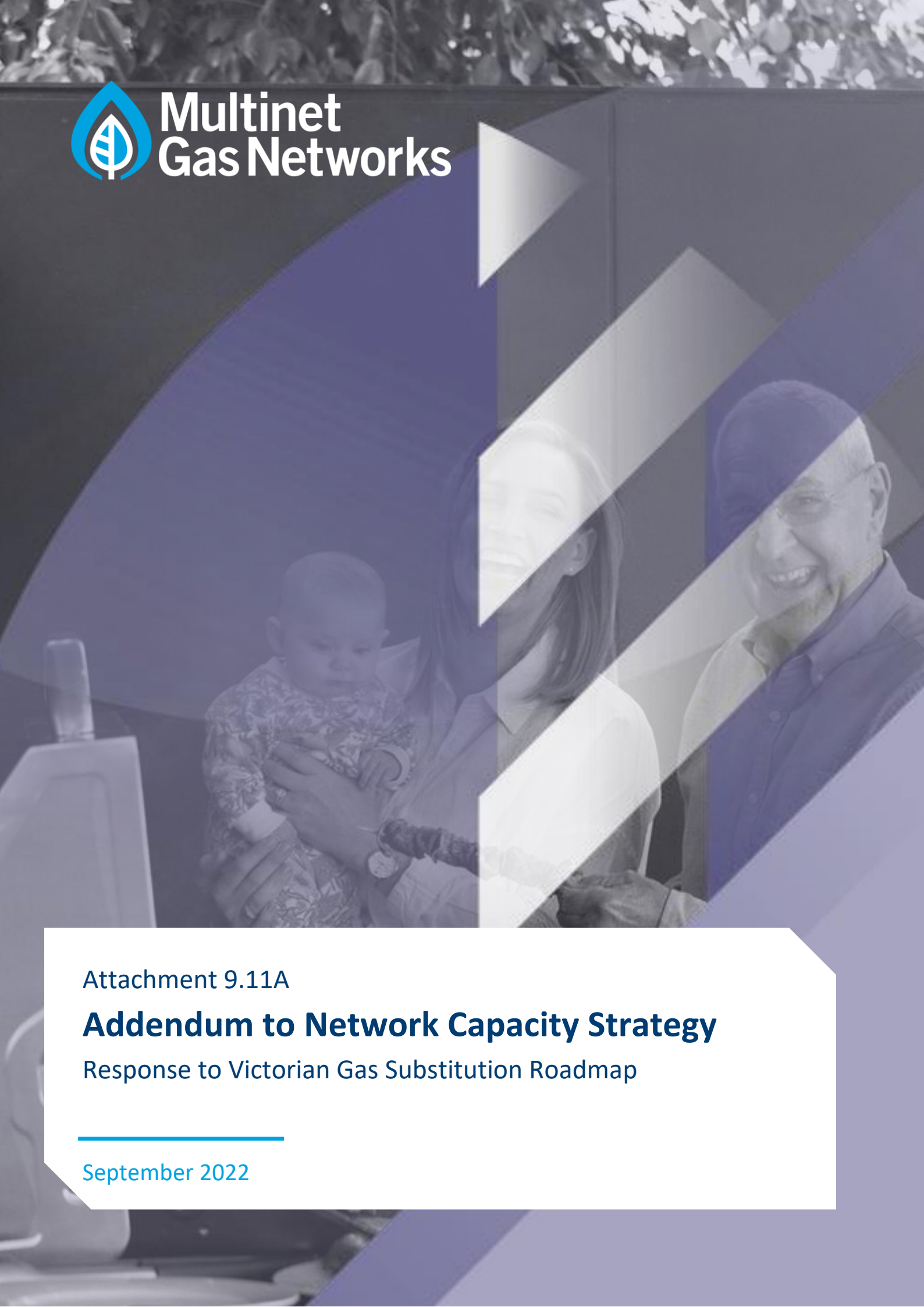

Multinet Gas Networks

Attachment 9.11A

Addendum to Network Capacity Strategy

Response to Victorian Gas Substitution Roadmap

September 2022

Multinet Gas Networks

Addendum to Network Capacity Strategy

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Executive summary

The purpose of this addendum is to provide a summary of the impacts of the Victorian Government's Gas Substitution Roadmap (GSR) on our proposed augmentation program for the next access arrangement (AA) period (July 2023 to June 2028). This Addendum should be read in conjunction with:

- Final Plan Attachment 9.11 – Network Capacity Strategy

All costs quoted in this addendum are expressed in real unescalated dollars at June 2021 unless otherwise stated.

Our GSR Response augmentation capex is $1.5 million. This is a $6.8 million (or 82%) reduction compared to our Final Plan.

TableExecSumm 1 provides a summary of the proposed augmentations in the next AA period.

TableExecSumm 1: Summary of proposed augmentations 2023/24 to 2027/28

Project	Final Plan untreated risk	Final Plan ($'000)	Final Plan Project Description	GSR untreated risk	GSR Response ($'000)	GSR Response Project Description
Augmentation Projects						
Doncaster Tooronga Link	High	6,208	Installation of 3.3 km of PE mains, a one-way valve, and the repurposing of existing steel mains	N/A	0	Project no longer required in next AA period. With the GSR demand forecast, the network should be able to maintain the required minimum pressures (under normal operational conditions) by the end of next GAAR.
Vermont/ Doncaster Reconfiguration (H42/H04)	Intermediate	145	Interconnect the Vermont and Doncaster networks at four locations and install a one way valve	Intermediate	145	Project still required. No change to project scope.
Regulator capacity upgrades						
Vermont Stage 2	Intermediate	507	Upgrade regulator and consolidating 4 runs into 2 as a part of a regulator pit upgrade.	Intermediate	507	Project still required. Asset integrity driver for project remains.

Project	Final Plan untreated risk	Final Plan ($'000)	Final Plan Project Description	GSR untreated risk	GSR Response ($'000)	GSR Response Project Description
High St	Intermediate	320	Upgrade regulator and components of the regulator pit and complete 40m of 250S HP mains extension	Intermediate	320	Project still required as this regulator is in a crucial location and even with the expected load decline, the regulator is expected to still operate over its velocity limit.
Lincoln Rd	Intermediate	295	Upgrade regulator and components of the regulator pit and complete 20m of 250S HP mains extension	Intermediate	295	Project still required as this regulator is in a crucial location and even with the expected load decline, the regulator is expected to still operate over its velocity and capacity limit during peak hour.
Blaxland Dr	Intermediate	202	Upgrade regulator and components of the regulator pit	N/A	0	Project no longer required in next AA period due to the decline in demand.
Glenfern Rd	Intermediate	289	Upgrade regulator and components of the regulator pit and complete 20m of 250S HP mains extension	N/A	0	Project no longer required in next AA period due to the decline in demand.
Azalea Ct	Intermediate	143	Upgrade regulator and components of the regulator pit	N/A	0	Project no longer required in next AA period due to the decline in demand.
East Boundary Rd	Intermediate	194	Upgrade MP regulator to HP regulator.	Intermediate	194	Project still required as it enables the mains renewal program converting MP to HP.
Total		**8,300**			**1,458**	

The purpose of our augmentation program is mitigating growth-driven delivery pressure decreases in parts of the downstream distribution network.

The two key drivers of the need for network augmentation are:

- peak hourly gas demand; and
- new connections.

Given the GSR is expected to have impacts on both the way customers use gas in their homes and businesses, and the number of new customers deciding to use gas as part of their energy mix, it will have impacts on the peak hourly gas demand and new connections across our network.

To understand these impacts, we have re-modelled adopting the GSR demand assumptions.

In summary, our analysis shows there will be one augmentation project and three regulator capacity upgrade projects no longer required in the next AA period. Refer to TableExecSumm 1 for further details.

In Section 1 of this Addendum, we provide an overview of the revisions to our augmentation program following the GSR.

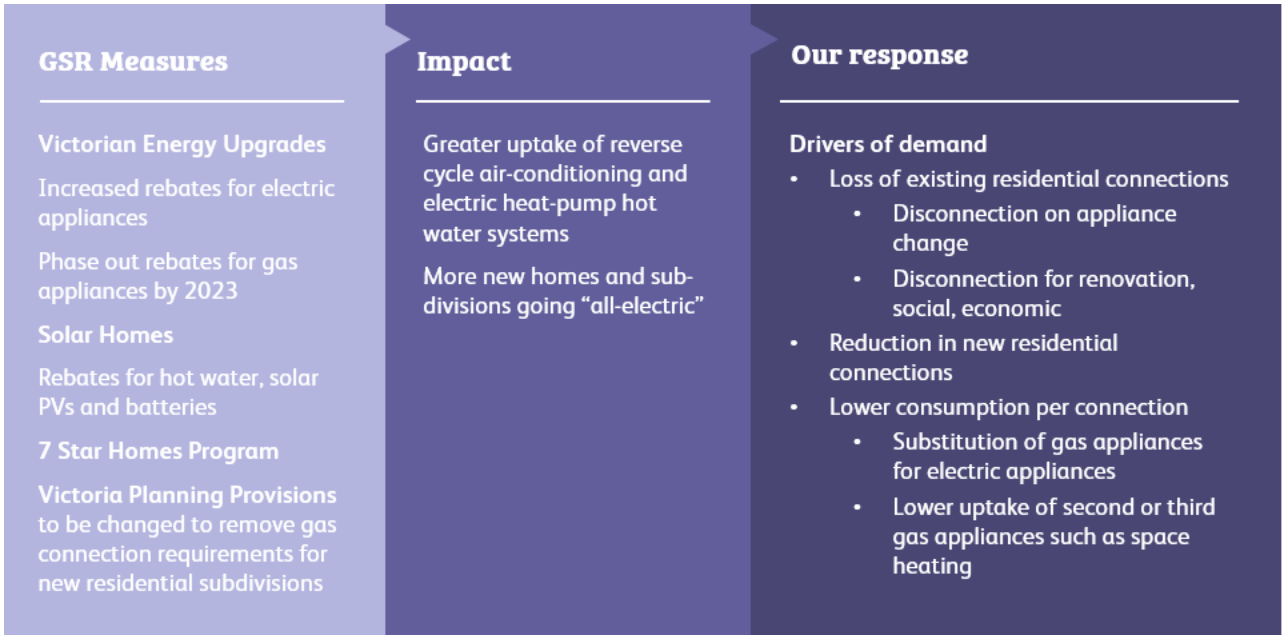
In Section 2, we provide the outcomes of network pressure modelling due to updated connection forecasts that has informed our revisions to the Final Plan augmentation capex in our GSR Response. This is set out for each of the programs in our Network Capacity Strategy.

1 Overview

1.1 Key aspects of the GSR for our plans

Figure 1.1 below summarises how we have interpreted the GSR measures into the impacts to connection forecasts for our networks over the next AA period.

Figure 1.1: Interpreting the GSR



1.2 Our approach

1.2.1 Background

Our planning methodology is outlined in Section 2.4 of Attachment 9.11 Network Capacity Strategy. We continually monitor the performance of our networks and apply calibrated computer simulated models to predict future performance. Our Network Planning group identifies necessary augmentation by simulating transmission and distribution networks with forecast load growth and demand provided, which in turn determines the appropriate timing of individual projects.

We use Synergi Gas for Computational Fluid Dynamic modelling of the gas network, which is industry standard practice. It is used to simulate gas transmission and distribution systems and to identify the need for future network augmentation to ensure the security of supply and maintenance of network pressures in accordance with code requirements.

1.2.2 Remodelling

Given the limited time available to reconsider our plans in light of the GSR, we have adopted a simplified methodology to assess the impacts on our proposed augmentation projects in the next AA period.

This methodology involves the following:

1 Application of an average combined load reduction related to lower residential new connections and existing residential customer disconnections over the next AA period.

2 Uniform distribution of the above throughout the whole of our metropolitan gas network (i.e. no consideration of individual council views).

We consider the results of this simplified methodology are similar to what we would expect to see adopting our full planning methodology.

1.2.3 Assumptions

The initial submission for the Network Capacity Strategy had a forecasted 0.32% pa average growth rate in connections over the next AA period. In our GSR Response, the revised average growth rate in connections over the next AA period is a decline of 2.49% pa.

Table 1-1: Initial residential total customer forecast

2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	Average growth 2023/24 to 2027/28
702,346	701,881	700,216	702,698	704,882	707,085	709,279	0.32%

Table 1-2: Revised residential total customer forecast

2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	Average growth 2023/24 to 2027/28
702,346	700,084	691,871	682,482	667,062	648,071	625,353	-2.49%

The total residential weighted annual load lost in our GSR Response compared to our Final Plan is a drop of 16.47% by the end of the next AA period, as shown in Table 1-3. This was derived through the initial analysis from Core Energy. Commercial loads have minimal impact therefore was not factored into the assessment

Table 1-3: Weighted annual and cumulative residential load lost compared to the initial load forecast (from the Final Plan document)

Year	Weighted annual residential load lost (compared to Final Plan)	Weighted cumulative residential load lost (compared to Final Plan)
2023/24	1.42%	1.42%
2024/25	2.39%	3.85%
2025/26	3.31%	7.29%
2026/27	3.90%	11.47%
2027/28	4.48%	16.47%

The combined load reduction related to lower new connections and existing customer disconnections averages 3.1% pa over the next AA period.

1.3 Our obligations

The distribution network must be able to adequately supply all customers during peak consumption times, during normal operating conditions. This ensures alignment with industry good practice, as well as compliance with its obligations under Schedule 1 of the Gas Distribution System Code. The code requires we use all reasonable endeavours to maintain sufficient network pressures above the targeted levels.

The likelihood of a poor pressure event is the same for each of the networks assessed to breach minimum acceptable pressures in the next AA period, and our obligations to maintain minimum delivery pressures for our gas distribution networks are applicable to all our networks, no matter the size.

The number of customers in the network drives the consequence of a poor pressure event, ultimately driving whether there is a medium or a high operational/supply risk.

In assessing the impacts of the GSR on our proposed augmentation projects in the next AA period, we have reviewed modelled network pressures under revised total connections forecasts. Where the remodelled scenario still sees the breach of minimum acceptable pressures within the next AA period, the risk assessment in the original business case remains unchanged. Where the remodelled scenario does not see the breach of minimum acceptable pressures within the next AA period, then we have considered the risk event does not materialise.

For some of the networks identified, where the primary risk event of a poor pressure event does not materialise, there is a secondary driver/risk event such us security of supply or interdependency with other programs. These are explained case by case as relevant in Section 2.

Our augmentation program is sensitive to changes in the assumptions for new residential connections and existing residential customer load reductions, therefore changes in these assumptions may change the forecast augmentation program.

1.4 Revisions to our plan for the next AA period

1.4.1 Program summary

Table 1-4 and

Table 1-5 summarise our revised augmentation proposal in response to the GSR.

Table 1-4: Summary of the augmentation proposal in response to the GSR

Project	Status	Reason	Revised Cost ($000)
Augmentation Projects			
Doncaster Tooronga Link	Removed	Given the negative growth of the demand over the next AA period, the minimum network pressure is expected to be over 140 kPa.	$ -
Vermont/Doncaster reconfiguration	No Change	Required for security of supply. Any decrease in customer volumes does not negate the need for this project.	$ 142.00
Network Regulator Capacity Upgrades			
Vermont (Stage 2)	No Change	Driver for this project was twofold – network capacity and hydraulic regulator replacement. No longer required from a network capacity perspective but the integrity driver remains. As it is integrity driven, the project will still be required.	$ 507.00
High St	No Change	Very impactful regulator currently operating well outside of acceptable limits. Load reduction within period is not expected to bring it back in line with accepted operating practices.	$ 320.00
Lincoln Rd	No Change	Very impactful regulator currently operating well outside of acceptable limits. Load reduction within period is not expected to bring it back in line with accepted operating practices.	$ 295.00
Blaxland Dr	Removed	Currently operating outside acceptable limits but load decrease is expected to rectify issues over time.	$ -
Glenfern Rd	Removed	Scope looked to address chocked flow on outlet of regulator during peak demands. Load decreases expected to reduce impacts. Project can be delayed.	$ -
Azalea Ct	Removed	Currently operating outside acceptable limits but load decrease is expected to rectify issues over time.	$ -
East Boundary Rd	No Change	Project linked to mains renewal program. Regulator to be repurposed from MP outlet to HP. Will be required to ensure supply to the HP network.	$ 194.00
			$ 1,458.00

Table 1-5: Augmentation project costs for given financial years in the next AA $'000 real 2020/21

$'000 real 2021/22	2023/24	2024/25	2025/26	2026/27	2027/28	Total
Augmentation	-	-	-	-	142	**142**
Regulator Capacity Upgrade	320	295	-	194	507	**1,316**
Total	**320**	**295**	**-**	**194**	**649**	**1,458**

1.4.2 Risk Assessment

As noted in Section 1.3 above, we have remodelled network pressures for revised growth forecasts in our GSR Response. Where the scenario still sees the breach of minimum acceptable pressures within the next AA period, the risk assessment in the original business case remains unchanged. Where the remodelled scenario does not see the breach of minimum acceptable pressures within the next AA period, we have considered the risk event does not materialise.

For some projects, we have identified a secondary driver/risk event. These are discussed where relevant.

2 Gas Substitution Roadmap Impact on Capex

2.1 Network Reinforcement – Doncaster Tooronga Link

Project Summary	
Project name	Doncaster Tooronga Link
Treated Risk	As per MGN risk matrix = **Low**
Amendments to original submission	As a result of the GSR demand forecast, the Doncaster Tooronga Link will be removed from the next AA period.
Estimated cost	The forecast direct cost (excluding overhead) during the next five-year period (July 2023 to June 2028) is $0. This is a reduction of $6,208k from our Final Plan.

$'000 real 2020/21	23/24	24/25	25/26	26/27	27/28	Total
Revised Program	-	-	-	-	-	**0**

Basis of cost estimates	All costs in this business case are expressed in real unescalated dollars at June 2021 unless otherwise stated.
Consistency with NGR	No longer applicable.
Project Approval	
Prepared by:	Linh Nguyen, Network Planning Engineer
Reviewed by:	Elsie Zhao, Senior Engineer Network Planning
Approved by:	Troy Praag, Head of Network Strategy & Planning, AGIG
Other Relevant Documents	

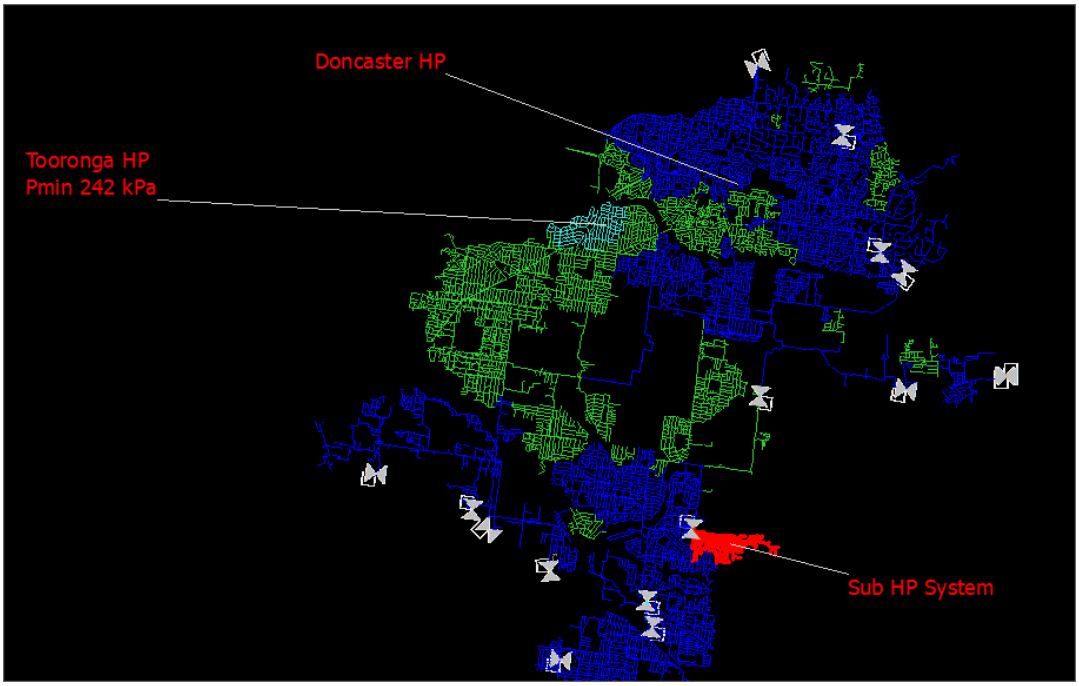
This addendum should be read in conjunction with:

- Final Plan Attachment 9.11 Network Capacity Strategy

2.1.1 Network Modelling

Tooronga and Doncaster networks were simulated using the revised cumulative growth rate of -16.47%. The result is shown in Figure 3-1. It can be observed that the minimum pressure is 242 kPa under normal operation conditions.

Figure 3-1: Network pressure profiles in 27/28



**Note: the Sub HP System is being addressed through mains replacement*

The networks are currently running higher than standard operating pressures to elevate the fringe pressures above 140 kPa, and will continually operate at this pressure until the expected load reduction enables for the regulators to be set at 450 kPa.

2.1.2 Modification to project

The Tooronga and Doncaster networks are currently operating at higher than standard operating pressures to elevate the fringe pressures above 140 kPa. However, the forecast load decrease in our GSR Response demand is expected to rectify pressure issues over time, allowing the networks to again be set at 450 kPa (standard operating pressure) within the next AA period. We therefore consider it is appropriate to monitor the risk over the next AA period, rather than installing 3.3 km of PE mains, a one-way valve, and repurposing existing steel mains as proposed in our Final Plan.

As highlighted in section 1.3, this augmentation is sensitive to changes in the assumptions for new residential connections and existing residential customer load reductions, therefore changes in these assumptions may change the forecast augmentation program for Doncaster Tooronga Link.

2.2 Network Reinforcement – Vermont Doncaster Reconfiguration

Project Summary	
Project name	Vermont Doncaster Reconfiguration
Treated Risk	As per MGN risk matrix = **Low**
Amendments to original submission	No amendments. Project is still required as it is an integrity risk. We will interconnect the Vermont and Doncaster networks at four locations and install a one way valve consistent with our Final Plan.
Estimated cost	The forecast direct cost (excluding overhead) during the next five-year period (July 2023 to June 2028) is $142k.

$'000 real 2021/22	23/24	24/25	25/26	26/27	27/28	Total
Revised Program	-	-	-	-	142	**142**

Basis of cost estimates	All costs in this business case are expressed in real unescalated dollars at June 2021 unless otherwise stated.
Consistency with NGR	This project complies with the following National Gas Rules (NGR): **NGR 79(1)** – the proposed solution is consistent with good industry practice, several practicable options have been considered, and market rates have been tested to achieve the lowest sustainable cost of providing this service. **NGR 79(2)** – proposed capex is justifiable under NGR 79(2)(c)(ii), as it is necessary to maintain the integrity of services. **NGR 74** – the forecast costs are based on the latest market rate testing and project options consider the asset management requirements as per the Asset Management Strategy. The estimate has therefore been arrived at on a reasonable basis and represents the best estimate possible in the circumstances.
Project Approval	
Prepared by:	Linh Nguyen, Network Planning Engineer
Reviewed by:	Elsie Zhao, Senior Engineer Network Planning
Approved by:	Troy Praag, Head of Network Strategy & Planning, AGIG
Other Relevant Documents	
This addendum should be read in conjunction with: • Final Plan Attachment 9.11 Network Capacity Strategy	

2.2.1 Network Modelling

While this network will have a decline in growth over the next 5 years the driver of this project is security of supply. The interconnection of the network will provide a backfeed to a singular fed area which currently puts approximately 800 connected customers, including one high risk site (a retirement village) at risk of loss of supply.

2.2.2 Modification to project

As noted above, the load reduction does not change the risk to security of supply that exists in this network, therefore it is appropriate for the project to be delivered in the next AA period as planned.

2.3 Network Regulator Capacity Upgrades

Project Summary	
Project name	Network Regulator Capacity Upgrades
Treated Risk	As per MGN risk matrix = **Low**
Amendments to original business case	Vermont Stage 2 still required. Driver changes from security of supply to asset integrity. No amendments to High St, Lincoln Rd and East Boundary Rd regulator upgrades. Blaxland Dr, Glenfern Rd and Azalea Ct projects no longer required in the next AA period.
Estimated cost	The forecast direct cost (excluding overhead) during the next five-year period (July 2023 to June 2028) is $1,316k. This is a reduction of $634k compared to our Final Plan.

$'000 real 2021/22	23/24	24/25	25/26	26/27	27/28	Total
Revised Program	320	295	-	194	507	**1,316**

Basis of cost estimates	All costs in this business case are expressed in real unescalated dollars at June 2021 unless otherwise stated.
Consistency with NGR	This project complies with the following National Gas Rules (NGR): **NGR 79(1)** – the proposed solution is consistent with good industry practice, several practicable options have been considered, and market rates have been tested to achieve the lowest sustainable cost of providing this service. **NGR 79(2)** – proposed capex is justifiable under NGR 79(2)(c)(ii), as it is necessary to maintain the integrity of services. **NGR 74** – the forecast costs are based on the latest market rate testing and project options consider the asset management requirements as per the Asset Management Strategy. The estimate has therefore been arrived at on a reasonable basis and represents the best estimate possible in the circumstances.
Project Approval	
Prepared by:	Linh Nguyen, Network Planning Engineer
Reviewed by:	Elsie Zhao, Senior Engineer Network Planning
Approved by:	Troy Praag, Head of Network Strategy & Planning, AGIG

Other Relevant Documents

This addendum should be read in conjunction with:

- Final Plan Attachment 9.11 Network Capacity Strategy

2.3.1 Vermont Stage 2

2.3.1.1 Network Modelling

The drivers for this project in our Final Plan were both network capacity and hydraulic regulator end-of-life replacement. Under the GSR Response demand forecast, the project is no longer required from a network capacity perspective, but the integrity driver remains unchanged.

2.3.1.2 Modifications to project

The risk event identified in our Final Plan remains unchanged and therefore the Vermont Stage 2 project is required as planned. Specifically, the risk of not replacing the end-of-life Grove regulators is caused by inability to source some critical spares required for their maintenance and absence of technical support with these models no longer supported by the manufacturer.

2.3.2 High St

2.3.2.1 Network Modelling

The capacity required at this site is 25,000 m^3/h and the current design allows for a flow of 11,330 m^3/h at 36 m/s. The gas velocity at the sites are currently well in excess of the 36 m/s design standard. Even with the forecasted cumulative load reduction of 16.5% in the next 5 years, the regulator will still have capacity issues whilst meeting the design standard. The regulator is also located in a very significant location and currently operating well outside of acceptable limits. Load reduction within period is not expected to bring it back in line with accepted operating practices.

2.3.2.2 Modifications to project

The risk event identified in the original strategy remains unchanged. Therefore there is no change to the upgrade of the High St regulator and components of the regulator pit and completion of 40m of 250mm Steel HP mains extension.

2.3.3 Lincoln Rd

2.3.3.1 Network Modelling

Through the analysis it was determined that this regulator is exceeding 36 m/s velocity to achieve the 25,000 m^3/h, and that the regulators were passing 80% design capacity. The current design capacity of the regulator is 11,110 m^3/h and the required capacity for this regulator set is 26,000 m^3/h at gas velocities below 36 m/s. Even with the load reduction of 16.5% in 5 years, the regulator will still have capacity constraints, and therefore upgrade is required.

2.3.3.2 Modifications to project

The risk event identified in the original strategy remains unchanged. Therefore, there is no change to the upgrade of the Lincoln Rd regulator and components of the regulator pit and completion of 20m of 250mm Steel HP mains extension. This project has already commenced and is anticipated for completion of works by 2024.

2.3.4 Blaxland Dr

2.3.4.1 Network Modelling

The regulator at Blaxland Dr is currently operating outside acceptable limits. However, the forecast load decrease in our GSR Response demand is expected to rectify issues over time, meaning the regulator can be monitored over the next AA period.

2.3.4.2 Modifications to project

The identified risk of exceeding 80% capacity is no longer expected to materialise in the next AA period. Instead of undertaking the proposed regulator upgrade, we will continue to monitor the regulator at Blaxland Dr.

As noted at 1.3 above, our augmentation program is sensitive to changes in the assumptions for new residential connections and existing residential customer load reductions, therefore changes in these assumptions may change the forecast augmentation program.

2.3.5 Glenfern Rd

2.3.5.1 Network Modelling

The regulator at Glenfern Rd has a risk of choked flow on the outlet of regulator during peak demands. However, the forecast load decrease in our GSR Response demand is expected to reduce peak demands, and therefore this reduce this risk.

2.3.5.2 Modifications to project

The load decreases in our GSR response are expected to reduce the identified risk of choked flow on outlet of regulator during peak demands. Instead of undertaking the proposed regulator upgrade, we will continue to monitor the regulator at Glenfern Rd.

As noted at 1.3 above, our augmentation program is sensitive to changes in the assumptions for new residential connections and existing residential customer load reductions, therefore changes in these assumptions may change the forecast augmentation program.

2.3.6 Azalea Ct

2.3.6.1 Network Modelling

Azalea Ct regulator is currently exceeding the design velocity of 36m/s. The load decreases in our GSR response are expected to see Azalea Ct regulator again operate below the maximum velocities.

2.3.6.2 Modifications to project

The load decreases in our GSR response would reduce the risk event identified in the next AA period to acceptable levels. Rather than upgrade the Azalea Ct regulator in the next AA period, we will monitor it closely.

As noted at 1.3 above, our augmentation program is sensitive to changes in the assumptions for new residential connections and existing residential customer load reductions, therefore changes in these assumptions may change the forecast augmentation program.

2.3.7 East Boundary Rd

2.3.7.1 Network Modelling

The East Boundary Rd regulator upgrade is not impacted by the GSR. The upgrade of the regulator to repurpose from MP outlet to HP is linked to our mains replacement program. The regulator will be required to ensure supply to the HP network providing up to 15,000 m3/h. It is also an end-of-life Grove regulator.

2.3.7.2 Modifications to project

The risk event identified in the original strategy remains unchanged. Therefore, there is no change to the upgrade of the East Boundary Rd regulator to be repurposed from MP outlet to HP.

2.3.8 Summary

In response to the GSR, four of our regulator upgrade projects are still required in the next AA period, while three would no longer be required in the next AA period.

The revised costs for the regulator upgrades is $1,316k.

The projects that remain as planned are:

- Vermont Stage 2 regulator upgrade;
- High Street regulator upgrade;
- Lincoln Rd regulator upgrade; and
- East Boundary Rd regulator upgrade.

There has been no changes to the timing of the regulator upgrades that are still required.

The projects that are no longer required in the next AA period, and have been removed from our GSR Response capex are:

- Blaxland Dr regulator upgrade;
- Glenfern Rd regulator upgrade; and
- Azalea Ct regulator upgrade.

With an average annual load reduction of 3.1% over the next 5 years, it is expected that these regulator upgrade projects are not required. As noted at 1.3 above, our augmentation program is sensitive to changes in the assumptions for new residential connections and existing residential customer load reductions, therefore changes in these assumptions may change the forecast augmentation program.