinsville. This network system consists of one IP10 pressure system, one MP4 pressure system and two DRSs. About 700 consumers are connected to the Morrinsville network system. They are predominately residential consumers; only around 7% are commercial consumers and there is one industrial gas user.

| SYSTEM | PLANNED DEVELOPMENT |
|---|---|
| **Morrinsville IP10** | Nil |
| **Morrinsville MP4** | Nil |

## F.9. KIWITAHI NETWORK SYSTEM

The Kiwitahi network system is supplied from the transmission system from one gate station located in Morrinsville-Walton Road. This network system comprises one MP4 pressure system. The Kiwitahi network system supplies one large commercial consumer and one large industrial gas user.

| SYSTEM | PLANNED DEVELOPMENT |
|---|---|
| **Kiwitahi MP4** | Nil |

## F.10. WAITOA NETWORK SYSTEM

The Waitoa network system is supplied from the transmission system from one gate station located in Wood Road. This network system consists of one IP20 pressure system, one MP7 pressure system, one MP4 pressure system and two DRSs.

A total of 46 consumers are connected to the Waitoa network system comprising 30 residential consumers and 14 commercial/industrial gas users. At system peak, the total gas demand from five major gas users takes 95% of the system total flow rate.

| SYSTEM | PLANNED DEVELOPMENT |
|---|---|
| **Waitoa IP20** | The forecast demand during the planning period is expected to result in the MinOP falling below the system pressure criteria. To address this issue, the following reinforcement project is planned:<br>– Construct 800 metres of steel pipe and link into the existing 50mm steel. |
| **Waitoa MP7** | Nil |
| **Waitoa MP4** | The forecast demand during the planning period is expected to result in the MinOP falling below the system pressure criteria. To address this issue, the following reinforcement projects are planned:<br>– Extend approximately 5,000 metres of 160mm MP7 PE pipeline from the existing Waitoa MP7 pressure system to connect to a proposed MP7/MP4 DRS in Ngarua (stage 1).<br>– Extend approximately 5,200 metres of 160mm MP7 PE pipeline to the south of Waitoa and relocate a proposed new DRS to a new location to the end of the MP7 network (stage 2).<br>– Install a DRS (MP7/MP4) at Ngarua.<br>– Relocate the above DRS installation further south to a new location. |

## F.11. CAMBRIDGE NETWORK SYSTEM

The Cambridge network is supplied from the transmission system from one gate station and consists of one IP20 pressure system, two MP4 pressure systems and three DRSs. There are currently around 1,920 consumers connected to the Cambridge network system. They are predominantly residential consumers; only around 5% are commercial/industrial gas users, including two large industrial consumers.

| SYSTEM | PLANNED DEVELOPMENT |
|---|---|
| **Cambridge IP20** | No constraints have been identified and the system pressure is not forecast to fall below the MinOP criteria during the planning period. However, recent requests from subdivision developers suggests that the gas demand in the area is expected to increase, resulting in the Cambridge IP20 network falling below the minimum pressure criteria during the planning period. To address this issue, the following reinforcement options are planned during the planning period:<br>– Elevate the Cambridge gate station outlet pressure 1,800kPa (under investigation).<br>– Construct approximately 3,400 metres of 80mm IP20 steel pipeline from the Cambridge gate station along Zig Zag Road into Swayne Road.<br>– Install a DRS (IP20/MP4) at 79 Swayne Road. |
| **Cambridge MP4** | No constraints have been identified and the system pressure is not forecast to fall below the MinOP criteria during the planning period. However, to enhance network security the following reinforcements are planned:<br>– Construct 1,100 metres of 100mm PE pipeline from DR-80244-CA Queen St to the bridge crossing in Queen Street.<br>– Link 50mm PE pipes in Thompson Street. |
| **Bruntwood MP4** | Nil |

## F.12. TE AWAMUTU NETWORK SYSTEM

The Te Awamutu network system is supplied from the transmission system from two gate stations, located at Te Awamutu and Kihikihi. The Te Awamutu network system consists of one IP10 pressure system, two MP4 pressure systems and two DRSs.

Te Awamutu network system supplies approximately 1,400 consumers, around 54% of whom are commercial/industrial gas users.

| SYSTEM | PLANNED DEVELOPMENT |
|---|---|
| **Kihikihi IP10** | Nil |
| **Te Awamutu MP4** | Nil |
| **Kihikihi MP4** | Nil |

## F.13. WAIKERIA NETWORK SYSTEM

The Waikeria network system is supplied from the transmission system from one gate station located in Higham Road. This network system comprises one IP20 pressure system currently supplying gas to one large customer at the end of the system.

| SYSTEM | PLANNED DEVELOPMENT |
|---|---|
| **Waikeria IP20** | Nil |

## F.14. PIRONGIA NETWORK SYSTEM

The Pirongia network system is supplied from the transmission system from one gate station located in Pirongia Road. This network system comprises one MP4 pressure system. A total of 50 consumers are connected to the Pirongia network system comprising 47 residential consumers and 3 small commercial gas users.

| SYSTEM | PLANNED DEVELOPMENT |
|---|---|
| **Pirongia MP4** | Nil |

## F.15. OTOROHANGA NETWORK SYSTEM

The Otorohanga network system is supplied from the transmission system from one gate station located in Waitomo Valley Road. This network system comprises one MP4 pressure system. About 180 consumers are connected to the Otorohanga network system. They are mainly residential consumers; around 21% are commercial/industrial gas users.

| SYSTEM | PLANNED DEVELOPMENT |
|---|---|
| **Otorohanga MP4** | Nil |

## F.16. TE KUITI NORTH NETWORK SYSTEM

The Te Kuiti North network system is supplied from the transmission system from one gate station located in the northwest of Te Kuiti. This network system consists of one IP10 pressure system, three MP4 pressure systems and five DRSs.

Approximately 150 consumers are connected to the Te Kuiti North network system. They are mainly residential consumers; around 23% are commercial/industrial gas users.

| SYSTEM | PLANNED DEVELOPMENT |
|---|---|
| **Te Kuiti North IP10** | Nil |
| **Hangatiki East Road MP4** | Nil |
| **Te Kuiti MP4** | Nil<br>Note that the Seddon St MP4 system was recently incorporated into the Te Kuiti MP4 system and DRSs rationalised between the systems. |

## F.17. TE KUITI SOUTH NETWORK SYSTEM

The Te Kuiti South network system is supplied from the transmission system from one gate station located in SH30 near Beros Road. This network system consists of one MP4 pressure system. A total of 7 consumers are connected to the Te Kuiti South network system comprising 2 residential consumers and 5 commercial/industrial gas users.

There is an industrial consumer located adjacent to the Te Kuiti South gate station from which gas is directly fed to this factory. The gas flow into Te Kuiti South pressure system is the difference between the flows recorded at the gate station meter and the industrial consumer's GMS.

| SYSTEM | PLANNED DEVELOPMENT |
|---|---|
| **Te Kuiti South MP4** | Nil |

## F.18. OKOROIRE NETWORK SYSTEM

The Okoroire network system is supplied from the transmission system from one gate station located in Somerville Road. This network system comprises one MP4 pressure system. The Okoroire network system supplies one residential consumer and one large commercial gas user. Flow data for the Okoroire gate station is not currently available. As the system is considered low risk of breaching quality of supply, we do not intend to collect this information at this point in time.

| SYSTEM | PLANNED DEVELOPMENT |
|---|---|
| **Okoroire MP4** | Nil |

## F.19. TIRAU NETWORK SYSTEM

The Tirau network system is supplied from the transmission system from one gate station located in Okoroire Road. This network system consists of one IP10 pressure system, one MP4 pressure system and two DRSs. A total of approximately 80 consumers are connected to the Tirau network system, comprising around 60 residential consumers and the remainder commercial/industrial gas users.

| SYSTEM | PLANNED DEVELOPMENT |
|---|---|
| **Tirau IP10** | Nil |
| **Tirau MP4** | Nil |

## F.20. PUTARURU NETWORK SYSTEM

The Putaruru network system is supplied from the transmission system from one gate station located in Bridge Street. This network system consists of one IP10 pressure system, one MP4 pressure system and two DRSs. There are 350 consumers connected to the Putaruru network system; with around 11% of commercial/industrial gas users.

| SYSTEM | PLANNED DEVELOPMENT |
|---|---|
| **Putaruru IP10** | Nil |
| **Putaruru MP4** | Nil |

## F.21. KINLEITH NETWORK SYSTEM

The Kinleith network system is supplied from the transmission system from one gate station located near the junction of Old Taupo Road and Kinleith Road. The gate station supplying the Kinleith MP4 is located in the same site as the supply to Kinleith Mills. This network system consists of one MP4 pressure system. The Kinleith network system supplies 5 residential consumers and 2 large industrial gas users.

| SYSTEM | PLANNED DEVELOPMENT |
|---|---|
| **Kinleith MP4** | Nil |

## F.22. TOKOROA NETWORK SYSTEM

The Tokoroa network system is supplied from the transmission system from one gate station located in Baird Road near Old Taupo Road. This network system consists of one IP20 pressure system, one MP4 pressure system and three DRSs.

Around 1,000 consumers are connected to the Tokoroa network system. They are mainly residential consumers; only 11% are commercial/industrial gas users.

| SYSTEM | PLANNED DEVELOPMENT |
|---|---|
| **Tokoroa IP20** | Nil |
| **Tokoroa MP4** | Nil |

## F.23. ROTORUA NETWORK SYSTEM

The Rotorua network system is supplied from the transmission system from one gate station located in the south of Rotorua in SH5. This network system consists of one IP20 pressure system, four MP4 pressure systems and 14 DRSs.

About 3,968 consumers are connected to the Rotorua network system. They are predominately residential consumers; only around 10% are commercial/industrial gas users.

| SYSTEM | PLANNED DEVELOPMENT |
|---|---|
| **Rotorua IP20** | Nil |
| **Rotorua East MP4** | Nil |
| **FRI MP4** | Nil |
| **Rotorua MP4** | No constraints have been identified and the system pressure is not forecast to fall below the MinOP criteria during the planning period. However, further investigations are underway due to determine and identify potential solutions to a system pressure breach during 2015. |
| **Waipa MP4** | Nil |

## F.24. REPOROA NETWORK SYSTEM

The Reporoa network system is supplied from the transmission system from one gate station located in Parekarangi. This network system consists of one IP20 pressure system, one MP4 pressure system and one DRS.

A total of 24 consumers are connected to the Reporoa network system comprising 16 residential consumers and 8 commercial / industrial consumers, including one large industrial gas user. At system peak, the large industrial user demands more than 99% of the total network system flow.

The major industrial consumer is supplied directly from the Reporoa gate station, i.e. not connected to the IP20 network. For modelling accuracy, the load from the industrial user is deducted from the total gate station flow when modelling the Reporoa network system.

| SYSTEM | PLANNED DEVELOPMENT |
|---|---|
| **Reporoa IP20** | Nil |
| **Reporoa MP4** | Nil |

## F.25. TAUPO NETWORK SYSTEM

The Taupo network system is supplied from the transmission system from one gate station located in Rakaunui Road. This network system consists of one IP20 pressure system, one MP4 pressure system and two DRSs.

About 2,137 consumers are connected to the Taupo network system. They are predominately residential consumers; only around 10% are commercial/industrial gas users.

The Taupo network system has two DRSs which supply gas to the Taupo MP4 pressure systems. As part of the reinforcement options, one of the DRSs will be set to provide an MP7 outlet for the proposed Taupo MP7 pressure system.

| System | Planned Development |
|---|---|
| **Taupo IP20** | Nil |
| **Taupo MP4** | Nil |

## F.26. Tauranga Network System

The Tauranga network system is supplied from the transmission system from two gate stations, located at Te Reti in the central Tauranga and Pyes Pa in the South West. The Tauranga network system consists of one IP20 pressure system, currently operating as an IP10 pressure system, one MP4 pressure system and five DRSs.

About 4,500 consumers are connected to the Tauranga network system. They are predominately residential consumers; with around 8% being commercial/industrial gas users.

The Tauranga network system has two gate stations (Tauranga and Pyes Pa). The gas distribution system takes an IP10 supply from Tauranga gate station at a NOP of 1,000kPa and an MP4 supply from Pyes Pa gate station at a NOP of 400kPa.

| System | Planned Development |
|---|---|
| **Tauranga IP10** | Pressure up-rating of the Tauranga IP10 pressure system from 1,000kPa to 1,700kPa is scheduled for completion in FY2017, with the cost of modifications to be covered by First Gas Transmission. Alongside the uprating of the gate station, Flange Insulation Kits to enhance cathodic protection are planned to be installed on the distribution network connecting the gate station. |
| **Tauranga MP4** | No constraints have been identified and the system pressure is not forecast to fall below the MinOP criteria during the planning period.<br>The following planned PE MP4 links will provide further network security and enhance supply capacity to meet new industrial and commercial demand growth over the planning period:<br>– Construct approximately 700 metres of 100mm PE pipeline between Oropi Road and Windermere Drive, and overlay approximately 1,000 metres of 50mm PE pipeline to replace several sections of 10mm PE pipeline in Windermere Drive / College Place in order to reinforce the network in Ohauiti area.<br>– Construct approximately 1,500 metres of 80mm PE pipeline between Bellevue and Bethlehem. |

## F.27. Mt Maunganui Network System

The Mt Maunganui network system is supplied from the transmission system from two gate stations, Mt Maunganui gate station and Papamoa gate station. The Maunganui network system consists of two IP20 pressure systems, two MP4 pressure systems and seven DRSs.

About 4,313 consumers are connected to the Mt Maunganui network system. They are predominately residential consumers; only around 5% are commercial/industrial gas users.

Major industrial and commercial activities are expected in the northern part of Mt Maunganui. Growth and change in gas demand will be very much dependent on the business development in this area.

The Papamoa East area provides an important opportunity for Tauranga City Council to provide green field urban development. The estimated population for Papamoa East is around 25,000 should development potential be fully realised. Urban development would occur over a period of 20-30 years, with initial stages catering for a population of around 9,200. An urban design structure plan is presented for Wairakei (Part 1), setting out how low and medium density residential land, business land and open space land will be laid out. Services structure planning provides the main roading network for the Wairakei area and locations of necessary bulk infrastructure. Progress of the development will depend on landowner responses, influencing the ultimate resident population.

| System | Planned Development |
|---|---|
| **Mt Maunganui IP20** | No constraints have been identified and the system pressure is not forecast to fall below the MinOP criteria during the planning period. However, to enhance network security the following reinforcements project is planned:<br>– Create IP20 pipeline loops. Possible solution would be to construct approximately 2,400 metres of 80mm IP20 steel pipeline along Newton Street, Hull Road into Totara Road Mt Maunganui.<br>Up-rating of the IP20 pipeline from Mt Maunganui gate station to Hewletts Road (including the upgrade of Mt Maunganui gate station and installation of a new DRS near Hewletts Road) was considered as an alternate option to the above. The looping project was ultimately selected as the preferred option to most practically meet the security requirements and deliver the most cost effective solution. As a result, the Mt Maunganui gate station to Hewletts road pipeline was deauthorised<br>The Mt Maunganui 806 gas transmission pipeline MAOP was reduced from 8,600kPa to 1,960kpa. |
| **Papamoa IP20** | No constraints have been identified and the system pressure is not forecast to fall below the MinOP criteria during the planning period. However, to enhance network security and support growth opportunities in Papamoa East, the development of a Papamoa MP7 network development is planned. |
| **Papamoa MP7 (new pressure system)** | In order to enhance network security and support growth opportunities in Papamoa East, the following projects are planned to develop an MP7 pressure system:<br>– Construct approximately 800 metres of 225mm MP7 PE pipeline in Domain Road.<br>– Construct approximately 1,000 metres of 180mm MP7 PE pipeline in Parton Road.<br>– Construct approximately 1,700 metres of 225mm MP7 PE pipeline in Tara Road.<br>– Install a DRS (MP7/MP4) at the junction of Parton Road and Papamoa Beach Road.<br>– Install a DRS (IP20/MP7) adjacent to Papamoa gate station. |
| **Mt Maunganui MP4** | Network monitoring recently revealed that system pressure had dropped below the MinOP criteria on one occasion, most likely owing to unexpected coincident demand on the Mt Maunganui MP4 pressure system. In order to maintain supply pressure quality, the following system reinforcement was initiated, with the final stage of development scheduled to be completed in FY17.<br>– Extend approximately 500 metres of 50mm PE MP4 pipeline in Maru/Te Maire Street. |
| **Tip Lane MP4** | Nil |

## F.28. TE PUKE NETWORK SYSTEM

The Te Puke network system is supplied from the transmission system from one gate station located in Washer Road. This network system consists of one IP10 pressure system, two MP4 pressure systems and three DRSs.

About 620 consumers are connected to the Te Puke network system. They are predominately residential consumers; only around 9% are commercial/industrial gas users.

| SYSTEM | PLANNED DEVELOPMENT |
|---|---|
| **Te Puke IP10** | Nil |
| **Te Puke MP4** | Nil |
| **Washer Road MP4** | Nil |

## F.29. KAWERAU NETWORK SYSTEM

The Kawerau network system is supplied from the transmission system from one gate station located in East Bank Road. This network system consists of one IP10 pressure system, two MP4 pressure systems and three DRSs.

About 260 consumers are connected to the Kawerau network system. They are predominately residential consumers; only around 8% are commercial/industrial gas users.

The Kawerau IP10 pressure system operates at a NOP of 1,000kPa and is fed from the Kawerau gate station which comprises three steel pipeline laterals. One lateral distributes gas to the Paora St MP4 and Kawerau MP4, while the other two supply gas to two large industrial consumers.

| SYSTEM | PLANNED DEVELOPMENT |
|---|---|
| **Kawerau IP10** | Nil |
| **Kawerau IP10 (ex-Caxton)** | Nil |
| **Kawerau IP10 (ex-Tasman)** | Nil |
| **Paora St MP4** | Nil |
| **Kawerau MP4** | Nil |

## F.30. TE TEKO NETWORK SYSTEM

The Te Teko network system is supplied from the transmission system from one gate station located in Tahuna Road. This network system consists of one IP10 pressure system, one MP4 pressure system and one DRS. The Te Teko network system supplies 3 residential consumers and 4 commercial gas users.

| SYSTEM | PLANNED DEVELOPMENT |
|---|---|
| **Te Teko IP10** | Nil |
| **Te Teko MP4** | Nil |

## F.31. EDGECUMBE NETWORK SYSTEM

The Edgecumbe network system is supplied from the transmission system from one gate station located in Awakeri Road. This network system consists of one IP20 pressure system and one MP4 pressure system. The Edgecumbe IP20 and the Edgecumbe MP4 pressure systems are metered separately inside the gate station. The Edgecumbe network system supplies 5 residential consumers and 5 commercial/industrial gas users.

| SYSTEM | PLANNED DEVELOPMENT |
|---|---|
| **Edgecumbe IP20** | Nil |
| **Edgecumbe MP4** | Nil |

## F.32. WHAKATANE NETWORK SYSTEM

The Whakatane network system is supplied from the transmission system by one gate station located in Mill Road. This network system comprises one IP20 pressure system, two MP4 pressure systems and three DRSs. About 450 consumers are connected to the Whakatane network system. They are predominately residential consumers; with commercial/industrial gas users accounting for around 20% of total demand.

| SYSTEM | PLANNED DEVELOPMENT |
|---|---|
| **Whakatane IP20** | Nil |
| **Whakatane MP4** | Nil |
| **Mill Road MP4** | Nil |

## F.33. OPOTIKI NETWORK SYSTEM

The Opotiki network system is supplied from the transmission system by one gate station located in Factory Road. This network system consists of one IP10 pressure system, two MP4 pressure systems and two DRSs. There is an industrial consumer supplied directly from the Opotiki gate station, i.e. not connected to the IP20 network. For modelling accuracy, the load from the industrial consumer is deducted from the total gate station flow when modelling the Opotiki network system.

| SYSTEM | PLANNED DEVELOPMENT |
|---|---|
| **Opotiki IP20** | Nil |
| **Opotiki MP4** | Nil |
| **Hospital Hill MP4** | Nil |

## F.34. GISBORNE NETWORK SYSTEM

The Gisborne network is supplied from the transmission system from one gate station and consists of one IP20 network and one MP4 network. About 3,400 consumers are connected to the Gisborne network system. They are predominately residential; only around 9% are commercial/industrial gas users.

| SYSTEM | PLANNED DEVELOPMENT |
|---|---|
| **Gisborne IP20** | No constraints have been identified and the system pressure is not forecast to fall below the MinOP criteria during the planning period. However, recent requests for increased gas load from industrial customers may result in the system pressure falling below the minimum pressure criteria. To cater for this potential load growth, the following reinforcements are planned:<br>– Upgrade the metering and regulator equipment at the Gisborne gate station to allow an increase in the outlet pressure from 1,700kPa to 1,800kPa plus.<br>– Construct approximately 1,400 metres of 100mm IP20 steel pipeline in Lytton Road between Aberdeen Road and Manuka Street, Te Hapara. |
| **Gisborne MP4** | Nil |

## F.35. KUKU NETWORK SYSTEM

The Kuku network system is supplied from the transmission system from one gate station located in Kuku Beach Road. This network system consists of one MP2 pressure system. A total of 31 consumers are connected to the Kuku network system comprising 28 residential consumers and 3 commercial gas users. Flow data for the Kuku gate station is not currently available. As the system is considered low risk of breaching quality of supply, we do not intend to collect this information at this point in time.

| SYSTEM | PLANNED DEVELOPMENT |
|---|---|
| **Kuku MP4** | Nil |

## F.36. OTAKI NETWORK SYSTEM

The Otaki network system is supplied from the transmission system from one gate station located in the southwest of Otaki. This network system consists of one MP4 pressure system. About 400 consumers are connected to the Otaki network system. They are predominately residential consumers and only around 11% are commercial gas users.

| SYSTEM | PLANNED DEVELOPMENT |
|---|---|
| **Otaki MP4** | Nil |

## F.37. TE HORO NETWORK SYSTEM

The Te Horo network system is supplied from the transmission system from one gate station located in Te Horo beach Road near Pukenamu Road. This network system consists of one MP4 pressure system. The Te Horo network system supplies 13 residential consumers and 2 commercial gas users. Flow data for the Te Horo gate station is not currently available. As the system is considered low risk of breaching quality of supply, we do not intend to collect this information at this point in time.

| SYSTEM | PLANNED DEVELOPMENT |
|---|---|
| **Te Horo MP4** | Nil |

## F.38. WAIKANAE NETWORK SYSTEM

The Waikanae network system is supplied from the transmission system from one gate station located in the west of Waikanae. This network system consists of one MP4 pressure system.

Approximately 1,500 consumers are connected to the Waikanae network system. They are predominately residential consumers; only around 3% are commercial gas users.

| SYSTEM | PLANNED DEVELOPMENT |
|---|---|
| **Waikanae MP4** | No constraints have been identified and the system pressure is not forecast to fall below the MinOP criteria during the planning period. However, to enhance network security and support growth opportunities, the following network development projects are planned:<br>– Construct approximately 600 metres of 50mm PE MP4 pipeline from Belvedere Avenue to David Street. |

## F.39. PARAPARAUMU NETWORK SYSTEM

The Paraparaumu network system is supplied from the transmission system from Paraparaumu gate station located in Valley Road. The Paraparaumu network system consists of one IP20 pressure system, one new MP7 pressure system, two MP4 pressure system and three DRSs. About 3,400 consumers are connected to the Paraparaumu network system. They are predominately residential consumers; only around 5% are commercial/industrial gas users.

| SYSTEM | PLANNED DEVELOPMENT |
|---|---|
| **Paraparaumu IP20** | System pressure is forecast to fall below the minimum pressure criteria within the planning period. To address this issue, the following reinforcement projects are planned, along with reinforcement of the Paraparaumu MP4 and MP7 installation:<br>– Up-rate the Paraparaumu IP20 pressure system from the current operating pressure of 1,350kPa to 1,800kPa (including the upgrade of the Paraparaumu gate station and DRS DR-80052-PR and DR-80081-PR upgrades). |
| **Paraparaumu MP7** | As a measure of reinforcement to the Paraparaumu network and to prevent the MinOP falling below minimum pressure criteria, the Waikanae to Otaihanga MP7 pipeline installed in FY16 will be reinforced. This will connect the existing Waikanae IP20 and Paraparaumu MP4 networks, and include the following reinforcements during the planning period:<br>– Installation of a new IP20/MP7 DRS adjacent to Waikanae gate station.<br>– Continuation from the end of Waikanae to Otaihanga MP7 pipeline to IP20/MP7 DRS adjacent Waikanae gate station.<br>– Continuation of Waikanae to Otaihanga MP7 pipeline to MP7/MP4 DRS at the northern end of the Paraparaumu MP4 pressure system. |
| **Paraparaumu MP4** | System pressure is forecast to fall below the minimum pressure criteria within the planning period. To address this issue, the following reinforcement projects are planned:<br>– Installation of a new MP7/MP4 DRS at the northern end of the Paraparaumu MP4 pressure system.<br>– Construct approximately 1,900 metres of 100mm MP4 PE pipeline from the proposed MP7/MP4 DRS (in Mazengarb Rd and Ratanui Rd) along Ratanui Road to Mazengarb Road.<br>Subject to the above reinforcements proceeding, a reinforcement connection with the existing Waikanae gate station will provide a second supply into the Paraparaumu MP4 pressure system via the MP7 link described above.<br>Note: The Nikau Valley MP4 pressure system was merged with the Paraparaumu MP4 pressure system in 2015. |

# G. LONG TERM DEVELOPMENT PLANS

This appendix sets out our long-term development plans for our larger gas distribution systems.

## G.1. OVERVIEW

Traditionally, the method used for developing the network has been a bottom up approach. This has enabled network development planning in phases based on projected demand (and other relevant information). The risk of this incremental approach is that the development will be significantly influenced by localised information available for the short term (three to five years) to medium term (five to ten years). This could result in short-term financially attractive solutions being adopted where better economic long-term solutions may be available.

We have utilised network modelling and long-term demand forecasts to establish a very long-term vision for our regional intermediate pressure network systems. The vision is presented in the form of a "target" network configuration in year 2050 that reflects the potential security and capacity needs of our customers. This offers guidance to our planners for the ongoing development of the network and enables them to take a holistic long-term view to ensure that the network is not developed in a piecemeal fashion. As a result, any duplication or redundancy can be minimised, and the network configuration can be further optimised for the long term.

The following sections provide a summary of the envisaged long-term network architecture for the IP networks located in:

- Hamilton
- Tauranga
- Mt Maunganui
- Paraparaumu/Waikenae

All estimates on schedule are indicative only, and may be subject to change dependent on updated modelling. Further regions will be added as network models are developed, utilising updated load forecasts and growth projections.

## G.2. HAMILTON

The long-term load distribution in Hamilton shows that the potential demand growth can be accommodated by:

1. Uprating of the IP10 network from the Te Kowhai gate station in 2 stages.

   Stage 1: Up rating of Hamilton IP10 to IP20 from Te Kowhai gate station to new IP20/IP10 DRS (FY17).

   Stage 2: Relocation of above DRS and up rating of existing IP10 network to IP20 (year 2030).
2. Connecting the existing Horotiu gate station to the Hamilton IP10 network (year 2030).

   Option 2a: Constructing an IP20 pipeline from Horotiu gate station to DR-80129-HM; and/or

   Option 2b: Constructing an IP20 pipeline from Horotiu gate station to DR-80145-HM.
3. Increasing security and supply to potential industrial growth area (year 2040).

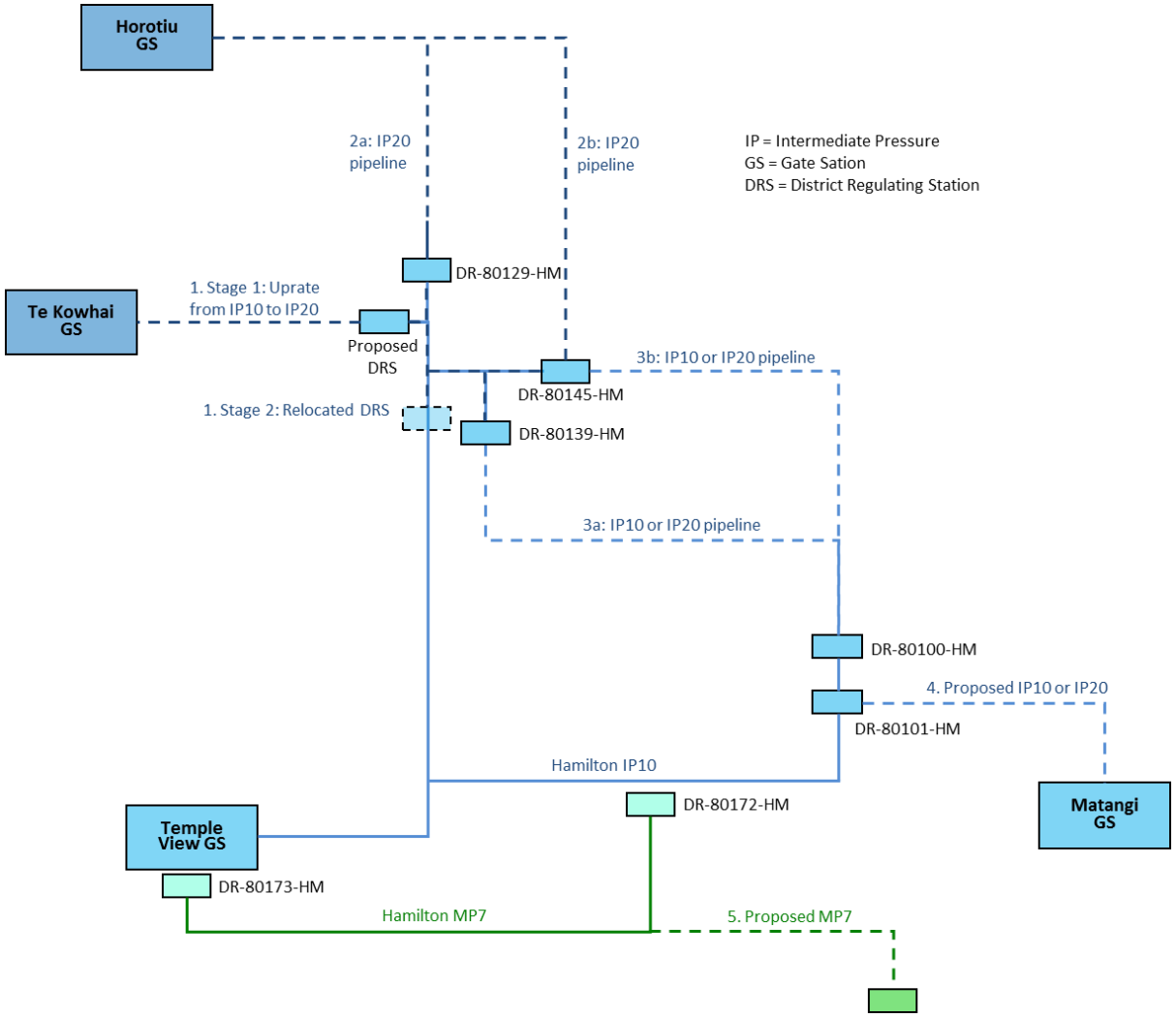
   Option 3a: Constructing an IP10 or IP20 pipeline from DR-80139-HM to DR-80100-HM, or

   Option 3b: Constructing an IP10 or IP20 pipeline from DR-80145-HM to DR-80100-HM, or
4. Increasing the available capacity of the Matangi gate station, pending capacity (year 2040).

5. Constructing a new MP7 pipeline from Collins Road (near DR-80175-HM) to Peacocke (year 2030)

The figure below shows the proposed long-term plan for the IP networks in the Hamilton network system.

Figure A1: Long-term network architecture: Hamilton network system




## G.3. TAURANGA

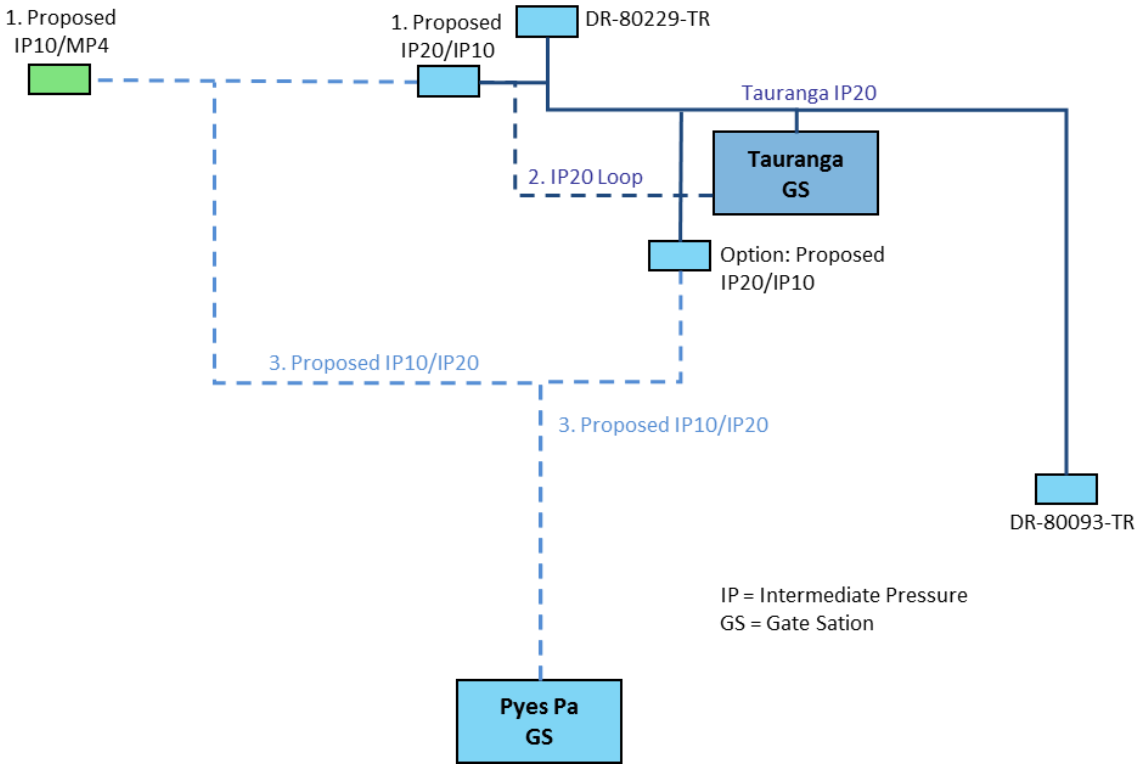
The long-term load distribution in Tauranga shows the potential demand growth can be accommodated by:

1. Constructing a new IP10 (or IP20) pipeline (approximately 3,200 metres) from near DR-80229-TR from Waihi Road, along Bellevue Road into Windsor Road and Charles Street, ending at Ngatai Road. In addition, construct IP20/IP10 (if required) and IP10(or IP20)/IP4 DRS's near DR-80229-TR and 422 Ngatai Road respectively (year 2030).
2. Constructing a new IP20 pipeline loop (approximately 1,000 metres) along Waihi Road between Birch Avenue and a IP20/IP10 DRS near DR-80229-TR. This is intended to improve system pressure.
3. Constructing a new IP10 (or IP20) pipeline (approximately 8,000 metres) from Pyes Pa gate station to the proposed IP10 pipeline (described above) to improve security of supply. Note that additional MP4 DRS reinforcement could be provided at various locations along this

pipeline. An alternative option is to relocate the proposed IP20/IP10 DRS to Birch Avenue/Waihi Road and extend the IP10 pipeline. This option replaces the need to construct the IP20 pipeline described above and replace it with a more cost effective IP10 PE pipeline (year 2040).

The figure below shows the proposed long-term plan for the IP and MP networks in the Tauranga network system.

Figure A2: Long-term network architecture: Tauranga network system




## G.4. MT MAUNGANUI

The long-term load distribution in Mt Maunganui shows the potential demand growth can be accommodated by:

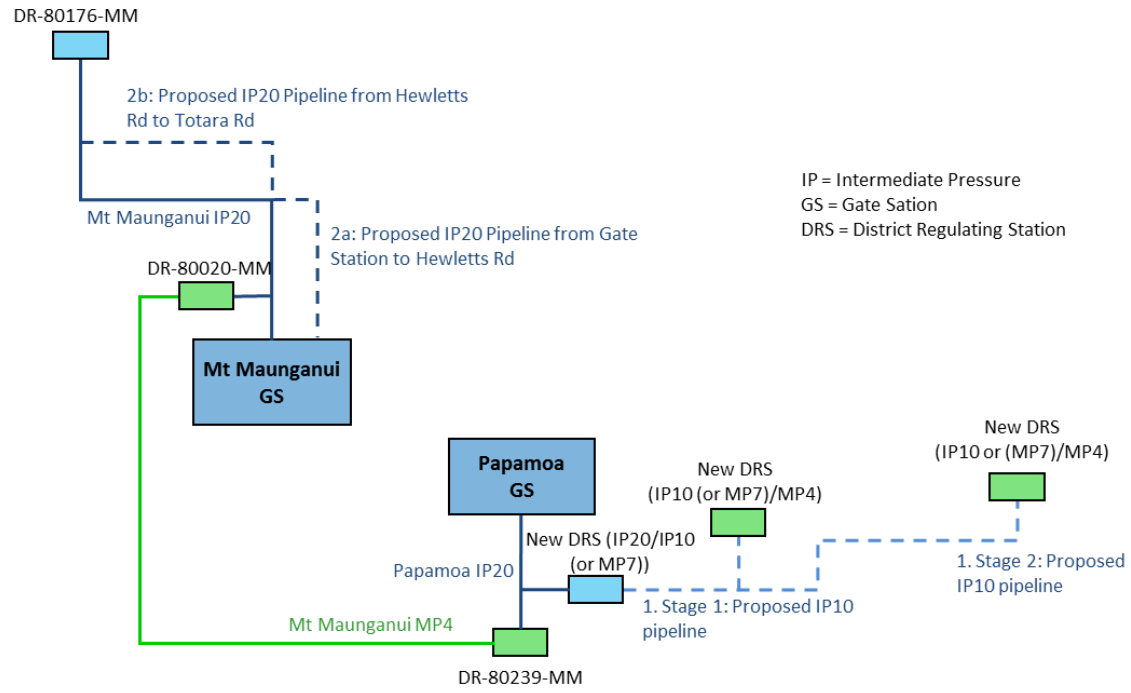
1. Constructing a new IP10 (or MP7) pipeline over 2 stages (including required DRSs) to supply the Papamoa East urban developments (year 2030 and 2040).
2. Reinforcement of the Mt Maunganui IP20 system (year 2030/2040)

   Option 2a: Constructing an IP20 pipeline from Hewletts Road to Totara Road; or

   Option 2b: Constructing an IP20 pipeline from Mt Maunganui gate station to Hewletts Road.

The figure below shows the proposed long-term plan for the IP and MP networks in the Mt Maunganui network system.

Figure A3: Long-term network architecture: Mt Maunganui network system



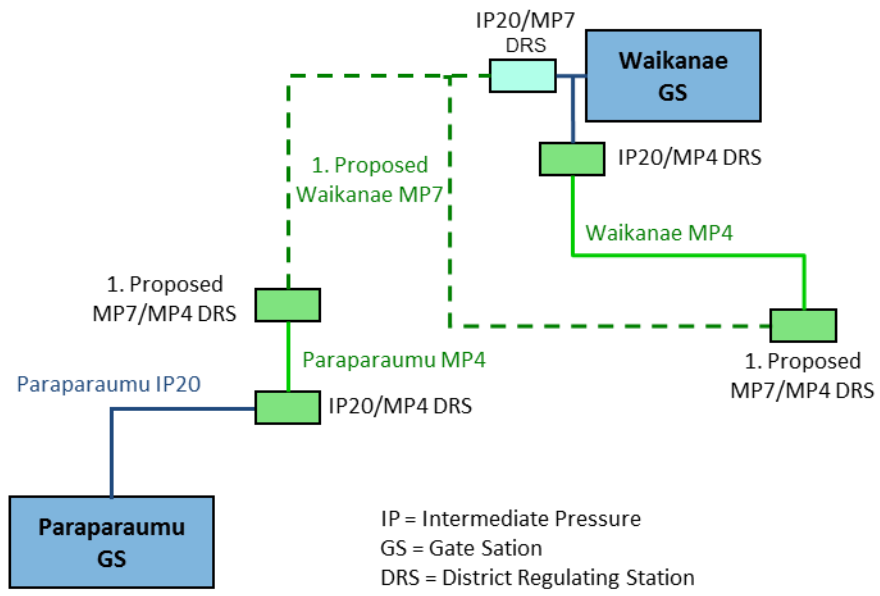

## G.5. PARAPARAUMU / WAIKANAE

The long-term load distribution in Paraparaumu and Waikanae shows the potential demand growth can be accommodated by:

1. Linking the Paraparaumu and Waikanae networks systems with an MP7 pipeline system, including the installation of multiple MP7/MP4 DRSs.

The figure below shows the proposed long-term plan for the IP and MP networks in the Paraparaumu and Waikanae network systems.

Figure A4: Long-term network architecture: Paraparaumu and Waikanae network systems



# H. SCHEDULED MAINTENANCE

This appendix summarises our main scheduled maintenance activities by asset fleet.

## H.1. ROUTINE MAINTENANCE ACTIVITIES

| Asset Category Activity Standard | Interval | Preventive Maintenance Description |
|---|---|---|
| Leakage survey GNS-0019 | Yearly | Distribution systems adjacent to public buildings, hospitals, schools and business districts; Identified higher risk areas, steel pipelines without operating cathodic protection systems |
| | 2 yearly | Service pipes located inside or under buildings; Distribution mains systems comprised predominantly of pre-1985 PE |
| | 4 yearly | All other pipes located under hard-paved surfaces in close proximity to buildings; Shallow IP mains |
| | 5 yearly | Balance of distribution system, including service connections |
| Above ground steel pipework GNS-0014 | Yearly | Above ground corrosion inspection |
| Cathodic protection GNS-0015 | 2 monthly | Inspection of impressed current transformer/rectifier sites; Inspection of drainage bonds |
| | 3 / 6 monthly / yearly | Inspect & test on and instant-off pipe/soil potential in major urban, urban and rural areas; Electrical test of galvanic anodes in major urban, urban and rural areas; Test electrical isolation at casing test points in major urban, urban and rural areas |
| | 3 / 6 monthly | Inspect & test “On” pipe/soil potential in rural and urban areas |
| Gate Station and DRS GNS-0012 | 3 monthly | Below ground DRS operational check |
| | 6 monthly | Above ground operational check |
| | 3 yearly | All DRS; full inspection and confirmation of settings and function |
| Odorant checks GNS-0020 | Monthly | Gate station odorant and odorant concentration tests |
| | 3 monthly | Extremity point ICP and designated DRS odorant and odorant concentration tests |
| Valves GNS-0013 | Yearly | Full service of emergency and designated valves, and partial service of other designated plug valves |

| Asset Category Activity Standard | Interval | Preventive Maintenance Description |
|---|---|---|
| | 2 yearly | Full service of other designated ball valves, and partial service of other plug valves; Audit of a sample of service riser valves |
| Telenet GNS-0016 | Yearly | Annual – inspections of master station, field sites and repeater station |
| | 4 yearly | Intrinsic safety inspections of field sites |
| Patrols GNS-0021 | 3 monthly | Visual inspection of above ground pipework, vent pipes and ducted crossings |
| | Yearly | Visual inspection of service pipes inside/under buildings |
| Service regulators GNS-0073 | Yearly | Visual inspection of below ground installations |
| | Yearly | Visual inspection of above ground installations |
| Critical spares and equipment GNS-0078 | Monthly | Visual inspection |
| | Yearly | Condition assessment of all critical spares and equipment; Review of inventory lists to determine level of inventory held is appropriate |
| | 5 – 10 yearly | Manufacture's check/refurbishment of all major items of equipment |
| Ground temperature | Monthly | Monitoring of ground temperature at key reference sites (Rotorua and Taupo) |

## H.2. MAINTENANCE ACTIVITIES FORECAST EXPENDITURE

Table A2: Maintenance Activities Opex Forecast Expenditure by Asset Category

| Expenditure description | Financial Year ($000) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 |
| **Pipelines** | $3,511 | $3,512 | $3,514 | $3,515 | $3,517 | $3,518 | $3,520 | $3,521 | $3,523 | $3,524 |
| **Stations** | $126 | $126 | $126 | $126 | $126 | $126 | $126 | $126 | $126 | $126 |
| **Valves** | $212 | $212 | $212 | $212 | $212 | $212 | $212 | $212 | $212 | $212 |
| **Special crossings** | $112 | $112 | $112 | $112 | $112 | $112 | $112 | $112 | $112 | $112 |
| **Monitoring and control systems** | $34 | $34 | $34 | $34 | $34 | $34 | $34 | $34 | $34 | $34 |
| **CP systems** | $118 | $118 | $118 | $118 | $118 | $118 | $118 | $118 | $118 | $118 |
| **Other** | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| **Total** | $4,112 | $4,113 | $4,115 | $4,116 | $4,117 | $4,119 | $4,120 | $4,122 | $4,123 | $4,125 |

# I. REGULATORY REQUIREMENTS LOOKUP

| 2.6 ASSET MANAGEMENT PLANS AND FORECAST INFORMATION | AMP Section where addressed |
|---|---|
| **Disclosure relating to asset management plans and forecast information** | |
| 2.6.1 Subject to clauses 2.6.3 and 2.13, before the start of each disclosure year commencing with the disclosure year 2014, every GDB must-<br>(1) Complete an AMP that-<br>(a) relates to the gas distribution services supplied by the GDB;<br>(b) meets the purposes of AMP disclosure set out in clause 2.6.2;<br>(c) has been prepared in accordance with Attachment A to this determination; Gas Distribution Information Disclosure Determination 2012 – (consolidated in 2015)<br>(d) contains the information set out in in the schedules described in clause 2.6.6;<br>(e) contains the Report on Asset Management Maturity as described in Schedule 13;<br>(2) Complete the Report on Asset Management Maturity in accordance with the requirements specified in Schedule 13; and<br>(3) Publicly disclose the AMP. | 1(a) Section 2.1.3 States the AMP relates to the First Gas distribution network.<br>1(b) Compliance with clause 2.6.2 described below.<br>1(c) Compliance with Attachment A is described below.<br>1(d) Compliance with clause 2.6.6 is described below. Required tables are included in Appendix B of the AMP and provided to the Commission in native format.<br>1(e) AMMAT report is included in Appendix C of the AMP.<br>2. AMMAT report is included in Appendix C of the AMP and discussed in Section 4.5.<br>3. The AMP and its appendices are publicly available on First Gas' website (www.firstgas.co.nz). |
| 2.6.2 The purposes of AMP disclosure referred to in subclause 2.6.1(1)(b) are that the AMP-<br>(1) Must provide sufficient information for interested persons to assess whether-<br>(a) assets are being managed for the long term;<br>(b) the required level of performance is being delivered; and<br>(c) costs are efficient and performance efficiencies are being achieved;<br>(2) Must be capable of being understood by interested persons with a reasonable understanding of the management of infrastructure assets;<br>(3) Should provide a sound basis for the ongoing assessment of asset-related risks, particularly high impact asset-related risks. | 1. (a) – (c) The AMP includes the following information:<br>- Asset Management Policy and Framework (Chapter 4)<br>- Network Development program (Chapter 5, Appendix F)<br>- Performance Measures and Targets (Section 4.4)<br>- Asset Lifecycle Management Strategy (Section 6.1)<br>2. The AMP has been structured and presented in a manner that is intended to be easier for persons with a reasonable understanding of the management of infrastructure assets to understand. This includes<br>- Location of large amounts of extraneous information into appendices to leave the body of the document to deliver the core messages of the AMP.<br>- Using common terminology to deliver the core messages of the AMP<br>- Inclusion of a glossary in Appendix 1 for further understanding of terminology used in the AMP |

| | |
|---|---|
| | - Clear description of expenditure forecasts presented in the AMP<br>3. Risk management policy, framework and high level risks are discussed in Section 4.3, detailed asset related risks and issues are discussed in Section 6.5. |
| Clauses 2.6.3 to 2.6.5 relate to AMP updates | N / A |
| 2.6.6 Subject to clause 2.13.2, before the start of each disclosure year, each GDB must complete and publicly disclose each of the following reports by inserting all information relating to the gas distribution services supplied by the GDB for the disclosure years provided for in the following reports-<br>(1) the Report on Forecast Capital Expenditure in Schedule 11a;<br>(2) the Report on Forecast Operational Expenditure in Schedule 11b;<br>(3) the Report on Asset Condition in Schedule 12a;<br>(4) the Report on Forecast Utilisation in Schedule 12b;<br>(5) the Report on Forecast Demand in Schedule 12c. | The required reports are included in Appendix B of the AMP, and have been provided to the commission in native format. |
| **Attachment A: Asset Management Plans** | |
| **AMP Design** | |
| 1. The core elements of asset management -<br>1.1. A focus on measuring network performance, and managing the assets to achieve performance targets;<br>1.2. Monitoring and continuously improving asset management practices;<br>1.3. Close alignment with corporate vision and strategy;<br>1.4. That asset management is driven by clearly defined strategies, business objectives and service level targets;<br>1.5. That responsibilities and accountabilities for asset management are clearly assigned;<br>1.6. An emphasis on knowledge of what assets are owned and why, the location of the assets and the condition of the assets;<br>1.7. An emphasis on optimising asset utilisation and performance;<br>1.8. That a total life cycle approach should be taken to asset management;<br>1.9. That the use of 'non-network' solutions and demand management techniques as alternatives to asset acquisition is considered. | 1.1 Section 4.4 outlines the performance measures for the network, including targets. Chapters 4, 5, 6 and 7 outline the asset management approach to achieve these targets.<br>1.2 Sections 4.4 and 4.5 discuss our performance measures and AMMAT results, along with providing details about our approach to continuous improvement and defining several improvement initiatives.<br>1.3 Chapters 1 and 2 describe our corporate objectives, and the purpose of the AMP in meeting those objectives. Chapter 4 further reiterates this alignment.<br>1.4 Service level targets are defined in Section 4.4; the asset management approach is discussed in Chapter 4.<br>1.5 Accountabilities for the asset management plan are defined in Section 2.2 and asset management governance in Section 4.2.<br>1.6 Section 3.5 provides an overview our network configuration. Further information on asset condition and configuration are included in Section 6.5, and key asset locations identified in Appendix D.<br>1.7 Section 6.2.1 discusses optimisation of asset performance. |

| | |
|---|---|
| | 1.8 Section 4.1 a total lifecycle management approach which is further detailed in Section 6.2.1.<br>1.9 Sections 5.1.4 and 6.2.1 discuss the considerations for deferring asset purchase or renewal/replacement. |
| 2. The disclosure requirements are designed to produce AMPs that -<br>2.1 Are based on, but are not limited to, the core elements of asset management identified in clause 1;<br>2.2 Are clearly documented and made available to all stakeholders;<br>2.3 Contain sufficient information to allow interested persons to make an informed judgement about the extent to which the GDB's asset management processes meet best practice criteria and outcomes are consistent with outcomes produced in competitive markets;<br>2.4 Specifically support the achievement of disclosed service level targets;<br>2.5 Emphasise knowledge of the performance and risks of assets and identify opportunities to improve performance and provide a sound basis for ongoing risk assessment;<br>2.6 Consider the mechanics of delivery including resourcing;<br>2.7 Consider the organisational structure and capability necessary to deliver the AMP;<br>2.8 Consider the organisational and contractor competencies and any training requirements;<br>2.9 Consider the systems, integration and information management necessary to deliver the plans;<br>2.10 To the extent practical, use unambiguous and consistent definitions of asset management processes and terminology consistent with the terms used in this attachment to enhance comparability of asset management practices over time and between GDBs; and<br>2.11 Promote continual improvements to asset management practices.<br>*Disclosing an AMP does not constrain an GDB from managing its assets in a way that differs from the AMP if its circumstances change after preparing the plan or if the GDB adopts improved asset management practices.* | 2.1 The elements identified in clause 1 are discussed above.<br>2.2 The AMP is distributed to major stakeholders and made publically available on the First Gas website (www.firstgas.co.nz).<br>2.3 The results of our self-assessment per the AMMAT are discussed in section 4.5.<br>2.4 Our performance measures and target levels are defined in Section 4.4 of the AMP.<br>2.5 Risks are discussed in Section 4.3 and more specifically focussed on Assets in Section 6.5 along with opportunities and projects related to performance improvements.<br>2.6 Our delivery model, including consideration of resourcing, is discussed in Section 4.2.3.<br>2.7 The organisational structure in relation to the delivery and responsibilities of the AMP are included in Section 2.2.1 and asset management governance in Section 4.2.<br>2.8 Section 4.2.3 outlines competency and training requirements.<br>2.9 Asset management systems, integration and information management are outlined in Chapter 4, and further detailed throughout Chapter 7.<br>2.10 Throughout the AMP we have used terminology and definitions consistent with those used in this attachment and other disclosure documentation.<br>2.11 Sections 4.4 and 4.5 discuss our performance measures and AMMAT results, along with providing details about our approach to continuous improvement and defining several improvement initiatives. |
| **Contents of the AMP** | |
| 3. The AMP must include the following - | |
| 3.1 A summary that provides a brief overview of the contents and highlights information that the GDB considers significant; | Chapter 1 contains an Executive Summary outlining the following:<br>- Overview of document contents, key messages and themes<br>- High level Capex & Opex forecasts and key projects |

| | |
|---|---|
| 3.2 Details of the background and objectives of the GDB's asset management and planning processes; and | The asset management framework and policy described in Section 4.1 outlines the asset management background objectives. Planning processes are outlined in Section 4.2 and further detailed in Chapters 5 and 6. |
| 3.3 A purpose statement which -<br>(a) makes clear the purpose and status of the AMP in the GDB's asset management practices. The purpose statement must also include a statement of the objectives of the asset management and planning processes;<br>(b) states the corporate mission or vision as it relates to asset management;<br>(c) identifies the documented plans produced as outputs of the annual business planning process adopted by the GDB;<br>(d) states how the different documented plans relate to one another, with particular reference to any plans specifically dealing with asset management; and<br>(e) includes a description of the interaction between the objectives of the AMP and other corporate goals, business planning processes, and plans<br><br>The purpose statement should be consistent with the GDB's vision and mission statements, and show a clear recognition of stakeholder interest. | (a) – (e)<br>Statement of purpose of AMP outlined in Section 2.1.1<br>Chapter 1 outlines the corporate focus for asset management within the Executive Summary.<br>The asset management framework and policy is outlined in Section 4.1, including corporate vision and mission to the asset management approach, and plan relationships. |
| 3.4 Details of the AMP planning period, which must cover at least a projected period of 10 years commencing with the disclosure year following the date on which the AMP is disclosed<br><br>Good asset management practice recognises the greater accuracy of short-to-medium term planning, and will allow for this in the AMP. The asset management planning information for the second 5 years of the AMP planning period need not be presented in the same detail as the first 5 years. | Section 2.1.2 identifies the ten-year period covered by the AMP, defined as the planning period. |
| 3.5 The date that it was approved by the directors | Section 2.1.2 includes the director approval date |
| 3.6 A description of each of the legislative requirements directly affecting management of the assets, and details of:<br>(a) how the GDB meets the requirements; and<br>(b) the impact on asset management | Section 6.2.1 lists the applicable legislations, regulations, and industry codes that affect the management of assets and describes how these requirements are incorporated into asset management. |
| 3.7 A description of stakeholder interests (owners, consumers etc.) which identifies important stakeholders and indicates:<br>(a) how the interests of stakeholders are identified;<br>b) what these interests are;<br>(c) how these interests are accommodated in asset management practices; and<br>(d) how conflicting interests are managed | (a) Section 2.3.2 describes how stakeholders needs are identified.<br>(b) Section 2.3 identifies the interests of each of the key stakeholders.<br>(c) Section 2.3.2 describes how stakeholder interests are accommodated into our decision making and asset management practices.<br>(d) Section 2.3.2 outlines how conflicting interests are managed. |
| 3.8 A description of the accountabilities and responsibilities for asset management on at least 3 levels, including:<br>(a) governance - a description of the extent of director approval required for key asset management decisions and the extent to which asset management outcomes are regularly reported to directors; | (a) Section 4.2 – "Asset Management Governance" describes governance levels for<br>(b) Section 2.2.1 – "Corporate and Organisation Structure" |

| | |
|---|---|
| (b) executive - an indication of how the in-house asset management and planning organisation is structured; and<br>(c) field operations - an overview of how field operations are managed, including a description of the extent to which field work is undertaken in-house and the areas where outsourced contractors are used. | (c) Sections 2.2.1 and 4.2.3 describes the field operations delivery model |
| 3.9 All significant assumptions<br>(a) quantified where possible;<br>(b) clearly identified in a manner that makes their significance understandable to interested persons, including<br>(c) a description of changes proposed where the information is not based on the GDB's existing business;<br>(d) the sources of uncertainty and the potential effect of the uncertainty on the prospective information; and<br>(e) the price inflator assumptions used to prepare the financial information disclosed in nominal New Zealand dollars in the Report on Forecast Capital Expenditure set out in Schedule 11a & the Report on Forecast Operational Expenditure set out in Schedule 11b. | (a) & (b) Key assumptions for the development of the AMP are outlined in Section 4.1.3. Expenditure assumptions are outlined in Section 8.1.<br>(c) Not relevant<br>(d) Section 4.2.2 identifies sources of uncertainty and possible effects; Section 5.1.3 describes methods of managing these uncertainties<br>(e) Escalation rates utilised for the purposes of disclosing nominal expenditure are included in Appendix B, Schedule 11a and 11b Explanatory Notes |
| 3.10 A description of the factors that may lead to a material difference between the prospective information disclosed and the corresponding actual information recorded in future disclosures | Section 4.2.2 identifies sources of uncertainty and possible effects; Section 5.1.3 describes methods of managing these uncertainties. |
| 3.11 An overview of asset management strategy and delivery<br><br>*To support the Report on Asset Management Maturity disclosure and assist interested persons to assess the maturity of asset management strategy and delivery, the AMP should identify-*<br>(a) how the asset management strategy is consistent with the GDB's other strategy and policies;<br>(b) how the asset strategy takes into account the life cycle of the assets;<br>(c) the link between the asset management strategy and the AMP; and<br>(d) processes that ensure costs, risks and system performance will be effectively controlled when the AMP is implemented. | (a) The Asset Management Framework and Policy is discussed in Section 4.1, and describes how the framework relates to corporate objectives.<br>(b) Section 4.1 describes how the Asset Management Framework includes asset lifecycle management, lifecycle management is further detailed in Chapter 6.<br>(c) Section 4.1 defines the relationship between our Asset Management Framework / strategy and the Asset Management Plan.<br>(d) Financial authority and control is discussed in Section 4.2.1. Risk management is described in Section 4.3. Performance measures and targets are included in Section 4.4. Processes to ensure the above are discussed throughout the AMP. |
| 3.12 An overview of systems and information management data<br><br>*To support the AMMAT disclosure and assist interested persons to assess the maturity of systems and information management, the AMP should describe:*<br>(a) the processes used to identify asset management data requirements that cover the whole of life cycle of the assets;<br>(b) the systems used to manage asset data and where the data is used, including an overview of the systems to record asset conditions and operation capacity and to monitor the performance of assets;<br>(c) the systems and controls to ensure the quality and accuracy of asset management information; and<br>(d) the extent to which these systems, processes and controls are integrated. | (a) Section 7.1.2 defines the categorisation and relationships of asset management data and the related systems used to manage the lifecycle of our assets.<br>(b) Section 7.1.2 identifies the systems used to manage asset data, including the condition and capacity of assets, and asset performance.<br>(c) & (d) Section 7.1.2 outlines asset data quality management processes, and system integration. |

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| 3.13 A statement covering any limitations in the availability or completeness of asset management data and disclose any initiatives intended to improve the quality of this data<br><br>*Discussion of the limitations of asset management data is intended to enhance the transparency of the AMP and identify gaps in the asset management system.* | Section 7.1.2 identifies data limitations and initiatives to improve data quality. |
| 3.14 A description of the processes used within the GDB for:<br>(a) managing routine asset inspections and network maintenance;<br>(b) planning and implementing network development projects; and<br>(c) measuring network performance. | (a) Section 6.3 describes maintenance approach and processes<br>(b) Section 5.1 describes the system development and planning process<br>(c) Section 4.4 describes the network performance measures and targets |
| 3.15 An overview of asset management documentation, controls and review processes<br><br>*To support the Report on Asset Management Maturity disclosure and assist interested persons to assess the maturity of asset management documentation, controls and review processes, the AMP should-*<br>*(a) identify the documentation that describes the key components of the asset management system and the links between the key components;*<br>*(b) describe the processes developed around documentation, control and review of key components of the asset management system;*<br>*(c) where the GDB outsources components of the asset management system, the processes and controls that the GDB uses to ensure efficient and cost effective delivery of its asset management strategy;*<br>*(d) where the GDB outsources components of the asset management system, the systems it uses to retain core asset knowledge in-house; and*<br>*(e) audit or review procedures undertaken in respect of the asset management system.* | The documentation describing the key components of the asset management system is outlined in Section 4.1.<br>Structure and financial control is outlined in Section 4.2.<br>Systems for retaining asset knowledge are described in Section 7.1.1<br>Section 4.23 describes the works management of our service provider.<br>Section 4.2.3 describes the works management of our service provider. |
| 3.16 An overview of communication and participation processes<br><br>*To support the Report on Asset Management Maturity disclosure and assist interested persons to assess the maturity of asset management documentation, controls and review processes, the AMP should:*<br>*(a) communicate asset management strategies, objectives, policies and plans to stakeholders involved in the delivery of the asset management requirements, including contractors and consultants; and*<br>*(b) demonstrate staff engagement in the efficient and cost effective delivery of the asset management requirements.* | (1) Section 2.3 and 4.1.2 outline our communication with key stakeholders on aspects of the AMP.<br>(2) Sections and 4.2.1 outline staff engagement in the preparation of the AMP. Where applicable, throughout the AMP key internal stakeholder teams are referenced in relation to delivery of the asset management requirements. |
| 3.17 The AMP must present all financial values in constant price New Zealand dollars except where specified otherwise; | All expenditure figures are denominated in constant value terms using FY16 New Zealand dollars as stated in Chapter 8. |

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| 3.18 The AMP must be structured and presented in a way that the GDB considers will support the purposes of AMP disclosure set out in clause 2.6.2 of the determination. | The AMP has been structured and presented in a manner intended to simplify the presentation of information relevant to the disclosure. |
| **Assets Covered** | |
| 4 The AMP must provide details of the assets covered, including: | |
| 4.1 A map and high-level description of the areas covered by the GDB, including the region(s) covered; and | Section 3.1 provides an overview map and high level region descriptions. |
| 4.2 A description of the network configuration, including:<br>if sub-networks exist, the network configuration information should be disclosed for each sub-network.<br>(a) A map or maps, with any cross-referenced information contained in an accompanying schedule, showing the physical location of:<br>(i) All main pipes, distinguished by operating pressure;<br>(ii) All ICPs that have a significant impact on network operations or asset management priorities, and a description of that impact;<br>(iii) All gate stations;<br>(iv) All pressure regulation stations; and<br>(b) if applicable, the locations where a significant change has occurred since the previous disclosure of the information referred to in subclause 4.2(a) above, including:<br>(i) a description of the parts of the network that are affected by the change; and<br>(ii) a description of the nature of the change. | Appendix D includes network maps showing the following:<br>(i) All mains pipes, colour coded by operating pressure<br>(ii) All ICPs greater than 20TJ<br>(iii) All gate stations feeding the distribution network<br>(iv) All pressure regulation stations<br><br>There have been no significant network changes since previous disclosure. |
| **Network Assets by Category** | |
| 5. The AMP must describe the network assets by providing the following information for each asset category:<br>5.1 pressure;<br>5.2 description and quantity of assets;<br>5.3 age profiles; and<br>5.4 a discussion of the results of formal risk assessments of the assets, further broken down by subcategory as appropriate. Systemic issues leading to the premature replacement of assets or parts of assets should be discussed. | 1. Section 3.5 details the pressure levels around the distribution network and quantities of pipes operating at each level.<br>2. Section 6.5 includes a description and quantity of each asset category<br>3. Section 6.5 includes age profiles and condition of assets<br>4. Section 6.5 lists risks and issues associated with assets and key projects. |
| 6. The asset categories discussed in clause 5 above should include at least the following:<br>6.1 the categories listed in the Report on Forecast Capital Expenditure in Schedule 11a(iii); and<br>6.2 assets owned by the GDB but installed at gate stations owned by others. | The distribution assets discussed in Chapter 3 and Section 6.5 include those specified in clause 6.1 and 6.2. |
| **Service Levels** | |

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| 7. The AMP must clearly identify or define a set of performance indicators for which annual performance targets have been defined.<br>The annual performance targets must be consistent with business strategies and asset management objectives and be provided for each year of the AMP planning period.<br>The targets should reflect what is practically achievable given the current network configuration, condition and planned expenditure levels. The targets should be disclosed for each year of the AMP planning period. | Performance measures and quantified targets for the distribution asset management and how they are consistent with the objectives of the AMP, are specified in Section 4.4 of the AMP. |
| 8. Performance indicators for which targets have been defined in clause 7 must include:<br>8.1 the DPP requirements required under the price quality path determination applying to the regulatory assessment period in which the next disclosure year falls;<br>8.2 consumer oriented indicators that preferably differentiate between different consumer types;<br>8.3 indicators of asset performance, asset efficiency and effectiveness, and service efficiency, such as technical and financial performance indicators related to the efficiency of asset utilisation and operation; and<br>8.4 the performance indicators disclosed in Schedule 10b of the determination. | 8.1 Section 4.4.2 includes targets aligning with DPP quality standard requirements<br>8.2 Section 4.4 includes consumer oriented performance measures<br>8.3 Section 4.4 includes measures of asset performance, delivery etc.<br>8.4 Section 4.4 includes the performance measures disclosed in schedule 10b of the determination |
| 9. The AMP must describe the basis on which the target level for each performance indicator was determined. Justification for target levels of service includes consumer expectations or demands, legislative, regulatory, and other stakeholders' requirements or considerations. The AMP should demonstrate how stakeholder needs were ascertained and translated into service level targets. | Section 4.4 describes the basis for each performance target. |
| 10. Targets should be compared to historic values where available to provide context and scale to the reader. | Historical performance values have been provided in Section 4.4 in order to provide context to the reader. |
| 11. Where forecast expenditure is expected to materially affect performance against a target defined in clause 7 above, the target should be consistent with the expected change in the level of performance. | Forecast expenditure is not expected to materially affect performance against any performance targets. |
| **Network Development Planning** | |
| 12. AMPs must provide a detailed description of network development plans, including - | Network development plans are described in Chapter 5 and further detailed in Appendix F. |
| 12.1 A description of the planning criteria and assumptions for network development; | Development planning criteria are discussed in Section 5.1. |
| 12.2 Planning criteria for network developments should be described logically and succinctly. Where probabilistic or scenario-based planning techniques are used, this should be indicated and the methodology briefly described; and | Development planning criteria are discussed in Section 5.1. |
| 12.3 The use of standardised designs may lead to improved cost efficiencies. This section should discuss:<br>(a) the categories of assets and designs that are standardised; and<br>(b) the approach used to identify standard designs. | (a) Standardised equipment and designs are discussed in Section 6.2.1, including the key design standards by asset type.<br>(b) Section 6.2.1 discusses the approach adopted when identifying and developing a standard design. |

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| 12.4 A description of the criteria used to determine the capacity of equipment for different types of assets or different parts of the network.<br>*The criteria described should relate to the GDB's philosophy in managing planning risks*. | Network and asset capacity is discussed in Section 5.2, and alongside planning risk as discussed in Sections 5.1.2 and 4.3. |
| 12.5 A description of the process and criteria used to prioritise network development projects and how these processes and criteria align with the overall corporate goals and vision. | Project prioritisation in network development is discussed in Section 5.1, and linked to the corporate investment prioritisation criteria in Section 4.2.2. |
| 12.6 Details of demand forecasts, the basis on which they are derived, and the specific network locations where constraints are expected due to forecast increases in demand;<br>a) explain the load forecasting methodology and indicate all the factors used in preparing the load estimates;<br>b) provide separate forecasts to at least the system level covering at least a minimum five year forecast period. Discuss how uncertain but substantial individual projects/developments that affect load are taken into account in the forecasts, making clear the extent to which these uncertain increases in demand are reflected in the forecasts; and<br>c) identify any network or equipment constraints that may arise due to the anticipated growth in demand during the AMP planning period.<br>*The AMP should include a description of the methodology and assumptions used to produce the utilisation and capacity forecasts and a discussion of the limitations of the forecasts, methodology and assumptions. The AMP should also discuss any capacity limitations identified or resolved in years during which an AMP was not disclosed.* | a) Load / demand forecasting methodology is described in Section 5.3.1.<br>b) Detailed load forecasts for each gate station is provided in Appendix E for the planning period and discussed in Section 5.3.<br>c) Key areas on the network that are anticipated to be constrained due to growth during the planning period are discussed in Section 5.8. Further less substantial development projects are outlined in Appendix F. |
| 12.7 Analysis of the significant network level development options identified and details of the decisions made to satisfy and meet target levels of service, including:<br>(a) the reasons for choosing a selected option for projects where decisions have been made;<br>(b) the alternative options considered for projects that are planned to start in the next five years; and<br>(c) consideration of planned innovations that improve efficiencies within the network, such as improved utilisation, extended asset lives, and deferred investment. | (a), (b) and (c) Section 5.8 and Appendix F describe the development projects and rational for decisions. |
| 12.8 A description and identification of the network development programme and actions to be taken, including associated expenditure projections. The network development plan must include:<br>(a) a detailed description of the material projects and a summary description of the non-material projects currently underway or planned to start within the next 12 months;<br>(b) a summary description of the programmes and projects planned for the following four years (where known); and<br>(c) an overview of the material projects being considered for the remainder of the AMP planning period.<br>*For projects included in the AMP where decisions have been made, the reasons for choosing the selected option should be stated which should include how target levels of service will be impacted. For other projects planned to start in the next five years, alternative options should be discussed.* | (a), (b) & (c) Section 5.8 and Appendix F describe the development projects forecast for the planning period. Associated expenditure projections for network development are included in Chapter 8. |

| Lifecycle Asset Management Planning (Maintenance and Renewal) | |
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| 13 The AMP must provide a detailed description of the lifecycle asset management processes, including— | |
| 13.1 The key drivers for maintenance planning and assumptions; | The key drivers for the asset maintenance are described in Section 6.3 |
| 13.2 Identification of routine and corrective maintenance and inspection policies and programmes and actions to be taken for each asset category, including associated expenditure projections. This must include-<br>(a) the approach to inspecting and maintaining each category of assets, including a description of the types of inspections, tests and condition monitoring carried out and the intervals at which this is done;<br>(b) any systemic problems identified with any particular asset types and the proposed actions to address these problems; and<br>(c) budgets for maintenance activities broken down by asset category for the AMP planning period; | (a) Routine inspections and maintenance are described in Section 6.3.2 defined in Appendix H.<br>(b) Key risks and issues identified for each asset type are described in Section 6.5.<br>(c) Categorised budgets for maintenance activities are included in appendix H. |
| 13.3 Identification of asset replacement and renewal policies and programmes and actions to be taken for each asset category, including associated expenditure projections. This must include-<br>(a) the processes used to decide when and whether an asset is replaced or refurbished, including a description of the factors on which decisions are based, and consideration of future demands on the network and the optimum use of existing network assets;<br>(b) a description of innovations made that have deferred asset replacement;<br>(c) a description of the projects currently underway or planned for the next 12 months;<br>(d) a summary of the projects planned for the following four years (where known); and<br>(e) an overview of other work being considered for the remainder of the AMP planning period; and | (a) Our approach to asset replacement and renewal, and the drivers behind investment are described in Section 6.2.<br>(b) – (e) Key asset replacement projects are described in Section 6.2. Further detail on projects planned for the planning period (10 years) are described in Section 6.5. |
| 13.4 The asset categories discussed in clauses 13.2 and 13.3 should include at least the categories in clause 6 above. | The distribution assets discussed in Section 6.5 include those specified in clause 6. |
| **Non-Network Development, Maintenance and Renewal** | |
| 14 AMPs must provide a summary description of material non-network development, maintenance and renewal plans, including - | |
| 14.1 A description of non-network assets; | Non-network assets are described in Section 7.1 |
| 14.2 development, maintenance and renewal policies that cover them; | Non-network assets are described in Section 7.1 |
| 14.3 a description of material capital expenditure projects (where known) planned for the next five years; and | Non-network asset projects are described in Section 7.1. |
| 14.4 a description of material maintenance and renewal projects (where known) planned for the next five years. | Non-network asset projects are described in Section 7.1. |

| **Risk Management** | Chapter 4 |
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| 15 AMPs must provide details of risk policies, assessment, and mitigation, including - | Chapter 4.3 – "Asset Risk Management" - describes asset risk management policy, principles and framework, as well as key risk sources. |
| 15.1 Methods, details and conclusions of risk analysis; | The Risk Management Framework and identified general risks are defined in Section 4.3. Further detail on asset related risks are outlined in Section 6.5. |
| 15.2 Strategies used to identify areas of the network that are vulnerable to high impact low probability events and a description of the resilience of the network and asset management systems to such events; | Section 4.3 outlines various risk sources, with factors and strategies used to identify vulnerable areas. |
| 15.3 A description of the policies to mitigate or manage the risks of events identified in clause 15.2; and | Section 4.3.1 identifies the policy, and Section 4.3.6 identifies the processes used to evaluate and treat risks associated with the network. |
| 15.4 Details of emergency response and contingency plans.<br><br>*Asset risk management forms a component of an EDB's overall risk management plan or policy, focusing on the risks to assets and maintaining service levels. AMPs should demonstrate how the GDB identifies and assesses asset related risks and describe the main risks within the network. The focus should be on credible low-probability, high-impact risks. Risk evaluation may highlight the need for specific development projects or maintenance programmes. Where this is the case, the resulting projects or actions should be discussed, linking back to the development plan or maintenance programme.* | Section 4.3.6 outlines the emergency response and contingency plans. |
| **Evaluation of Performance** | |
| 16 AMPs must provide details of performance measurement, evaluation, and improvement, including— | Performance measures are outlined in Section 4.4. |
| 16.1 A review of progress against plan, both physical and financial;<br>(a) referring to the most recent disclosures made under clause 2.5.1 of this determination, discussing any significant differences and highlighting reasons for substantial variances;<br>(b) commenting on the progress of development projects against that planned in the previous AMP and provide reasons for substantial variances along with any significant construction or other problems experienced; and<br>(c) commenting on progress against maintenance initiatives and programmes and discuss the effectiveness of these programmes noted. | (b) and (c) The progress of development projects and maintenance initiatives / programs are discussed in Chapters 5 and 6.<br>First Gas is a new business and so past performance may not be relevant |
| 16.2 An evaluation and comparison of actual service level performance against targeted performance<br>(a) in particular, comparing the actual and target service level performance for all the targets discussed in the previous AMP under clause 7 and explain any significant variances. | A comparison of past performance measures is included in Section 4.4.<br>First Gas is a new business and so past performance may not be relevant |
| 16.3 An evaluation and comparison of the results of the asset management maturity assessment disclosed in the Report on Asset Management Maturity set out in Schedule 13 against relevant objectives of the GDB's asset management and planning processes. | Evaluation of AMMAT results, and future improvement initiatives are discussed in Section 6.5. |
| 16.4 An analysis of gaps identified in clauses 16.2 and 16.3. Where significant gaps exist (not caused by one-off factors), the AMP must describe any planned initiatives to address the situation. | Improvement initiatives based on gaps in the AMMAT results are discussed in Section 4.5.2. |

| Capability to Deliver | |
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| 17 AMPs must describe the processes used by the GDB to ensure that | |
| 17.1 The AMP is realistic and the objectives set out in the plan can be achieved; and | Section 4.2 describes the governance and framework to achieve a realistic AMP. |
| 17.2 The organisation structure and the processes for authorisation and business capabilities will support the implementation of the AMP plans. | Section 4.2 describes the governance and framework of the AMP, with further definition of organisational structure identified in Section 2.2. |

# J. DIRECTOR CERTIFICATE

**CERTIFICATE FOR YEAR-BEGINNING DISCLOSURES**

Pursuant to clause 2.9.1 of Section 2.9

We, Richard Krogh, and Philippa Dunphy, being directors of First Gas Limited certify that, having made all reasonable enquiry, to the best of our knowledge –

a) The following attached information of First Gas Limited prepared for the purposes of clause 2.6.1, 2.6.3, 2.6.6, and 2.7.2 of the Gas Distribution Information Disclosure Determination 2012 (consolidated in 2015) in all material respects complies with that determination.

b) The prospective financial or non-financial information included in the attached information has been measured on a basis consistent with regulatory requirements or recognised industry standards.

c) The forecasts in Schedules 11a, 11b, 12a, 12b, and 12c are based on objective and reasonable assumptions which both align with First Gas Limited's corporate vision and strategy and are documented in retained records.

Director

Director

28 / 9 / 16

Date

28 / 9 / 16

Date