Augmentation

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Approval and Amendment Record

VERSION	AMENDMENT OVERVIEW
1	

Contents

1. Purpose of this document 5

2. Structure of this document 6

3. Expenditure Profile 7

4. Nature of expenditure 9

5. Current period expenditure 11

5.1. Our Access Arrangement Information and the AER's final decision 11

5.2. Actual expenditure versus AER allowance 11

5.3. 2017 Augmentation Forecast 12

5.4. Explanation of variances 12

5.5. Benefits to customers 13

6. Expenditure forecasting method for forthcoming period 14

6.1. Network Objectives 14

6.2. Planning Objectives 14

6.3. Demand Forecasting 14

6.4. Existing network operation outside of standard operating pressures 15

6.5. Augmentation Capex forecasting 15

6.5.1. Forecast Augmentation Projects 15

6.5.2. Forecast unit rates 16

7. Capex forecasts for forthcoming period 17

7.1. Legend 18

7.2. Oakleigh HP Network 18

7.3. South Melbourne HP Network 19

7.4. Korumburra HP network 19

7.5. Eastern HP Network 20

8. Meeting Rules' requirements 23

8.1. The new capex criteria 23

8.2. How the forecast meets the new capex criteria 23

9. Supporting documentation 25

1. Purpose of this document

This document explains and justifies at a high level our Augmentation capital expenditure (capex) forecasts for our Pipeline Services for our next access arrangement period (1 January 2018 to 31 December 2022). This document references other supporting documents for further detail.

Unless otherwise stated, capex is presented in real 2017 dollars and is expressed in total costs for our Pipeline Services, which includes both our Reference Services and our Non-Reference Services.

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

The actual 2013 to 2015 capex detailed in this document does not include overheads, as this was reported separately to the AER in our Annual Regulatory Information Notices for these years, rather than being incorporated into each capex sub-category.

We note that our forecast annual revenue requirements for our Haulage Reference Services do not include returns on and of capex attributable to Non-Reference Services (including from major asset relocations) because they are based on our net capex only. This is because our capital contributions (and therefore the revenue that we receive from our major relocations) are netted off from our gross (pipeline services) capex forecast in developing our regulatory asset base for our Haulage Reference Services.

For clarity, Attachment 1 details how we have allocated the components of our costs between our different service categories. The fourth row deals with our Augmentation capex forecast. In particular, we note that our Augmentation capex forecast relates only to our mains and supply regulators.

We have provided our Augmentation Strategy documents to the AER with this Overview Document. The forecasts in these documents do not include labour escalators or overheads, whereas the forecasts in this Overview Document are total costs (unless otherwise stated). The following table reconciles the forecasts in the Strategy documents with those in this Overview Document and our Access Arrangement Information.

Table 1: Breakdown of 2018-22 capex forecasts by direct costs, overheads and escalations ($M, Real 2017)

Program	Strategy	2018	2019	2020	2021	2022	Total
Network Reinforcement	MG-PL-0002	3.6	3.3	2.6	1.6	1.2	12.4
Supply Regulator Capacity Upgrades	MG-PL-0002	0.5	2.4	-	-	-	2.9
New Supply Regulators	MG-PL-0002	-	-	0.9	-	-	0.9
Total Direct (excluding escalations)		4.1	5.8	3.5	1.6	1.2	16.2
Overheads		0.2	0.3	0.2	0.1	0.1	1.0
Total including overheads (excluding escalations)		4.3	6.1	3.7	1.7	1.3	17.2
Escalations		0.0	0.0	0.0	0.0	0.0	0.1
Total including overheads and escalations		4.4	6.1	3.7	1.8	1.3	17.3

2. Structure of this document

This document is structured as follows:

- Section 3 details our Augmentation capex profile for the previous, current and forthcoming access arrangement periods;
- Section 4 explains the conceptual nature of our Augmentation capex and why it is necessary;
- Section 5 explains and justifies our actual Augmentation capex against the Australian Energy Regulator's (AER) allowances in the current access arrangement period (1 January 2013 to 31 December 2017);
- Section 6 explains and justifies our forecasting methodology for our Augmentation capex for the next access arrangement period;
- Section 7 details our Augmentation capex forecasts for the next access arrangement period;
- Section 8 explains how we consider that our Augmentation capex forecasts meet the requirements of the National Gas Rules (NGR); and
- Section 9 details the supporting documentation relevant to our Augmentation capex forecasts.

3. Expenditure Profile

This section details the profile of our Augmentation capex for the previous, current and forthcoming access arrangement periods.

Table 2 compares the Essential Services Commission of Victoria's (ESC) Augmentation capex allowance from its Final Decision for the previous access arrangement period with the actual capex that we incurred. It shows that we spent $19.1 million more for the period than the ESC allowed. This is a 55 per cent increase on the ESC's allowance.

Table 2 - Previous access arrangement period Augmentation capex ($M, Real 2017)

	2008	2009	2010	2011	2012	TOTAL
Final Decision	4.3	5.0	14.4	4.2	5.6	33.4
Actual	6.6	7.1	8.7	13.2	17.1	52.6
Variance (Actual – Final Decision)	2.3	2.2	(5.8)	9.0	11.4	19.1

Table 3 compares the AER's Augmentation capex allowance from its Final Decision for the current access arrangement period with the actual capex that we estimate we will spend. It shows that we expect to spend $8.0 million for the period, or $17.9 million less than the AER's $26.0 million allowance.

Table 3 - Current access arrangement period Augmentation capital expenditure ($M, Real 2017)

	2013	2014	2015	2016	2017	TOTAL
Final Decision	7.7	6.2	5.7	6.0	0.4	26.0
Actual / Estimate	0.7	0.1	0.6	1.8	4.8	8.0
Variance (Actual – Final Decision)	(6.9)	(6.0)	(5.1)	(4.2)	4.4	(17.9)

Table 4 shows that we are forecasting that our Augmentation capex will be $17.3 million for the forthcoming access arrangement period.

Table 4 – Forthcoming access arrangement period Augmentation capital expenditure ($M, Real 2017)

	2018	2019	2020	2021	2022	TOTAL
Forecast	4.4	6.1	3.7	1.8	1.3	17.3

Our forecast Augmentation capex for the forthcoming access arrangement period is therefore:

- $9.3 million more than what we expect to spend in the current access arrangement period;
- $8.7 million less than what the AER allowed in its Final Decision for the current access arrangement period;
- $35.3 million less than what we spent in the previous access arrangement period; and
- $16.1 million less than what the ESC allowed in its Final Decision for the previous access arrangement period.

These variances can be attributed to the following:

- The 2008 to 2012 actual Augmentation capex was significantly higher than the ESC's allowance for the period because of higher than anticipated demand growth. This was a result of the strong performance of the Australian economy in the years immediately preceding the global financial crisis (GFC) and strong population growth;
- The 2013 to 2017 actual and estimated Augmentation capex is lower than the regulatory allowance. This is attributed to the deferral of projects resulting from lower than expected network growth, network reconfiguration eliminating the immediate need for augmentation, and running our networks at higher than normal operating pressures; and
- The 2018 to 2022 forecast Augmentation capex is expected to increase from the levels in the current period, due particularly to the need to:
    - Address localised network growth in certain areas of our network – especially in South Melbourne, Korumburra and our Eastern network; and
    - Reduce network operating pressures in our Oakleigh high pressure (HP) network, which is currently operating outside standard pressures during times of peak demand.

4. Nature of expenditure

This section explains the conceptual nature of our Augmentation capex and why it is necessary.

We have an obligation to maintain and manage the supply of natural gas to our customers in accordance with our Gas Safety Case (which complies with the *Gas Safety Act 1997* and the *Gas Safety Regulations 2008*) and the Gas Distribution System Code.

In particular, Schedule 1 of Part A of the Code requires us to maintain network pressures above the minimum levels detailed in Table 5.

Table 5 – Minimum network pressures required under the Gas Distribution System Code

Network Pressure	Minimum Obligated Pressure (kPa)
Low Pressure	1.4
Medium Pressure	15
High Pressure	140
High Pressure 2	**600**

Our Augmentation capex, which includes network reinforcements resulting from expectations of both customer numbers and throughput, is required to create new assets, or upgrade the capacity or functionality of existing assets to achieve appropriate outcomes for customers and other stakeholders. Our Augmentation capex includes:

- Installing new mains to reinforce the existing network;
- Upgrading existing regulating and metering facilities, including auxiliary equipment; and
- Installing new regulating and metering facilities, including auxiliary equipment;

Our Network Growth Strategy (MG-PL-0002) and underpinning network performance reports outline the augmentation required on our distribution and transmission assets to meet our regulatory obligations.

Our distribution networks are continually changing due to residential growth and commercial and industrial development. We apply computer-calibrated models to predict the operation of the networks in the field. Our models are based on one-in-two winters' peak day (also known as a 14.21[1] Effective Degree Day (EDD)). This standard is based on the system coincident peak day with a 50 per cent probability of exceeding this value in any given year.

We use this model of forecast gas consumption to identify the need for future network augmentation to ensure the security of supply and maintenance of fringe pressures in accordance with the Gas Safety Case and the Gas Distribution System Code.

Our Network Planning group identifies necessary augmentation by simulating forecast growth and demand, which in turn determine the appropriate timing of individual projects.

A major input to augmentation planning is the winter testing program. This is a detailed pressure monitoring program that is conducted at selected locations across the network during peak load conditions. Winter testing data is then analysed and used to ensure the accuracy of network models, as well as to identify required reinforcements to ensure that network fringe pressures remain above required minimum levels, even in peak load conditions.

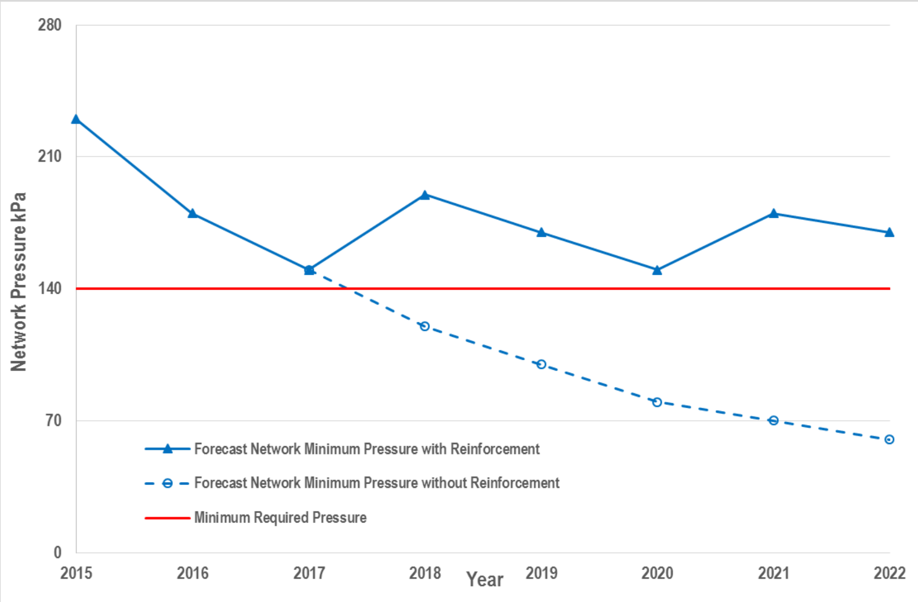
Our network models are validated periodically, or as required, including following a major augmentation project on the network.

Figure 1 provides an example of typical network analysis that highlights the benefit of augmentation, in terms of minimum network pressures. The graph indicates the consequence of not following planned augmentation with

[1] AEMO 2012 Review of The Weather Standards For Gas Forecasting

network pressures falling below 140 kPa, which is the benchmark for HP networks required in the Gas Distribution System Code and our Gas Safety Case.

Figure 1: Example of resulting network pressures with and without identified augmentation



5. Current period expenditure

This section explains and justifies our actual Augmentation capex against the AER's allowances for the current access arrangement period.

5.1. Our Access Arrangement Information and the AER's final decision

In our initial Access Arrangement Information (AAI) for the current period we proposed demand-related augmentation capex of $38.5 million, excluding internal direct overheads (or $35.1 million in Real 2012 dollars). In its Draft Decision, the AER rejected 22 of these projects and adjusted the unit rates for the remaining projects, so that it approved an allowance of $8.2 million, excluding internal direct overheads (or $7.5 million in Real 2012 dollars).[2]

We subsequently submitted a revised Augmentation capex forecast of $38.8 million, excluding internal direct overheads (or $35.4 million in Real 2012 dollars). The reduction from our initial proposal reflected the changes in our circumstances and involved withdrawing four of our original 31 projects and adding two projects, leaving 29 projects.[3]

Based on the additional information that we provided, the AER approved an allowance of $26.0 million, excluding internal direct overheads ($23.7 million in Real 2012 dollars).[4]

Table 6 provides an annual breakdown (in Real 2017 dollars) of our initial and revised proposals and the AER's Draft and Final Decisions for our Augmentation capex for the current access arrangement period.

Table 6 – Multinet Gas' initial and revised proposals and AER's Draft and Final Decisions – Augmentation capex ($M, Real 2017) *

	2013	2014	2015	2016	2017	TOTAL
Multinet Gas' initial proposal	9.3	7.6	6.7	7.0	7.9	38.5
AER's Draft Decision	-	1.9	2.5	3.8	-	8.2
Multinet Gas' revised proposal	9.6	7.6	6.7	7.0	7.9	38.8
AER's Final Decision	7.7	6.2	5.7	6.0	0.4	26.0

* Direct costs, excluding internal direct overheads

5.2. Actual expenditure versus AER allowance

Table 7 details what has occurred for the first three years of the current access arrangement period for our Augmentation capex and what we estimate will occur for the final two years of the period. Table 7 also details our estimate of the variance of our capex to the AER's Final Decision.

We estimate that over the current five-year access arrangement period our Augmentation capex will be $8.0 million, or $17.9 million less than the AER's $26.0 million allowance.

2 AER, Access arrangement final decision, Multinet Gas (DB No. 1) Pty Ltd, Multinet Gas (DB No. 2) Pty Ltd, 2013–17, Part 4 Confidential Appendix C, March 2013, pages 44 to 45

3 AER, Access arrangement final decision, Multinet Gas (DB No. 1) Pty Ltd, Multinet Gas (DB No. 2) Pty Ltd, 2013–17, Part 4 Confidential Appendix C, March 2013, page 45

4 AER, Access arrangement final decision, Multinet Gas (DB No. 1) Pty Ltd, Multinet Gas (DB No. 2) Pty Ltd, 2013–17, Part 4 Confidential Appendix C, March 2013, pages 46 to 51

Table 7 – Actual Augmentation capex and variance against AER's Final Decision ($M, Real 2017)

	2013	2014	2015	2016	2017	TOTAL
Allowance – Final Decision	7.7	6.2	5.7	6.0	0.4	26.0
Actual / Estimate	0.7	0.1	0.6	1.8	4.8	8.0
Variance (Actual – Allowance)	(6.9)	(6.0)	(5.1)	(4.2)	4.4	(17.9)

5.3. 2017 Augmentation Forecast

We are currently in the process of delivering four augmentation projects to be completed by the end of 2017:

1. **Yarra Glen HP** – this involves installing 1.9 kilometres of 125NB polyethylene mains in Glenview Road, Yarra Glen. This project is forecast to cost $0.9 million and raise minimum network pressures to 329kPa (from 109kPa) in winter 2018.
2. **Vermont Outstation** – this involves the reconfiguration of the Vermont MP field regulator (P2-064) to provide HP feed to Knox HP network costing $0.3 million.
3. **High Street Regulator** – this involved the capacity upgrade of the High Street Field Regulator (P4-067) which provides HP feed to the Knox HP network costing $0.3 million
4. **Oakleigh HP** – this involves starting a multi-year project resulting in the installation of new field regulator (Darling Road) and 6.7 kilometres of 300NB steel mains interconnecting the supply point to the Oakleigh HP network. This significant project will reduce network operating pressures in line with standard operating conditions (450kPa during winter peak). The project is forecast to spend $3.3 million in 2017.

5.4. Explanation of variances

The following reasons explain the $17.9 million variance between our expected Augmentation capex for the current access arrangement period and the AER's allowance.

1. **Deferral of projects due to lower network growth than the original forecast**

   We continually assess our networks through the access arrangement period to identify the need and timing for augmentations, including having regard for changes in network growth against forecasts. This results in the acceleration or delay of augmentation projects relative to the AER's allowance in its Final Decision and changes in the size of the works required.

   An example of this in the current access arrangement period occurred in the Ringwood HP sub-network. In total, ten minor augmentation projects were planned for the period but only one has in fact been carried out. The remainder of the projects have either been delayed until the next access arrangement period or have been removed from the program altogether due to lower network growth.

2. **Deferral of projects by reconfiguring network**

   Our continual review of the networks results in us re-examining the requirement for network reinforcement and the designs of previously proposed reinforcement works. In certain circumstances, we can delay or eliminate the immediate network for reinforcement by reconfiguring our network.

   An example of this in the current access arrangement period occurred with the installation of the Yarra Glen to Lilydale Transmission Pipeline (TP) extension. This project resulted in an increase in capacity of the inner Ring Main TP which shifted load off the nearing capacity 840kPa High Pressure 2 (HP2) system. This removed the immediate need to reinforce the HP2 system.

3. **Deferral of projects by running systems at higher than normal operation pressure**

   High pressure networks are designed to operate at 450kPa with sufficient capacity to cater for a one-in-two winters' peak demand. At times, we can operate our networks at higher pressures (up to 515kPa – i.e. the maximum allowable operating pressure) to cater for higher demand than anticipated. This is considered a short-term solution to network operation to minimise adverse impacts on our customers. Additional reinforcement is required in the long-term to increase network capacity to bring it back in-line with accepted industry planning standards (i.e. operating at 450kPa).

   This scenario is the driver for the proposed augmentation of the Oakleigh HP network in the forthcoming access arrangement period. In winter 2016, all feeds to the Oakleigh network were set above standard operation pressures (510kPa) to ensure supply to customers. This is not desirable and provides limited options to meet supply requirement during the event of emergency or higher than planned demand event. We expect to set our Oakleigh HP network at 450 kPa or lower when our proposed Oakleigh HP reinforcement project is completed in the next access arrangement period.

4. **Projects are no longer required due to integration into pipework strategy**

   In some cases, we can satisfy demand constraints through our Mains Replacement capex program where low pressure (LP) mains are upgraded to HP. This program is discussed in our Mains Replacement Overview Document.

   While the principal aim of our Mains Replacement capex is to improve safety, a secondary benefit is an increase in network capacity – typically, this is in the order of 50 per cent. This has reduced the need for LP augmentation and provided additional interlinks within the HP network. This has led to increased network efficiencies and the deferral or removal of network reinforcement projects in the current access arrangement period.

5.5. Benefits to customers

Our ongoing review and management of our distribution networks has resulted in a lower Augmentation capex in the current access arrangement period than the AER allowed. Customers have benefited because the capex savings are not included in the regulatory asset base, and we will therefore earn a lower return on, or of, assets in future access arrangement periods.

Throughout the current access arrangement period, we have continued to comply with our obligations in the Gas Distribution System Code and we have made all reasonable efforts to maintain minimum network pressures above those outlined in the Code.

In addition, we have maintained our network reliability to customers in the current access arrangement period. We have delivered:

- SAIFI of 6 interruptions per 1,000 customer per annum between 2013 and 2015 compared to our benchmark of 16.2 with a reported downward trend;
- SAIDI of 3.37 minutes per customer per annum between 2013 and 2015 compared to our benchmark of 5 minutes; and
- Unplanned outages at a rate of once in every 40+ years.

6. Expenditure forecasting method for forthcoming period

This section explains and justifies our forecasting methodology for our Augmentation capex for the next access arrangement period.

6.1. Network Objectives

We have several long-term planning objectives that influence the scope and timing of our Augmentation works. These long-term planning objectives are subject to economic evaluation to ensure the best economic outcome for our consumers, while meeting the demand for gas. Growth in demand occurs due to increasing loads of existing customers, additional loads of new customers and changes in network dynamics due to changing consumer behaviour. Therefore, new assets are continually required to ensure the distribution network has sufficient capacity to meet demand and to extend the existing network to distribute gas to new locations.

6.2. Planning Objectives

Our gas network comprises 54 individual networks. Our over-riding objective for each of these networks is to provide sufficient capacity to transport during their peak load. We plan our networks to meet supply capacities during the peak hour load that occurs for a probability of once in two years, when operating at normal pressures.

By contrast, transmission systems are typically planned to have capacity to supply the peak hour load that occurs for a probability of once in 20 years. Expansion of the transmission pipeline system in densely populated urban areas is to be avoided where possible.

In the long term, we plan for all LP networks to be upgraded to a HP standard. All new mains and services are constructed to HP standard where practical and economic, even though these mains and services may continue to be operated at LP for some time before their pressure is increased. The preferred method for increasing the capacity of LP and medium pressure (MP) networks is upgrading part, or all, of a network to HP. Augmentation of LP and MP networks is therefore generally avoided, though in some cases upgrading to HP is not an economically viable option due to distances to the existing HP network.

Where there is an overlap in the planning of assets required for growth purposes and assets required for replacement purposes then growth assets take precedence. Planning for growth is not compromised to any significant degree by planning for replacement.

We work to complete projects prior to the winter in which the load is forecast to exceed network capacity.

6.3. Demand Forecasting

We use forecast peak hour gas loads in each year, based on a weather probability of one-in-two years, as the basis for determining requirements for demand growth projects. We estimate these loads using historical trends, knowledge of system load changes and forecast data from earlier year projections. These values have since been sense checked by the National Institute for Economic and Industry Research (NIEIR) against the latest forecast peak day loads using econometric modelling for different economic growth rate scenarios and prudently revised in the light of current economic circumstances.

Demand growth projects have been determined from forecast peak hour loads for each network. These currently occur in winter. NIEIR produced forecast annual gas loads for each postcode area that we supply, which we have used to check the integrity of internally produced growth forecasts based on historical trending and known network load changes that have both occurred and can be anticipated.

NIEIR's report entitled "Natural gas, customer number and MHQ forecasts for Multinet Gas to 2026" contains consumption and customer numbers on our gas network in the forthcoming access arrangement period. Maximum Daily Quantities (MDQ) and Maximum Hourly Quantities (MHQ) are estimated for Tariff V and Tariff D consumers.

The key steps in the demand forecasting process include:

- Defining standard weather conditions;

- Specifying the previous years' actual values for customer numbers, sales and weather;
- Weather standardizing the previous years' sales data;
- Estimating growth rates for at least one condition from: low, medium and high economic growth scenarios; and
- Forecasting consumer numbers and maximum daily and hourly consumption, yearly for the forecast period required.

Actual sales data, by postcode area, includes:

- Consumption data by classes comprising residential Tariff V, small commercial and industrial Tariff V, and Tariff D,
- Consumer numbers by class, postcode and tariff;
- Daily demand data by tariff V and D; and
- Daily EDD weather index.

These were determined by NIEIR from the previous years' data for daily demand, the corresponding daily EDD and the EDD's for one-in-two and one-in-20 peak days.

Gas sales each day are correlated with weather conditions for that day by a weather index defining EDD. The aggregate of EDD's for each day of the year gives the annual EDD, which correlates with annual sales. Urban warming in Victoria reduces the annual EDDs from its past values. Consequently, annual sales per consumer are expected to reduce due to this effect in successive years.

The NIEIR's forecast data and report were based on an econometric model from which growth rates in customer numbers and energy consumption were produced for low, medium and high economic growth scenarios for Tariff V residential, Tariff V commercial/ industrial and Tariff D consumer classes. These growth rates were applied by NIEIR to the standardised actual data to produce the forecast customer numbers and maximum daily and hourly consumption for each year in the forecast period.

6.4. Existing network operation outside of standard operating pressures

HP networks are designed to operate at 450 kPa with sufficient capacity to cater for a one-in-two winters' peak demand. At times, we can operate our networks at higher pressures (up to 515 kPa – i.e. the maximum allowable operating pressure) to cater for higher demand than anticipated. This is considered a short-term solution to network operation to minimise adverse impacts on our customers. Additional reinforcement is required in the long-term to increase network capacity to bring it back in-line with accepted industry planning standards (i.e. operating at 450 kPa).

As discussed, we are in the process of delivering a multi-year project to address elevated operating pressure within the Oakleigh High Pressure network. In winter 2016, all feeds to the Oakleigh network were set above standard operation pressures (510kPa) to ensure supply to customers. We expect to set our Oakleigh HP network at 450 kPa or lower when our proposed Oakleigh HP reinforcement project is completed in the next access arrangement period.

6.5. Augmentation Capex forecasting

6.5.1. Forecast Augmentation Projects

Our over-riding objective for each of our networks is to provide sufficient capacity to transport gas during their peak load. We plan our networks to meet supply capacities during the peak hour load that occurs for a probability of once in two years, when operating at normal pressures.

Our distribution networks are continually changing due to residential growth and commercial and industrial development. We apply computer-calibrated models to predict the operation of the networks in the field. Our models are based on one-in-two winters' peak day (i.e. 14.21[5] EDD).

We use this model of forecast gas consumption to identify the need for future network augmentation to ensure the security of supply and maintenance of fringe pressures in accordance with the Gas Safety Case and the Gas Distribution System Code.

Our Network Planning group identifies necessary augmentation by simulating forecast growth and demand, which in turn determines the appropriate timing of individual projects.

Augmentation comprises:

- Network Reinforcement – the installation of new gas mains to reinforce or back-feed areas of poor supply.
- Network Regulator capacity upgrades – the upgrading of regulating stations to allow for increased throughput of a station.
- New Network Regulating stations – the construction of new network supply points to allow for additional feeds to our networks.

A major input to augmentation planning is the winter testing program. This is a detailed pressure monitoring program that is conducted at selected locations across the network during peak load conditions. Winter testing data is then analysed and used to ensure the accuracy of network models, as well as to identify required reinforcements to ensure that network fringe pressures remain above required minimum levels, even in peak load conditions.

Our network models are validated periodically, or as required, including following a major augmentation project on the network.

6.5.2. Forecast unit rates

We used two methods to determine project costs - depending on the nature of the augmentation project.

1. **Independent Estimator – *Network Reinforcement***

   For all network reinforcement projects we engage our independent estimator – Advisian – due to the unique nature of each project. We provide Advisian with scopes for each project for the forthcoming access arrangement period from which they prepare a bottom-up estimate for each project.

   Advisian's construction estimates were developed using 'first principle' estimation techniques, industry benchmark rates and current market knowledge.

   Refer to Advisian's Independent Estimates Report for more details.

2. **Historical Unit Rates – *New or upgrade of network regulating facilities***

   When possible, our preferred method is to use actual costs from historical projects as a benchmark where we have previously undertaken comparable works. We have adopted this approach for costing all new regulating stations and the capacity upgrade of existing stations.

[5] AEMO 2012 Review of The Weather Standards For Gas Forecasting

7. Capex forecasts for forthcoming period

This section details our Augmentation capex forecasts for the forthcoming access arrangement period.

We have prepared our Augmentation capex forecast by reference to four network planning reports for the forthcoming access arrangement period:

- Oakleigh HP;
- South Melbourne HP;
- Korumburra HP; and
- Eastern HP.

Table 8 summarises our total Augmentation capex forecast for the forthcoming access arrangement period by HP network.

Table 8 – Augmentation capex forecast by HP network – 2018 to 2022 ($M, Real 2017)

	2018	2019	2020	2021	2022	TOTAL
Oakleigh HP	3.3	2.7	3.7	-	-	9.8
South Melbourne HP	-	-	-	-	1.3	1.3
Korumburra HP	-	0.8	-	-	-	0.8
Eastern HP	1.0	2.6	-	1.8	-	5.4
Total	4.4	6.1	3.7	1.8	1.3	17.3

Table 9 summarises our total Augmentation capex forecast for the forthcoming access arrangement period by asset type.

Table 9 – Augmentation capex forecast by asset type – 2018 to 2022 ($M, Real 2017)

	2018	2019	2020	2021	2022	TOTAL
Network Reinforcement	3.8	3.6	2.8	1.8	1.3	13.2
Supply Regulator Capacity Upgrades	0.5	2.6	-	-	-	3.1
New Supply Regulators	-	-	1.0	-	-	1.0
Total	4.4	6.1	3.7	1.8	1.3	17.3

The remainder of this section overviews our Augmentation capex forecast by HP network.

7.1. Legend

Our network planning reports include schematics of the relevant networks before and after reinforcement.

The following legend has been used throughout this document and in the network planning reports to depict the pressure ranges:

Below 140 kPa

Between 140 and 250 kPa

Between 250 and 350 kPa

Between 350 and 450 kPa

Greater than 450 kPa

7.2. Oakleigh HP Network

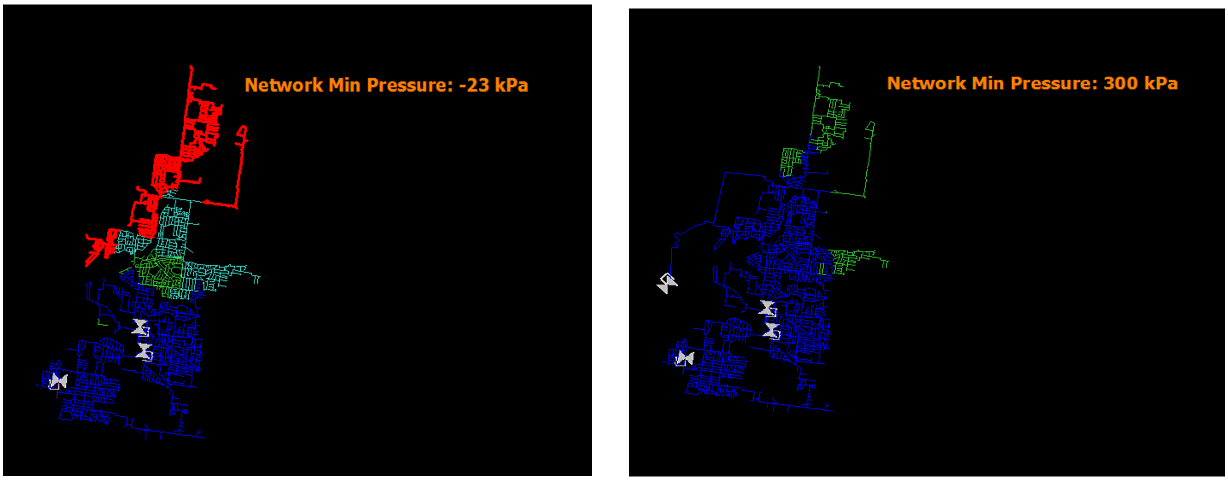
The Oakleigh HP network supplies the suburbs of Oakleigh, Box Hill, Burwood, Mt Waverley, Surrey Hills and Chadstone. The network is supplied by three field regulators.

We are currently operating the network outside of normal standard operating pressure. We increased network pressures above 490 kPa during times of high network demand during winter 2016. Notwithstanding the increased operating constraints, our network modelling shows that almost a third of the Oakleigh HP network will experience mains pressure of less than 140 kPa in winter 2018.

We have identified the need to augment the network to increase minimum pressures to maintain minimum code requirement and to allow for the operation of the network within accepted industry guidelines. Our proposed augmentation works include installing a new field regulating station in Princes Highway Oakleigh and a total of 6.7 kilometres of 300NB Steel mains interconnecting the supply point to the Oakleigh HP from 2017 to 2020. The total forecast project cost is $9.8 million.

Figure 2 details the modelled pressures of the Oakleigh HP network before and after the proposed network augmentation project. It shows minimum network pressure at the north of the Oakleigh HP network are modelled to experience pressure significantly below the targeted 140 kPa. After reinforcement, network capacity is restored (minimum pressure: 300kPa) allowing network operation at 450kPa.

Figure 2: Modelled pressures of the Oakleigh High Pressure network before and after network augmentation



The Oakleigh HP Planning Report provides further details about this project.

7.3. South Melbourne HP Network

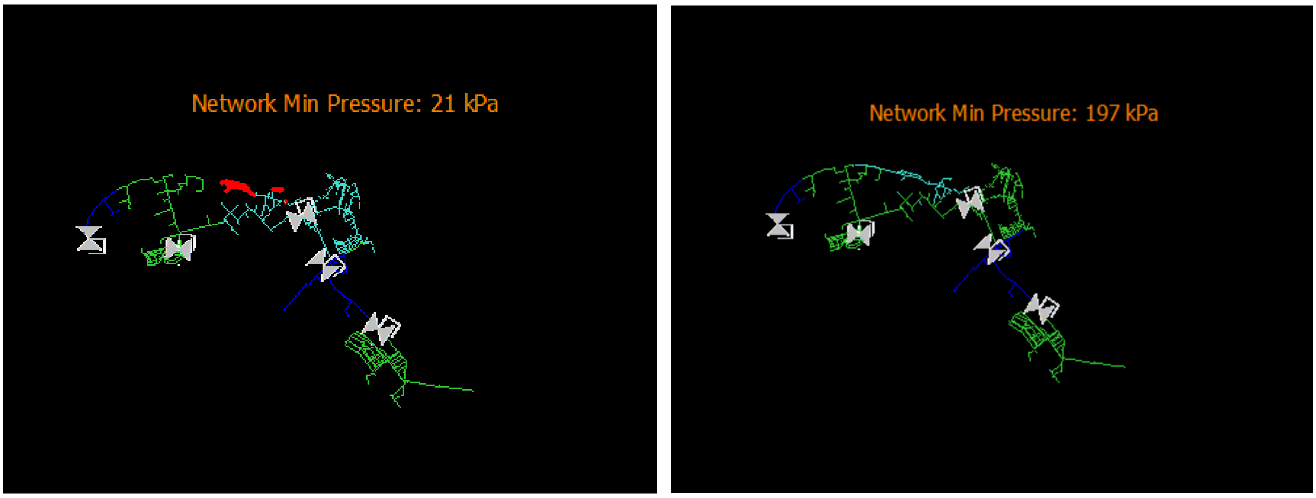
The South Melbourne HP network is supplied by five field regulators and includes the rapidly expanding areas of South Wharf, Fishermans Bend, Docklands and Yarras Edge.

Fishermans Bend is one of largest urban renewal areas in Australia. The Metropolitan Planning Authority (MPA) prepared a Strategic Framework Plan[6] to guide the future development of the Fishermans Bend Urban Renewal Area to help cater for the future growth to 2051, which includes 40,000 new dwelling over a 40-year period. The plan continues to highlight the central role the region will play in delivering new space for office, retail, tourism, education, health and cultural activities needed to support such growth.

Modelling of the South Melbourne HP network indicates network reinforcement is required in 2022 to meet Gas Distribution System Code target pressures. Proposed reinforcement includes 1.5 kilometres of 180NB polyethylene main in Lorimer Street, Fishermans Bend at a forecast cost of $1.3 million.

Figure 3 details the modelled pressures of the South Melbourne HP network before and after the proposed network augmentation project. It shows that minimum network pressure rise from a modelled 21 kPa in winter 2022 to 197 kPa following network reinforcement.

Figure 3: Modelled pressures of the South Melbourne HP network before and after network augmentation



The South Melbourne HP Planning Report provides further details about this project.

7.4. Korumburra HP network

The Korumburra HP network is an isolated HP network in the South Gippsland region that is supplied solely by Korumburra City Gate (P4-290). It supplies the towns of Korumburra, Wonthaggi and Inverloch.

We forecast the strong network growth experienced in the current access arrangement period will continue in the short to medium term, as detailed in Table 10.

Table 10 – Demand growth rates – Korumburra High Pressure Network (per cent).

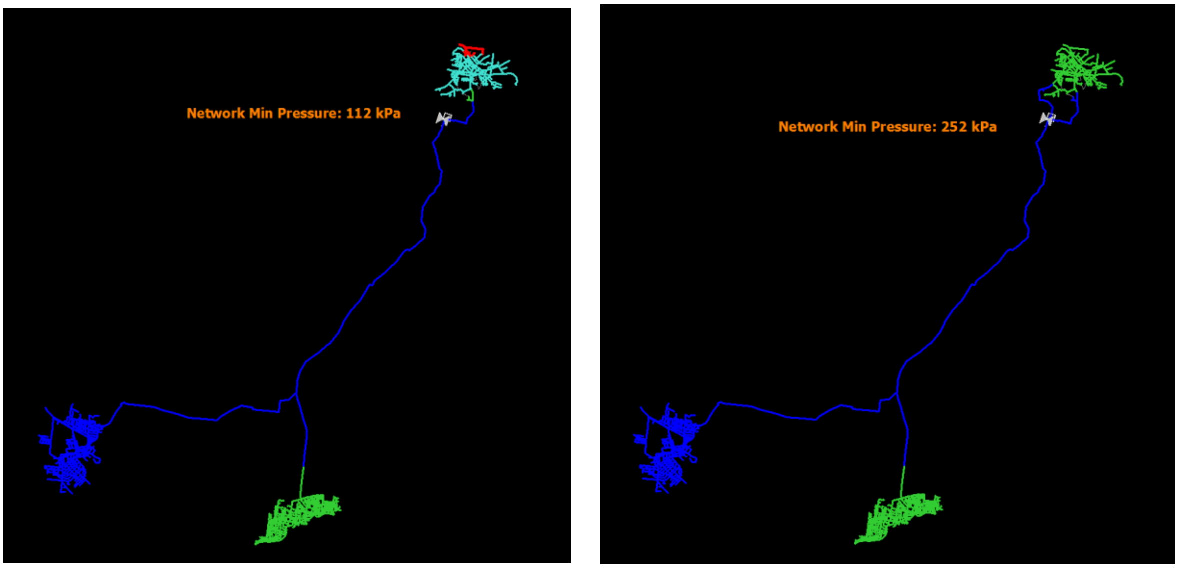
Postcode	Suburb	2016	2017	2018	2019	2020	2021	2022
3950	Korumburra	6.1	6.2	4.8	4.4	3.6	3.2	3.2
3995	Wonthaggi	7.8	8	6.3	5.8	4.7	4	3.9
3996	Inverloch	7.3	7.5	6.1	5.6	4.8	4.4	4.3

[6] Fishermans Bend Strategic Framework Plan (2015 update)

Our modelling of the Korumburra HP network indicates that network reinforcement is required in 2019 to maintain targeted minimum pressure as defined in the Gas Distribution System Code. Proposed reinforcement includes 0.5 kilometres of 100NB Steel mains and 1.9 kilometres of 125NB polyethylene in Glenview Road, Yarra Glen. We estimate the project to cost $0.8M in 2019.

Figure 4 depicts the modelled pressures of the Korumburra HP network before and after the proposed network augmentation project. It shows that minimum network pressure rise from a modelled 112kPa in winter 2019 to 252kPa following network reinforcement.

Figure 4: Modelled pressures of the Korumburra HP network before and after network reinforcement.



The Korumburra HP Planning Report provides further details about this project.

7.5. Eastern HP Network

The Eastern HP network is our largest network. It covers approximately 35 per cent of our distribution area and supplies approximately 30 per cent of our customers. It comprises four sub-networks - Ringwood HP, Knox HP, Olinda North HP and Olinda South HP. It is SCADA-controlled and is supplied by twenty field regulating stations.

Modest but steady growth within pockets of the Ringwood HP, Olinda HP and Knox HP sub-networks has resulted in supply-related network constraints. It is common for network regulating stations to be operating at levels above normal standard operating conditions (450kPa) during peak hours to maintain minimum network pressure above code requirements (140kPa).

We forecast modest growth for most suburbs for the forthcoming access arrangement period with the exception of the Olinda North and Olinda South sub-networks, where we expect to see annual growth rates of up to 4.3 per cent.

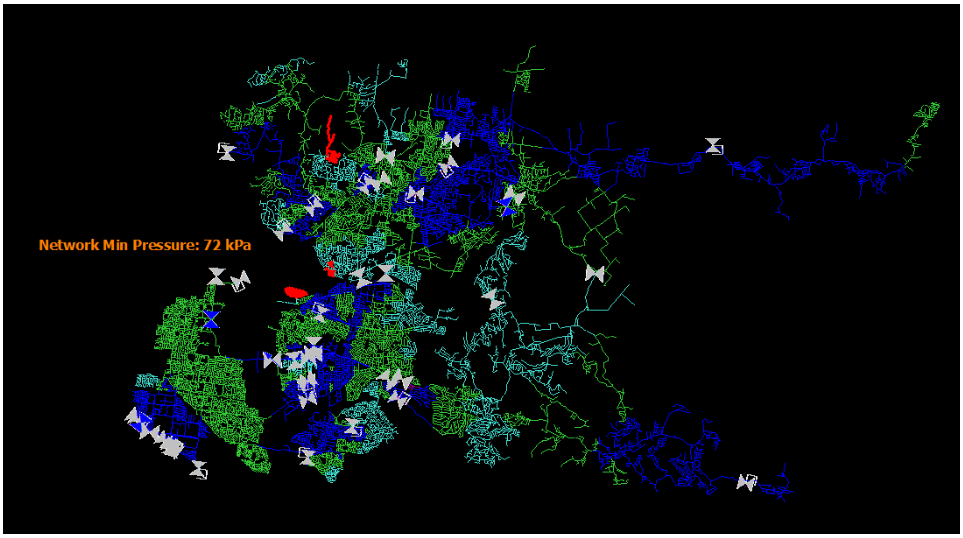
Our modelling of the Eastern HP network identifies the need for several network reinforcement projects in the Knox and Ringwood sub-networks in 2018 and in the Olinda North and Olinda South sub-networks in 2021.

In addition, five field regulators within the Eastern HP system have reached their capacity and will require upgrading in the forthcoming access arrangement period. Excessive gas flow rates through three of the five stations[7] has increased the scope of these capacity upgrades to include new supply offtakes which increases the cost of each project. Capacity upgrades are forecast from 2019 to 2020.

Figure 5 shows the modelled pressures of the Eastern HP network before and after the proposed network augmentation project in 2018. It shows that minimum network pressure rise from a modelled 72kPa in winter 2018 to 140kPa following network reinforcement.

[7] Modelled flow rates (above 80 m/s) are well in excess of 36m/s planning standard "MG Field Regulator Capacity Analysis" by OGP

Figure 5: Modelled pressures of the Eastern High Pressure network before and after network reinforcement for 2018



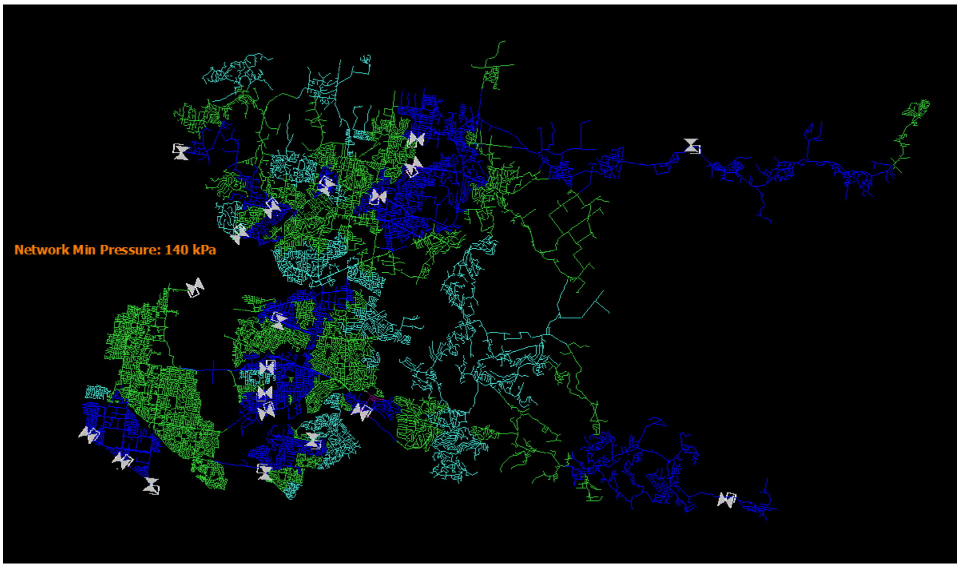
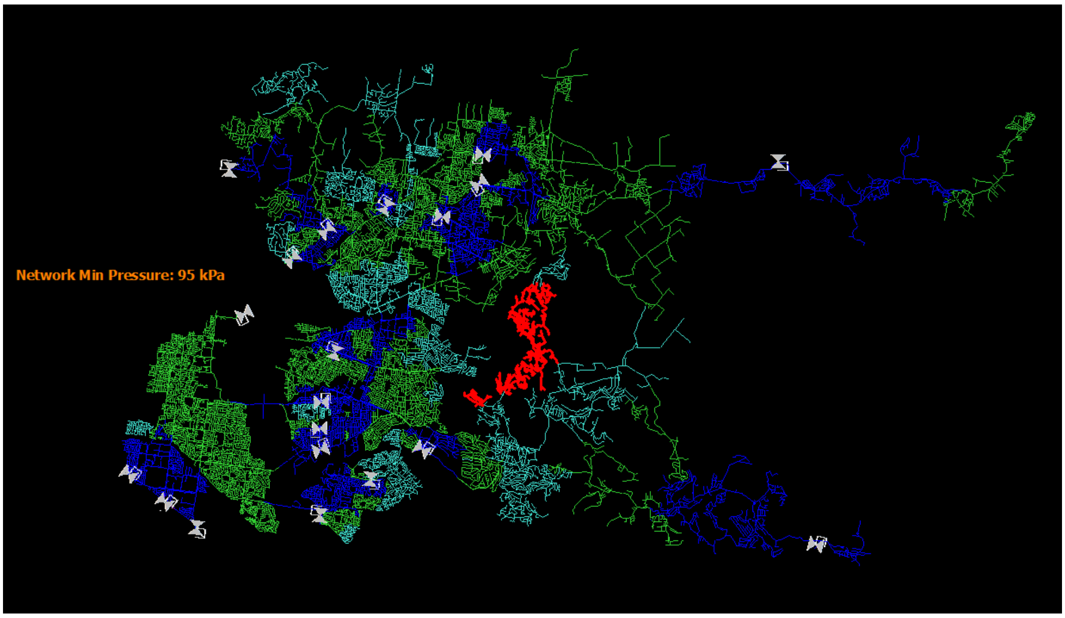
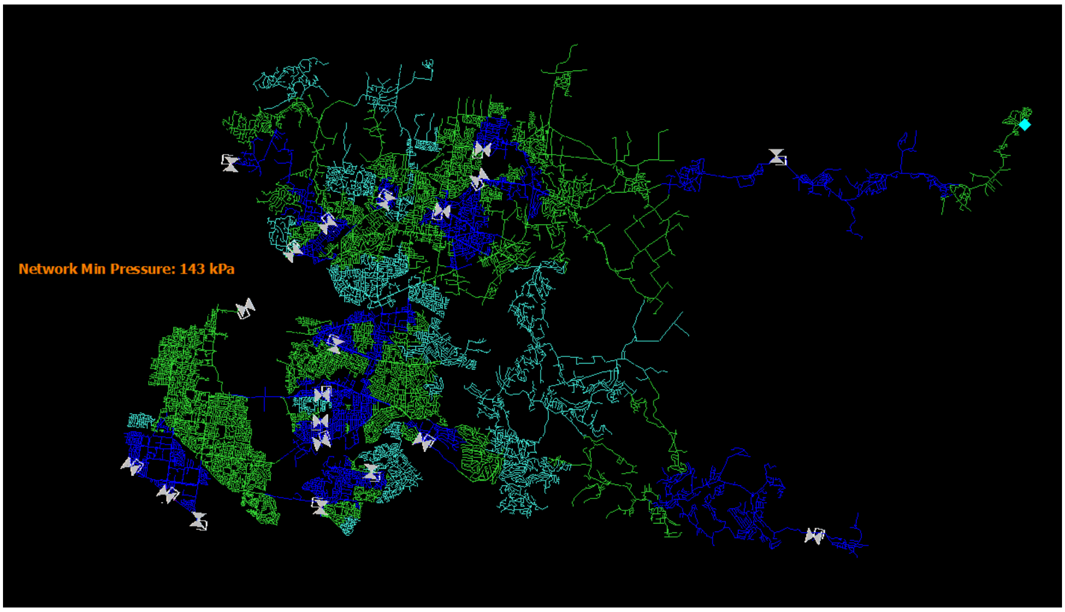


Figure 6 shows the modelled pressures of the Eastern HP network before and after the proposed network augmentation project in 2021. It shows that minimum network pressure raise from a modelled 95 kPa in winter 2021 to 143 kPa following network reinforcement.

Figure 6: Modelled pressures of the Eastern High Pressure network before and after network reinforcement for 2021





The Eastern HP Planning Report provides further details about this project.

8. Meeting Rules' requirements

This section explains and justifies our Augmentation capex forecast against the new capex criteria set out in Rule 79 of the NGR. It demonstrates that our Augmentation capex forecast is conforming capex which should be approved by the AER as part of its final decision for our forthcoming access arrangement period.

8.1. The new capex criteria

Rule 79 defines the new capex criteria as follows:

(1) Conforming capex is capex that conforms with the following criteria:

(a) the capex must be such as would be incurred by a prudent service provider acting efficiently, in accordance with accepted good industry practice, to achieve the lowest sustainable cost of providing services;

(b) the capex must be justifiable on a ground stated in subrule (2).

(2) Capex is justifiable if:

(a) the overall economic value of the expenditure is positive; or

(b) the present value of the expected incremental revenue to be generated as a result of the expenditure exceeds the present value of the capex; or

(c) the capex is necessary:

(i) to maintain and improve the safety of services; or

(ii) to maintain the integrity of services; or

(iii) to comply with a regulatory obligation or requirement; or

(iv) to maintain the service provider's capacity to meet levels of demand for services existing at the time the capex is incurred (as distinct from projected demand that is dependent on an expansion of pipeline capacity); or

(d) the capex is an aggregate amount divisible into 2 parts, one referable to incremental services and the other referable to a purpose referred to in paragraph (c), and the former is justifiable under paragraph (b) and the latter under paragraph (c).

(3) In deciding whether the overall economic value of capex is positive, consideration is to be given only to economic value directly accruing to the service provider, gas producers, users and end users.

(4) In determining the present value of expected incremental revenue:

(a) a tariff will be assumed for incremental services based on (or extrapolated from) prevailing reference tariffs or an estimate of the reference tariffs that would have been set for comparable services if those services had been reference services; and

(b) incremental revenue will be taken to be the gross revenue to be derived from the incremental services less incremental operating expenditure for the incremental services; and

(c) a discount rate is to be used equal to the rate of return implicit in the reference tariff.

(5) If capex made during an *access arrangement period* conforms, in part, with the criteria laid down in this rule, the capex is, to that extent, to be regarded as conforming capex.

(6) The AER's discretion under this rule is limited.

8.2. How the forecast meets the new capex criteria

The information presented in this Overview Document and its supporting documents demonstrates that our Augmentation capex forecast is consistent with a prudent service provider, acting efficiently and in accordance with good industry practice to achieve the lowest sustainable cost of providing services, as required by Rule 79(1). In particular, the proposed capex is necessary to comply with the following provisions of the NGR:

Primary

- Rule 79(2)(c)(iv) – The forecast capex is required to maintain our capability to meet levels of demand in those areas where the existing network is unable to satisfy peak demand and/or allow for the connection of new customers; and

Secondary

- Rule 79(2)(c)(i) to (iii) – The forecast capex is required to maintain the safety and integrity of services and to comply with regulatory obligations or requirements by maintaining network pressures above the minimum levels specified in Schedule 1 of Part A of the Gas Distribution System Code;

Given the above, the Mains Replacement capex forecast for the 2018 to 2022 access arrangement period is consistent with the National Gas Objective, in that it promotes efficient investment in natural gas services that is in the long term interests of consumers in terms of price, quality, safety, reliability and security of supply of natural gas services.

9. Supporting documentation

The following documents support our Mains Replacement capex forecast for the forthcoming access arrangement period.

- Project planning report – Oakleigh;
- Project planning reports - South Melbourne;
- Project planning reports – Korumburra;
- Project planning reports – Eastern;
- NIEIR, Natural gas, customer number and MHQ forecasts for Multinet Gas to 2026 (Calendar year basis) Volume 1
- NIEIR, Peak day, peak hour and postcode projections for Multinet Gas to 2026, Volume Two
- NIEIR, Review of EDD weather standards for Victorian gas forecasting, April 2016
- Advisian Independent Estimates Report - Augmentation and Mains Replacement Projects
- Capital Growth Strategy (MG-PL-0002)

Glossary

Abbreviations	
AAI	Access Arrangement Information
Act	*Gas Safety Act 1997*
AER	Australian Energy Regulator
Code	Gas Distribution System Code
EDD	Effective Degree Day
ESC	Essential Services Commission of Victoria
GFC	Global Financial Crisis
HP	High pressure
kPa	kilopascals
NIEIR	National Institute for Economic and Industry Research
LP	Low pressure
M	Million
MDQ	Maximum Daily Quantities
MHQ	Maximum Hourly Quantities
mm	Millimetre
MP	Medium Pressure
NGR	National Gas Rules
Opex	Operating expenditure

Attachment 1 – Allocation of Asset Costs between Capex Categories

		Capital Allocations							
Expenditure Category		Transmission & Distribution Mains	Services	Cathodic Protection	Meters[8]	Supply Regulators / Valve Stations	SCADA	IT Systems	Other
Mains Replacement	Planned and reactive replacement of distribution mains	Yes: 1. LP to HP replacement 2. MP replacement 3. Early Generation High Density Polyethylene pipe replacement 4. Reactive mains replacement.	Yes: 1. Where of a suitable standard reconnecting service after mains replacement 2. Replacement as part of the mains replacement program 3. Unplanned services renewal (i.e.~$1m pa) – not related to proactive Mains Replacement programs	No	No	Yes, installation of new supply regulators and valves	No	No	No
Customer Connections	Residential and C&I Connections	Yes, installation or extension of mains related to a new connection	Yes, installation of new service	No	Yes, purchase of new meters and installation of meters for new connections (excluding as part of the digital meter trial). (Note – purchases of new meters were previously part of Meters Capex.)	No	No	No	No

[8] For the purposes of capital allocation Meters is inclusive of the consumer service regulator.

		Capital Allocations							
Expenditure Category		**Transmission & Distribution Mains**	**Services**	**Cathodic Protection**	**Meters[8]**	**Supply Regulators / Valve Stations**	**SCADA**	**IT Systems**	**Other**
Meters Replacement	Planned and unplanned replacement of existing metering fleet	No	No	No	Yes, purchase of new meters: 1. to replace a failed meter; 2. to seed the time-expired meter program; and 3. for digital meter trial	No	No	No	No
Augmentation	Project to increase the capacity of the network	Yes, demand related mains augmentation	No	No	No	Yes, demand related regulator augmentation	No	No	No
Information Technology	-	No	No	No	No	No	No	Yes, complete IT program	No
SCADA	-	No	No	No	Yes, for vortex flow meter installations associated with supply regulators	No	Yes, complete SCADA program	No	No
Other capex	Supply Regulators – Replacement	No	Fire valve program	No	No	Yes, 1. integrity related supply regulator upgrades 2. Network valve repayment	No	No	No

		Capital Allocations							
Expenditure Category		Transmission & Distribution Mains	Services	Cathodic Protection	Meters[8]	Supply Regulators / Valve Stations	SCADA	IT Systems	Other
	Network Valves	No	No	No	No	Yes, All network valve programs	No	No	No
	Recoverable works	Various, assets created depend on project							
	Corrosion Protection	No	No	Yes, complete CP program	No	No	No	No	No
	Services / Meters	No	No	No	No	No	No	No	No
	Gas Heaters	No	No	No	No	Yes, installation / replacement of heating installations	No	No	No
	Pigging Capex	Yes, Non-piggable pipeline alteration program	No	No	No	No	No	No	No