

Gas Network

Network Planning Report – Bendigo PUBLIC

Friday, 10 June 2022

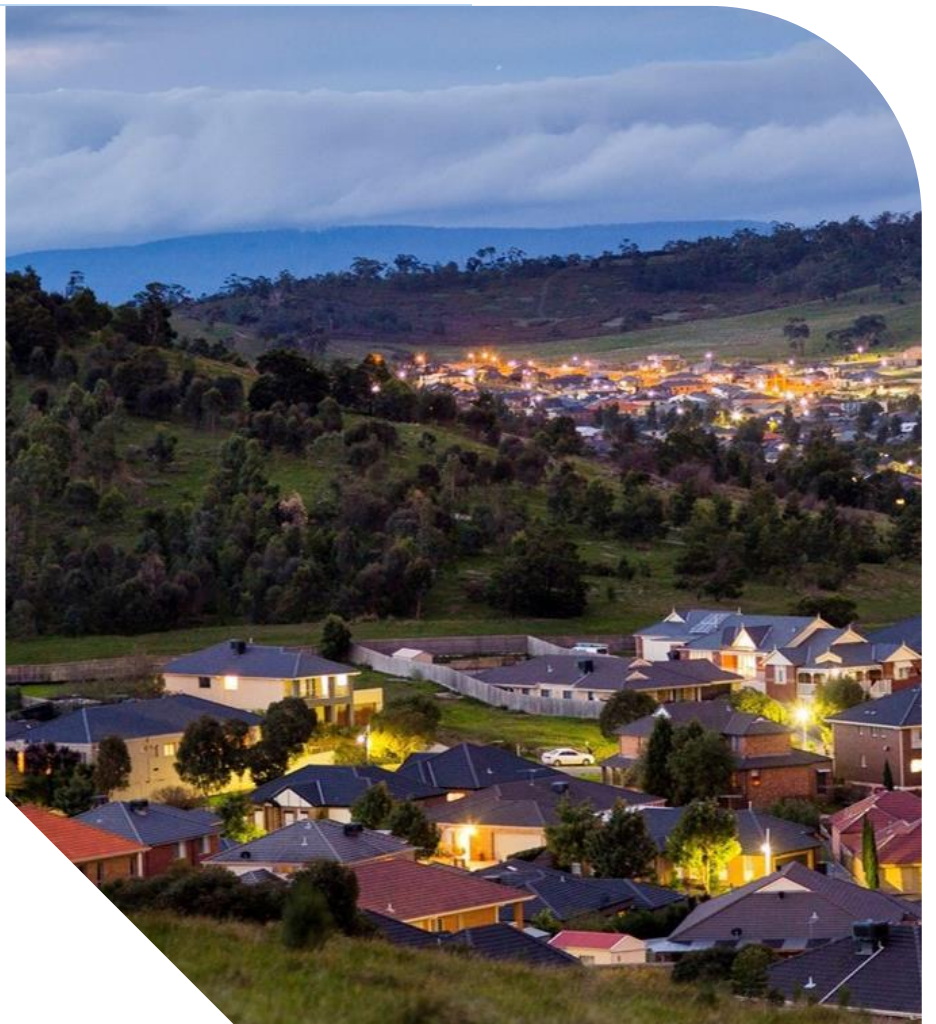
Document number: AMS 30-17-Bendigo

Issue number: 1

Status:

Approver:

Date of approval:



ISSUE / AMENDMENT STATUS

Issue Number	Date	Description	Author	Approved by
1.0	Jul 2020	Document Finalised	T Nguyen	

Disclaimer

This document belongs to AusNet Services and may or may not contain all available information on the subject matter this document purports to address.

The information contained in this document is subject to review and AusNet Services may amend this document at any time. Amendments will be indicated in the Amendment Table, but AusNet Services does not undertake to keep this document up to date.

To the maximum extent permitted by law, AusNet Services makes no representation or warranty (express or implied) as to the accuracy, reliability, or completeness of the information contained in this document, or its suitability for any intended purpose. AusNet Services (which, for the purposes of this disclaimer, includes all of its related bodies corporate, its officers, employees, contractors, agents and consultants, and those of its related bodies corporate) shall have no liability for any loss or damage (be it direct or indirect, including liability by reason of negligence or negligent misstatement) for any statements, opinions, information or matter (expressed or implied) arising out of, contained in, or derived from, or for any omissions from, the information in this document.

Contact

This document is the responsibility of AusNet Services.
Please contact the indicated owner of the document with any inquiries.

AusNet Services
Level 31, 2 Southbank Boulevard
Melbourne Victoria 3006
Ph: (03) 9695 6000

Table of contents

Executive Summary	4
1. Network Overview	5
2. Network Performance	6
3. Network Modelling	8
4. Recommendations	10
4.1. Options considered	10
4.2. Option 1 – Do Nothing / No Capital expenditure	10
4.3. Option 2 – High Pressure network reinforcements	10
4.4. Option 3 – Looping of existing Bendigo transmission pipeline	13
4.5. Benefit Assessment	15
5. Capital expenditure summary	16

Executive Summary

The Bendigo gas network will be unable to support projected gas consumption growth and would require a network reinforcement by 2025/26 to boost network capacity in affected areas to maintain adequate minimum network pressure and complying with Gas distribution code minimum obligated pressure.

Recommendation - FY25/26

- Construction of [C.I.C] of 180mm polyethylene at Napier St & Powell St intersection to tie-in to Bobs St.
- Construction of [C.I.C] of 63mm polyethylene from 63mm poly pipe at along Bakers Ln from Guys Hill Rd to Taylors Ln

1. Network Overview

The Bendigo gas network is one of AusNet Services' largest regional High Pressure (HP1) networks. It is currently being solely supplied by Bendigo City Gate through a lateral transmission pipeline of 200mm steel with an MAOP of 1,900kPa supplying two downstream HP1 field regulators for the entire Bendigo gas distribution network.

Bendigo network is experiencing continued residential development and expansion of network away from existing field regulator supply sources. The recent network expansion to Huntly township North East of Bendigo as a new town network further extended the network fringes, combined with continue developments have continued to cause supply pressure decline in the network.

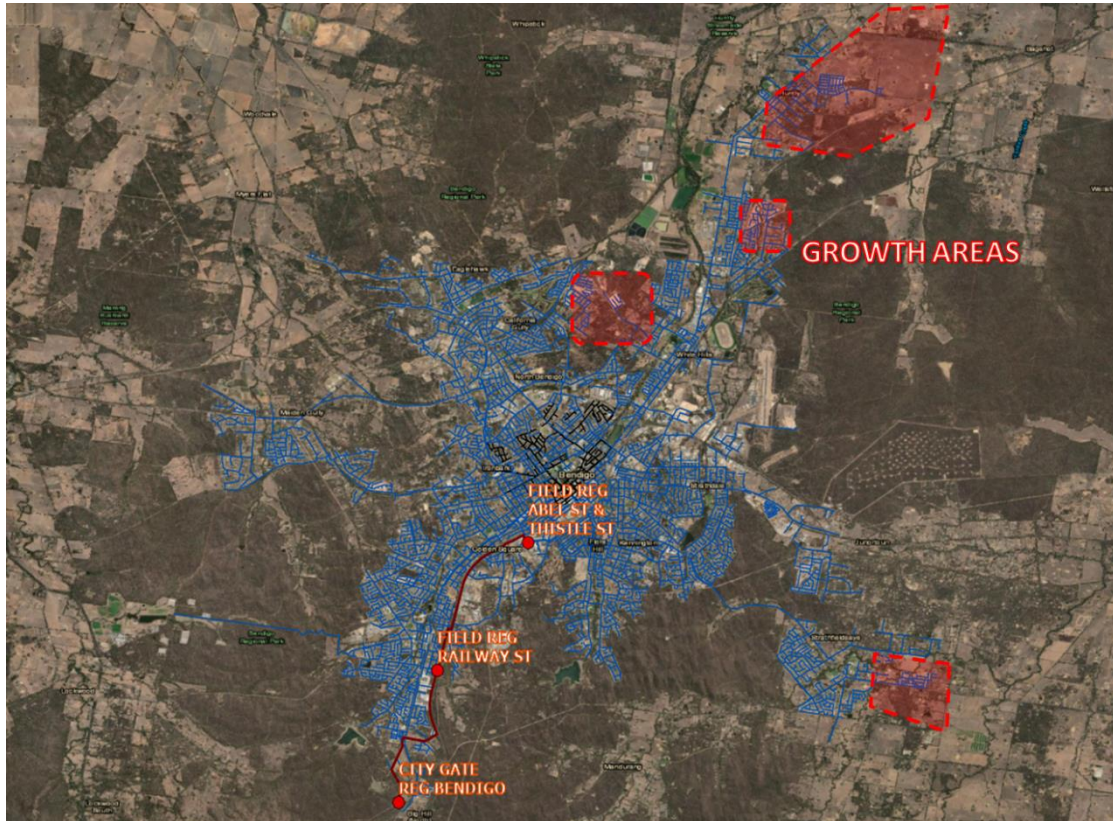


Figure 1: Bendigo gas distribution network overview

2. Network Performance

With the continued growth in Bendigo areas, the existing lateral transmission pipeline have been experiencing supply pressure decline of the inlet pressure to downstream critical HP1 field regulators, with the most impact at “Abet St” field regulator, falling to approximately 800kPa from 1,850kPa during peak demand periods. This pressure deterioration has been impacting on the downstream field regulators performance, reducing its outlet pressure required to maintain adequate supply pressure in the network. Furthermore, “Abel St” field regulator is also supplying the majority of Bendigo network and its growth areas combined with the current limited output capacity of “Abel St” field regulator have resulted in the low network pressures in recent years.

The chart below details the number of instances of low network pressure experienced in the Bendigo downstream regulators in recent years during winter periods as of August 2020.

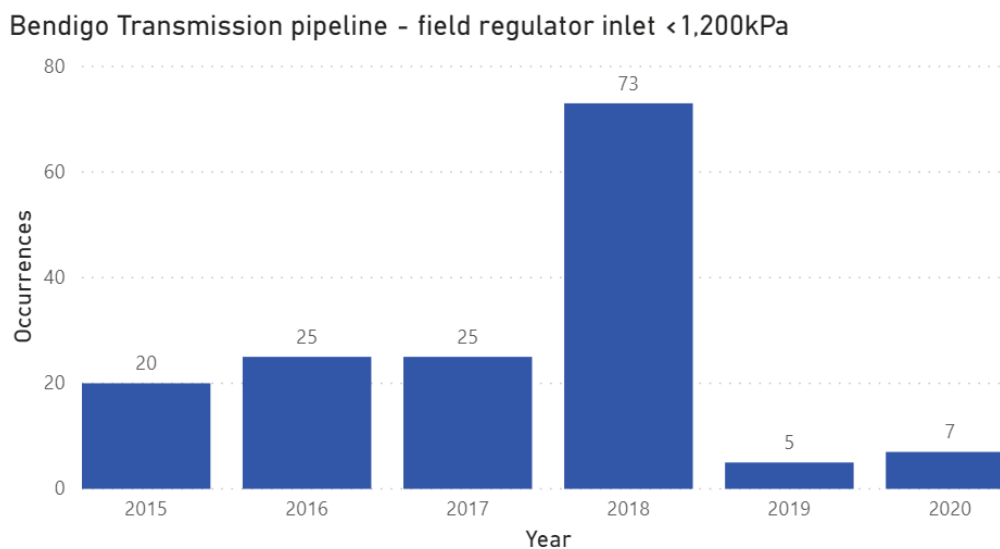


Figure 2: Bendigo's transmission pipeline performance issues

The above chart shows the reduction in instances when the transmission pipeline's capacity experienced shortfall in 2019. This is due the non-expenditure initiative completed of raising Bendigo's City Gate outlet pressure from 1,750kPa to 1,850kPa. Even though this has improved capacity in the Bendigo's transmission network, winter 2020 has seen increasing instances of low inlet pressure and with the continued growth in Bendigo areas, the capacity reduction is forecasted to increase year by year, affecting the safety and reliability of Bendigo's network supply.

The low inlet pressures to “Abel St” field regulator shown above have caused its outlet pressure settings to be limited to below 450kPa at maximum during peak periods, hence unable to be temporarily raised higher to alleviate the impact of peak demand. This outlet pressure limitations have resulted in decreasing network pressures in the Bendigo fringes. The chart below details the instances of low fringe network pressure experienced in the Bendigo network in recent years as of August 2020.

Bendigo Network Pressure Deterioration - Lowest 10 Fringe Pressures

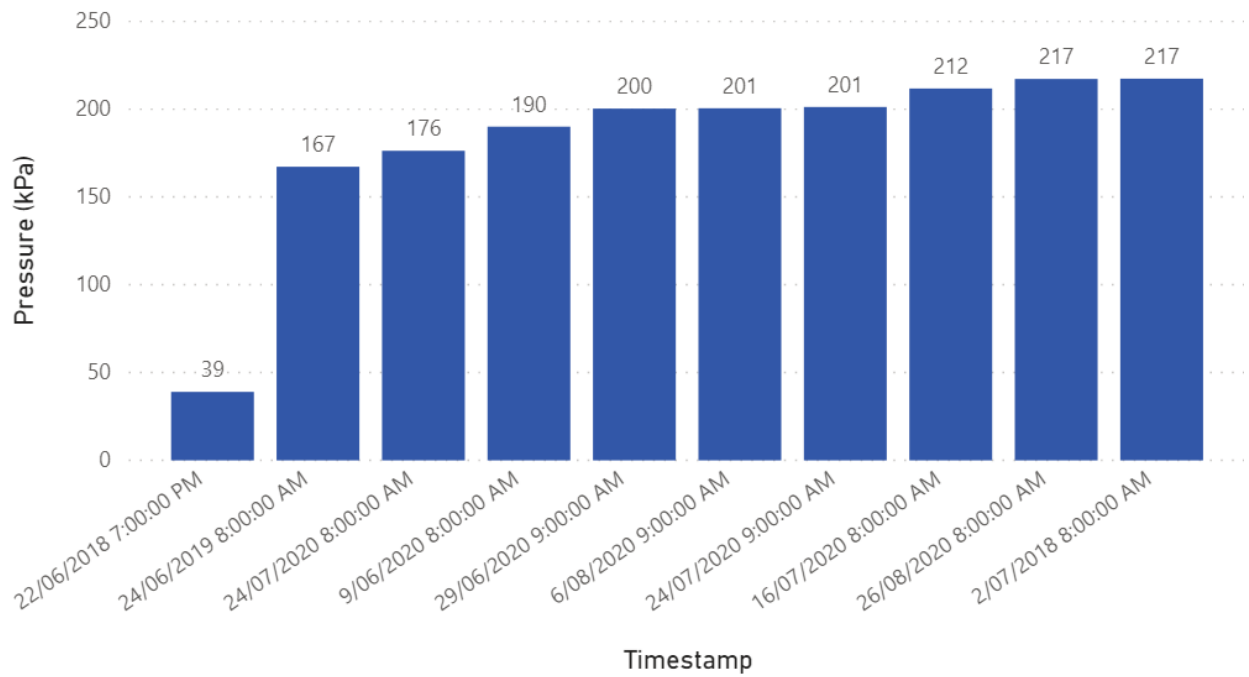


Figure 3: Bendigo fringes network pressure deterioration

The major contributing factors of capacity constraints in the Bendigo network include:

- Capacity limitations in the existing 200mm steel transmission pipeline supplying Bendigo's field regulators for the distribution network.
- Continued growth in the Bendigo North-East and South-East's growth corridor.

3. Network Modelling

Network model for the Bendigo High Pressure network is matched with latest analysis of the network using SCADA monitoring, and fringe pressures in 2020.

The matched model illustrates the affected areas at the Bendigo fringes as shown below.

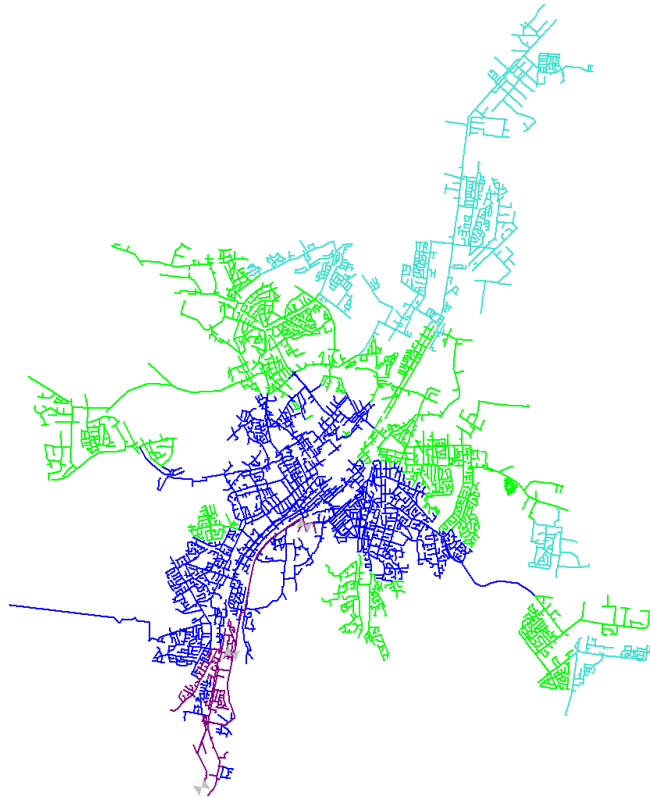


Figure 4: Bendigo model - winter 2020

Growth Forecasts rates provided Finance Data Analytics team in AusNet Services' Finance department for the Bendigo are as shown in table below.

Table 1: Bendigo Growth Rate Forecast

Postcode	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28
3556	1.16%	0.32%	0.40%	0.32%	0.39%	0.39%

Modelling the growth forecast rates above, the forecast minimum network pressures and estimated number of customer impact for the regulatory period can be obtained and detailed below:

Table 2: Bendigo forecasted minimum pressure and customer impact

BENDIGO	2022/23	2023/24	2024/25	2025/26
Minimum pressure (kPa)	146	140	131	Reinforcement required
Customer impact (no.)	0	0	840	-

Based on the consumption growth forecast, the Bendigo network will be unable to support projected gas consumption growth and would require a network reinforcement by 2025/26 to boost network capacity in affected areas, in order to maintain adequate minimum network pressure and be compliant with Gas distribution code.

4. Recommendations

4.1. Options considered

Several options were considered to increase the Bendigo network capacity, which include

Table 3: Options Description Summary

OPTION	DESCRIPTION SUMMARY
1	No Capital Expenditure
2	Downstream high-pressure network reinforcement
3	Looping of existing Bendigo's transmission pipeline

4.2. Option 1 – Do Nothing / No Capital expenditure

With the current one directional transmission pipeline operating at MAOP of 1,900kPa, there is no further current non-capital expenditure option of increasing flow capacity and address pressure issues to Bendigo network.

This is not an acceptable solution.

4.2.1. Cost Estimations

The cost of the Do Nothing option is to accept a system capacity shortfall and hence affecting the safe and reliable supply of the Bendigo distribution network.

Total capital expenditure = \$0

4.2.2. Capacity

Capacity limitations still existing with this option and capital expenditure cannot be deferred.

4.3. Option 2 – High Pressure network reinforcements

This reinforcement solution targets the most impacted fringe areas in the Bendigo high pressure network located at the North-Eastern and South-Eastern areas and increase the network capacity required to maintain above minimum obligated pressure during peak demand periods. This is achieved by constructing critical supply mains to direct capacity towards to the affected fringe and increase supply pressure.

Network Reinforcement work comprises of:

- Construction of [C.I.C] of 180mm polyethylene from 150mm steel pipe at Napier St & Powell St intersection to tie-in to existing 150mm steel pipe at 83 Bobs St, Bendigo.
- Construction of [C.I.C] of 63mm polyethylene from 63mm poly pipe at along Bakers Ln from Guys Hill Rd to Taylors Ln.

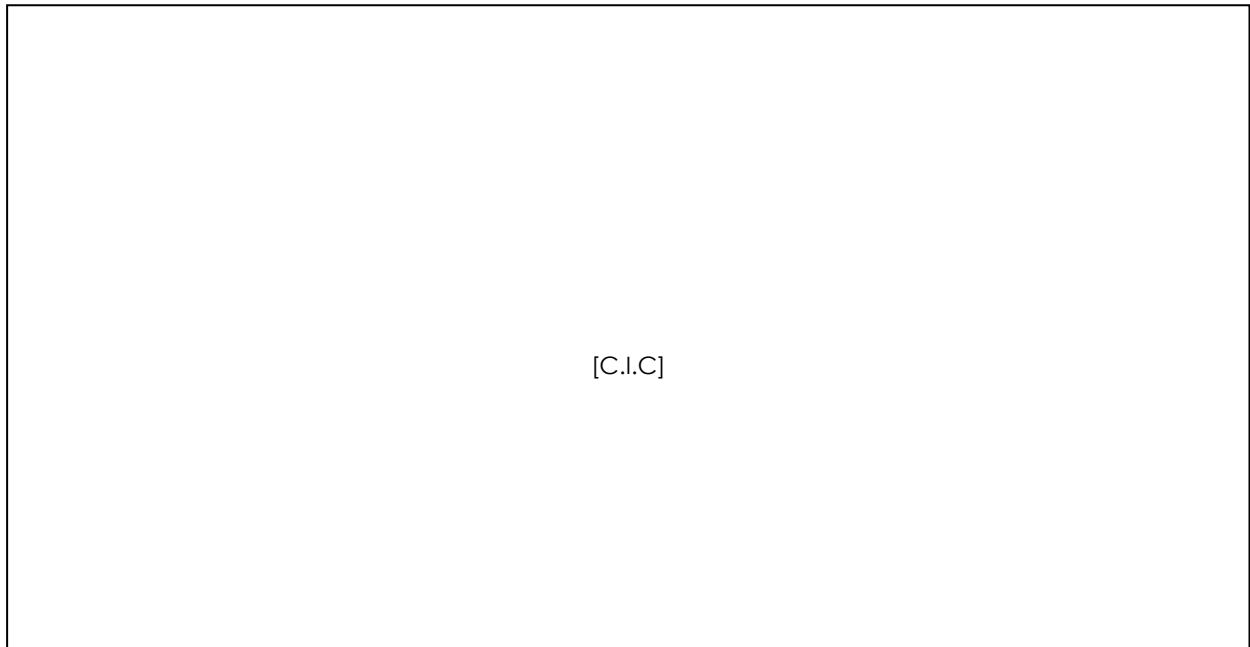


Figure 5: Bendigo reinforcement - Option 2

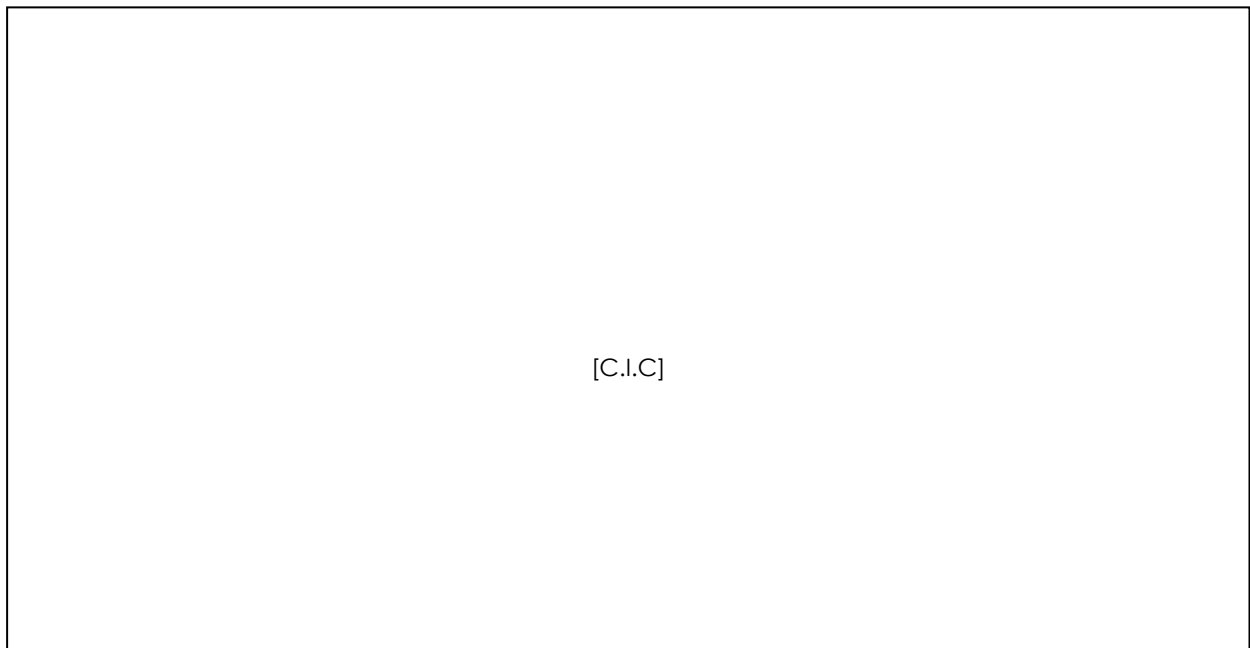


Figure 6: Bendigo reinforcement - Option 2

4.3.1. Cost Estimations

[C.I.C]

4.3.2. Capacity

Table 4: Option 2 – Bendigo Identified Network Reinforcement

2025/26 Forecast Minimum Pressure	Affected Customers	REINFORCEMENT SUMMARY	Post Reinforcement Minimum Pressure
130kPa	840	[C.I.C] HP1 180mm polyethylene pipe [C.I.C] HP1 63mm polyethylene pipe	186kPa

Table 5: Bendigo Forecast Minimum Network Pressures

2022/23	2023/24	2024/25	2025/26	2026/27	2027/28
146kPa	140kPa	131kPa	186kPa	184kPa	182kPa

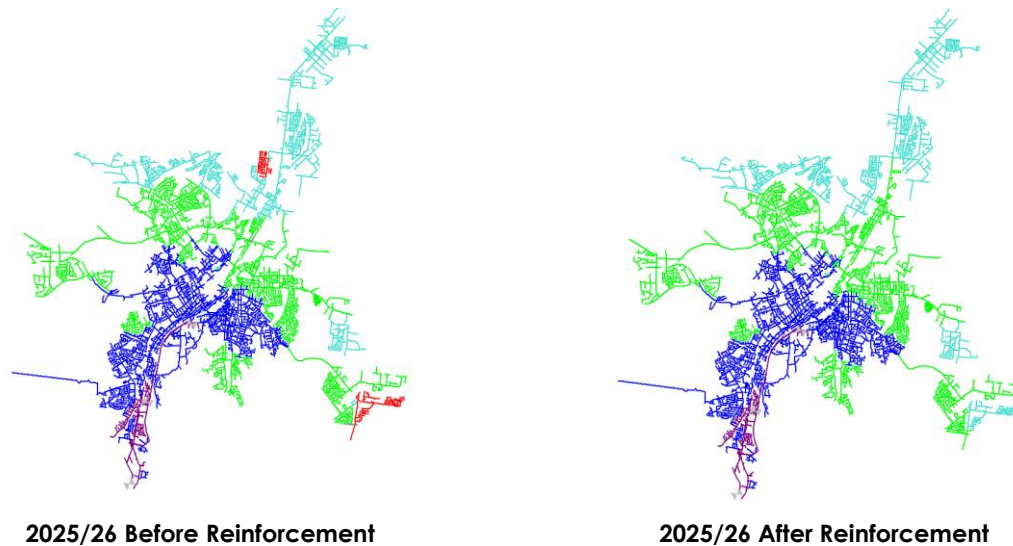


Figure 7: Bendigo before and after augmentation

4.4. Option 3 – Looping of existing Bendigo transmission pipeline

Looping the existing 200mm Bendigo's transmission pipeline for approximately 2,000 metres with 250mm Steel pipe from the outlet of Bendigo City Gate at Bendigo East considerably increases flow capacity in the network and inlet pressure to the most impacted field regulator namely Abel St field regulator, hence allowing Abel St field regulator to perform at its 100% capacity and be raised higher than 450kPa during peak demand periods to alleviate poor pressures issue at Bendigo network fringes to meet gas distribution code.

Network Reinforcement work comprises of:

- Pipe looping of [C.I.C] of 250mm Steel from existing Bendigo's City Gate

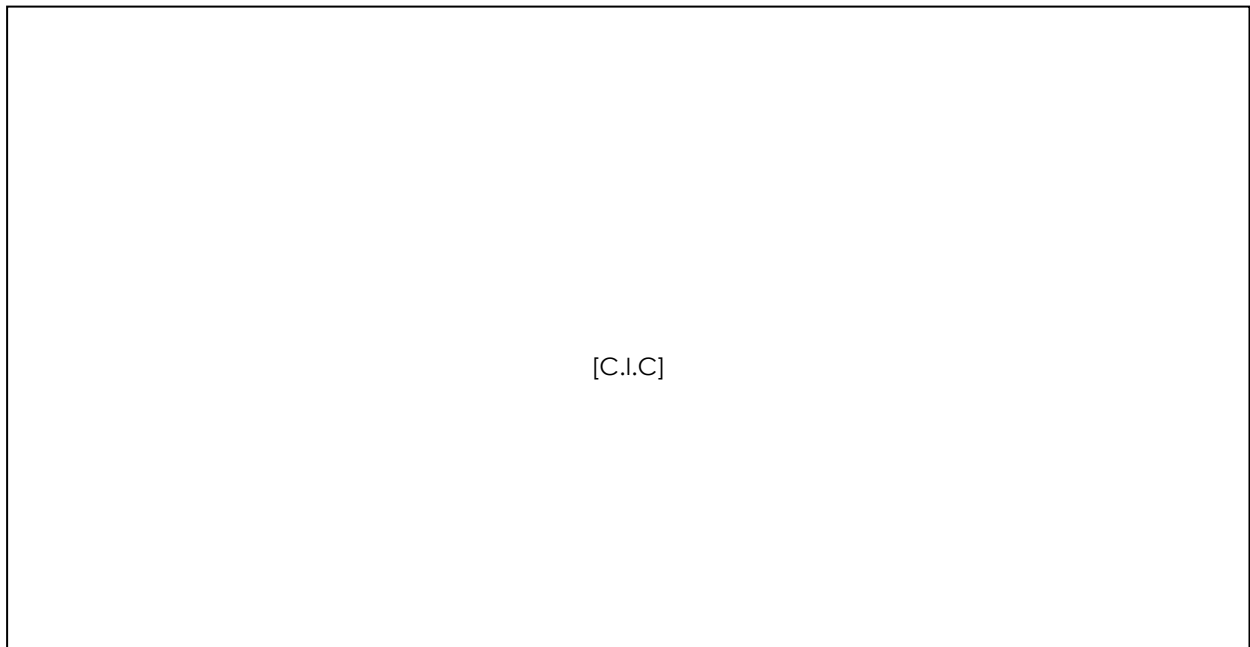


Figure 8: Bendigo reinforcement - Option 3

4.4.1. Cost and benefit analysis

[C.I.C]

4.4.2. Capacity

Table 6: Option 3 - Bendigo Identified Network Reinforcement

2025/26 Forecast Minimum Pressure	Affected Customers	REINFORCEMENT SUMMARY	Post Reinforcement Minimum Pressure
130kPa	840	[C.I.C] TP 250mm steel pipe	177kPa

Table 7: Bendigo Forecast Minimum Network Pressures

2022/23	2023/24	2024/25	2025/26	2026/27	2027/28
146kPa	140kPa	131kPa	177kPa	175kPa	173kPa

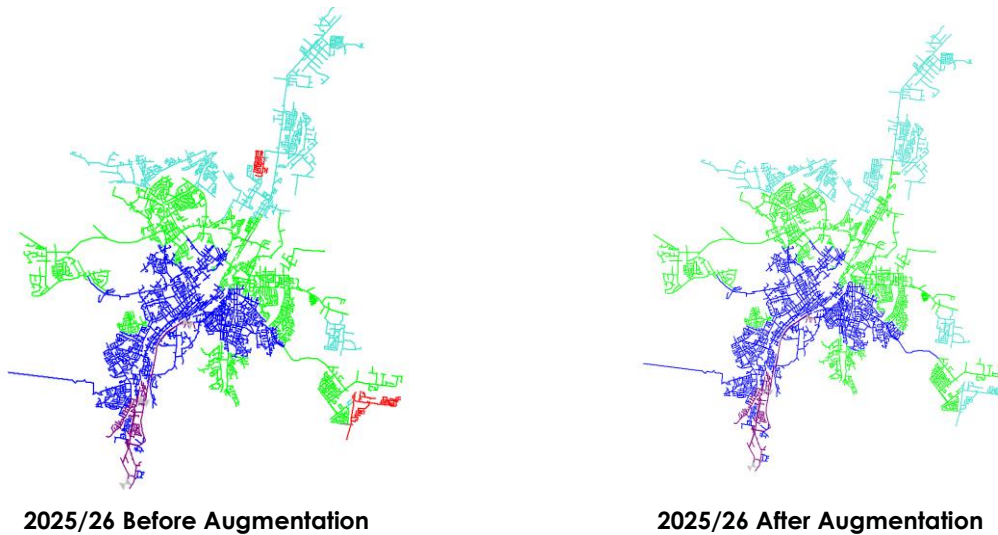


Figure 9: Sunbury before and after augmentation

4.5. Benefit Assessment

The preferred solution is Option 2 which involves the high-pressure mains reinforcement with [C.I.C] metres and [C.I.C] metres of 180mm and 63mm polyethylene pipe, respectively. This augmentation is considered the most cost-effective solution to augment the capacity of the Bendigo network and would be required to be in service by FY2025/26.

Table 8: Options Assessment Summary

OPTION	BENEFITS	COSTS (\$2020)
Option 1	Nil.	Continue accepting Bendigo capacity shortfall and low fringe pressures during peak periods. Compromised safety and reliability of existing network.
Option 2	Preferred solution – This option is recommended to address the current pressure constraints in the downstream high-pressure network at a lower unit rate cost reinforcement at High pressure compared to transmission pressure reinforcement.	[C.I.C]
Option 3	This option would provide long term solution to current Bendigo's transmission network capacity limitations. However, this would be at a significant cost due to the high unit rate of transmission pressure pipeline construction. Furthermore, due the complexity of transmission pipeline's regulatory and safety requirements, there would be a substantially longer project time than a typical distribution high pressure reinforcement of option 2, across all project stages including planning, design, construction, and completion. Therefore, this option is not a preferred option compared to option 2.	[C.I.C]

5. Capital expenditure summary

Table 9: Capital Expenditure Summary

	2023-24	2024-25	2025-26	2026-27	2027-28	2023-28 TOTAL
			[C.I.C]			

AusNet Services

Level 31
2 Southbank Boulevard
Southbank VIC 3006
T +613 9695 6000
F +613 9695 6666
Locked Bag 14051 Melbourne City Mail Centre Melbourne VIC 8001
www.AusNetservices.com.au

Follow us on

 @AusNetServices

 @AusNetServices

 @AusNet.Services.Energy

AusNet

