AusNet

Gas Network

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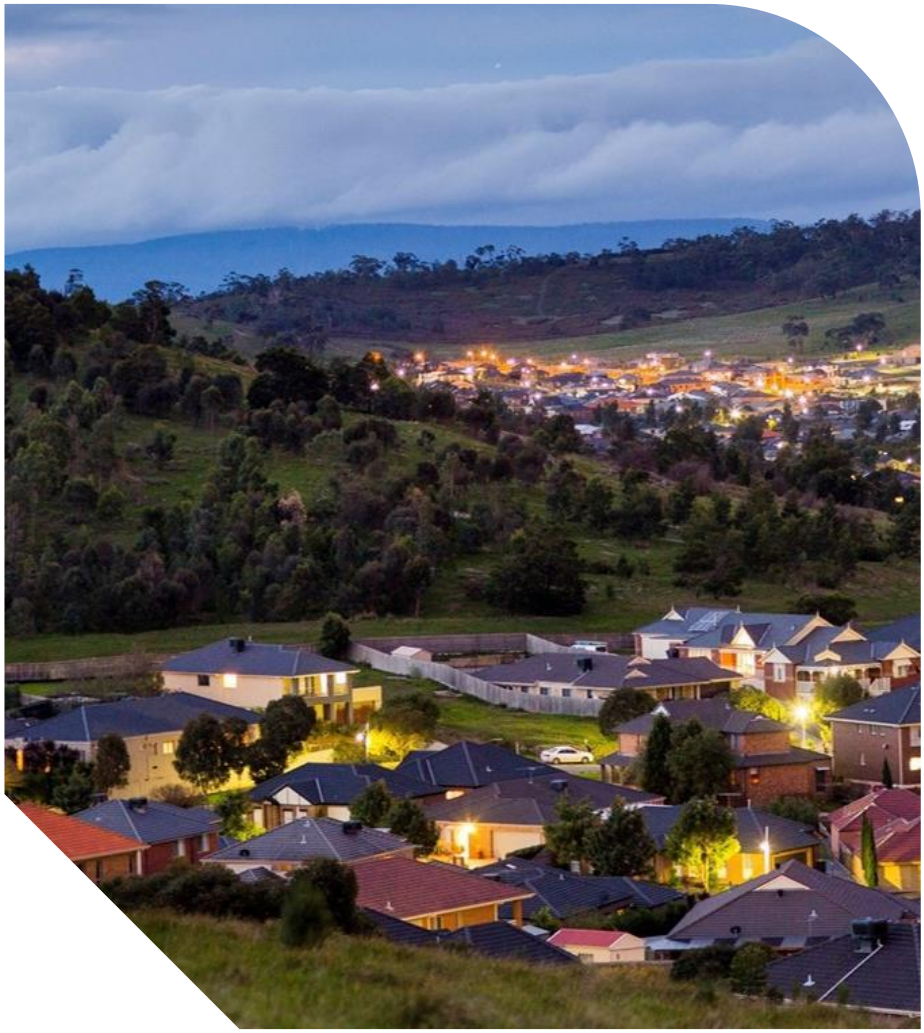

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AusNet Services
Level 31, 2 Southbank Boulevard
Melbourne Victoria 3006
Ph: (03) 9695 6000

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Executive Summary

The Craigieburn gas network is part of AusNet Services' Northern Metropolitan High Pressure (HP1) network currently experiencing continued strong growth and expansion in the in the Hume growth corridor. As a result, the Craigieburn HP1 will be unable to support projected gas consumption growth and would require a network reinforcement by FY2024/25 to increase network capacity required in affected areas to maintain adequate minimum network pressure complying with Gas distribution code.

Recommendation - FY24/25

- Construction of a new proposed City Gate on Mt Ridley Road in Mickleham
- Construction of [C.I.C] of 180mm polyethylene pipe to supply existing network

1. Network Overview

The Craigieburn gas network is part of AusNet Services' metropolitan High Pressure (HP1) network in the Northern region. It is currently being supplied predominantly by a single HP1 field regulator located in the South East of Craigieburn at "Potter Street" Field Regulator.

The northern Growth Corridor of Craigieburn has and is experiencing substantial development and the fringe locations continuingly expanding outwards away from existing supply regulator, as a result supply pressures are declining.

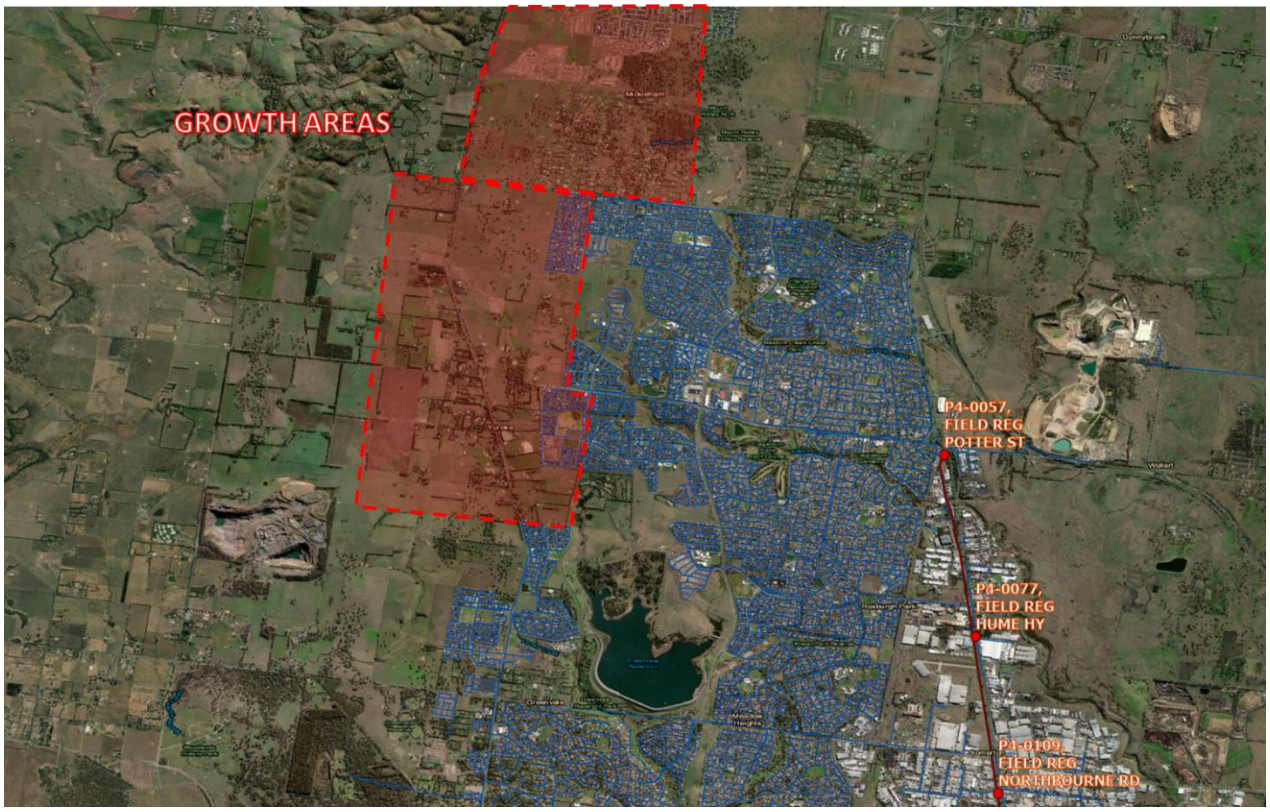


Figure 1: Craigieburn gas distribution network overview

2. Network Performance

As a result of continued significant growth in the Hume growth areas of Craigieburn and Mickleham, during winter peak demand periods, network pressures have been experiencing significant increase in low pressures events dropping below gas distribution code of 140kPa minimum. This has been resulting in frequent outages in the fringe pockets within this network. The chart below details the instances of low network pressure events experienced in the Craigieburn areas in recent years as of August 2020.

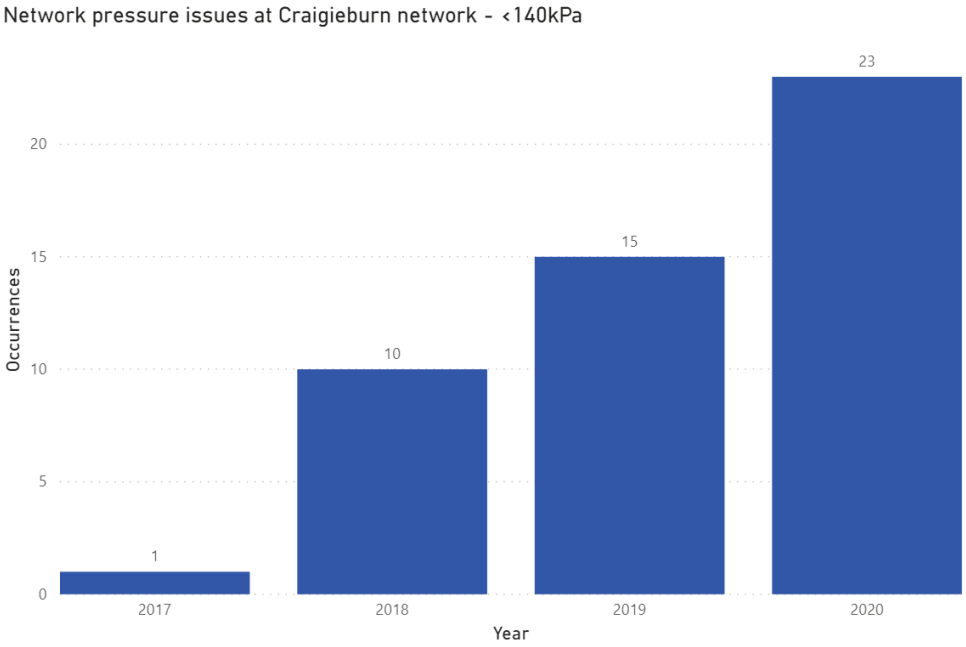


Figure 2: Craigieburn fringes network low pressure instances

The chart below details the instances of actual low network pressures experienced in the Craigieburn network in recent years as of August 2020.

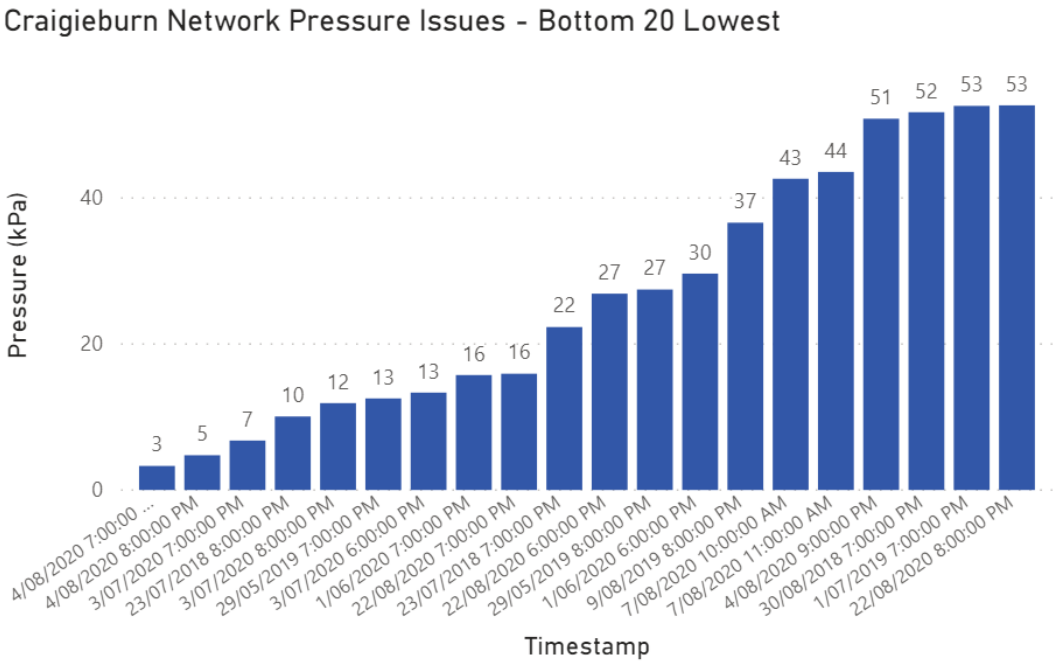


Figure 3: Craigieburn lowest fringe pressure instances

The increasing number of low fringe network pressure instances shown above falling below gas distribution code of 140kPa minimum, have been resulting in increasing number of customer supply affected since 2017, showing the current insufficient reliability of the Craigieburn network.

The contributing factors to capacity constraints in the Craigieburn network include:

- Limited number supply source with a single field regulator Potter St supplying the entire growing Craigieburn network.
- Small diameter supply mains outlet of closest city gate namely Potter St of 150mm steel pipe.
- Rapidly expanding network fringes with continued exponential growth in the Hume growth corridor.

3. Network Modelling

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

The construction of 4,000m of additional 180mm P10 large diameter supply main along Mickleham Road completed in October 2020 has delivered greater capacity to the western and northern fringes raising minimum pressure from approximately 8.5kPa to 164kPa to be above gas distribution code minimum requirement as shown in network model below.

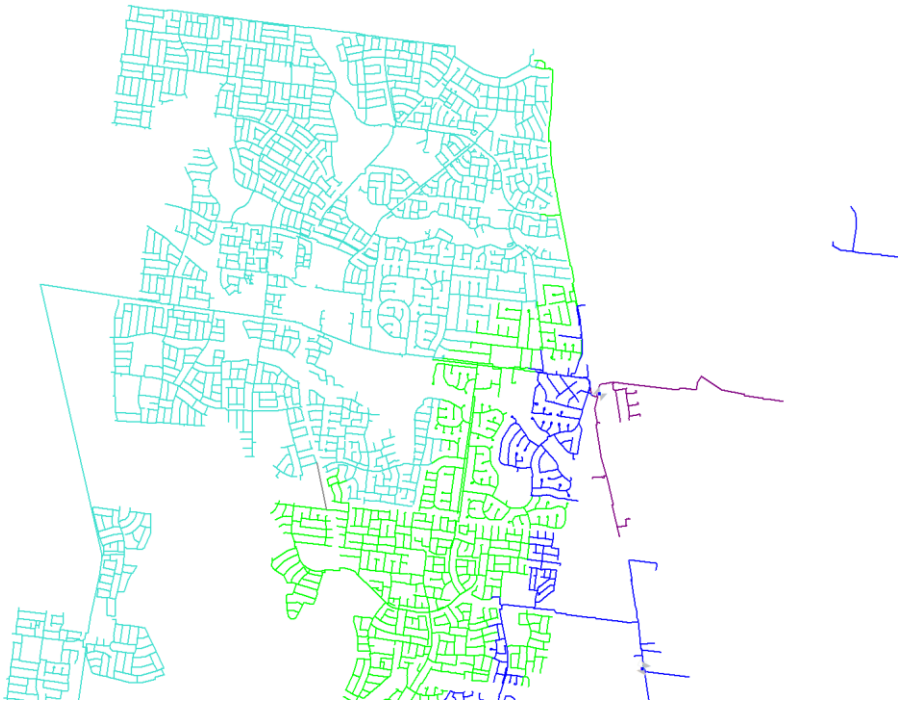


Figure 4: Craigieburn model - winter 2020

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

Table 1: Cragieburn Growth Rate Forecast

Postcode	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28
3064	5.47%	2.54%	2.55%	2.55%	2.52%	2.52%

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: Cragieburn forecasted minimum pressure and customer impact

CRAGIEBURN	2021/22	2022/23	2023/24	2024/25
Minimum pressure (kPa)	164	141	107	Reinforcement required
Customer impact (no.)	0	0	6,200	0

Based on the consumption growth forecast, the Craigieburn network will be unable to support projected gas consumption growth and would require a network reinforcement by FY2024/25 to boost network capacity in affected areas to maintain adequate minimum network pressure complying with Gas distribution code.

4. Recommendations

4.1. Options considered

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

Table 3: Options Description Summary

OPTION	DESCRIPTION SUMMARY
1	No Capital Expenditure
2	New City Gate and pipeline reinforcement
3	Expansion of nearby Craigieburn City Gate and pipeline reinforcement

4.2. Option 1 – Do Nothing / No Capital expenditure

The current Craigieburn network's supply source is at Potter St field regulator and all non-capital expenditure options have been utilised to alleviate pressure issues in the Craigieburn network including:

- Increase of Potter St's outlet pressure to maximum allowable pressure of 510kPa
- Raising Potter St's outlet pressure during off-peak period to improve line pack capacity during peak.

These measures have all been unsuccessful to adequately maintain minimum pressures in the Craigieburn network and increasing outages have been occurring.

The consequence of accepting this option is that any pressure at or above the 500kPa threshold accelerates the wear of the regulator components. It is therefore not recommended from a safety and engineering standard perspective to operate the regulator at or above 500kPa for an extended period of time.

This option is not acceptable based on safety and engineering concerns.

4.2.1. Cost Estimations

Raise Craigieburn City Gate outlet pressure to 510kPa

- The cost of the non-capital expenditure option is to accept safety risk from regulator failures due to the acceleration of deterioration of the regulator components.

Total capital expenditure = $0

4.2.2. Capacity

The benefits of the non-capital expenditure option are the deferred capital expenditure..

4.3. Option 2 – New City Gate and pipeline reinforcement

As APA's construction of the Western Outer Ring Main (WORM) is to be completed by the end of 2023 and this pipeline is proposed to pass through the Hume growth corridor and will cross Mickleham area. This would enable a new City Gate to be constructed along this pipeline and be connected to existing Craigieburn network along Mt Ridley Road. This would address current capacity shortfall in the Craigieburn growing network and provide long term capacity solution to capture the entire projected Hume growth corridor, ensuring safe and reliable supply to the Craigieburn network.

Network Reinforcement work comprises of:

- Construction of a new proposed City Gate on Mt Ridley Road in Mickleham at the intersection of Mt Ridley Rd and Parkland Cres.
- Construction of [C.I.C] of 180mm polyethylene pipe to supply existing network along Mt Ridley Rd and tie-in to 180mm polyethylene pipe at Mt Ridley Rd and Blush St intersection.

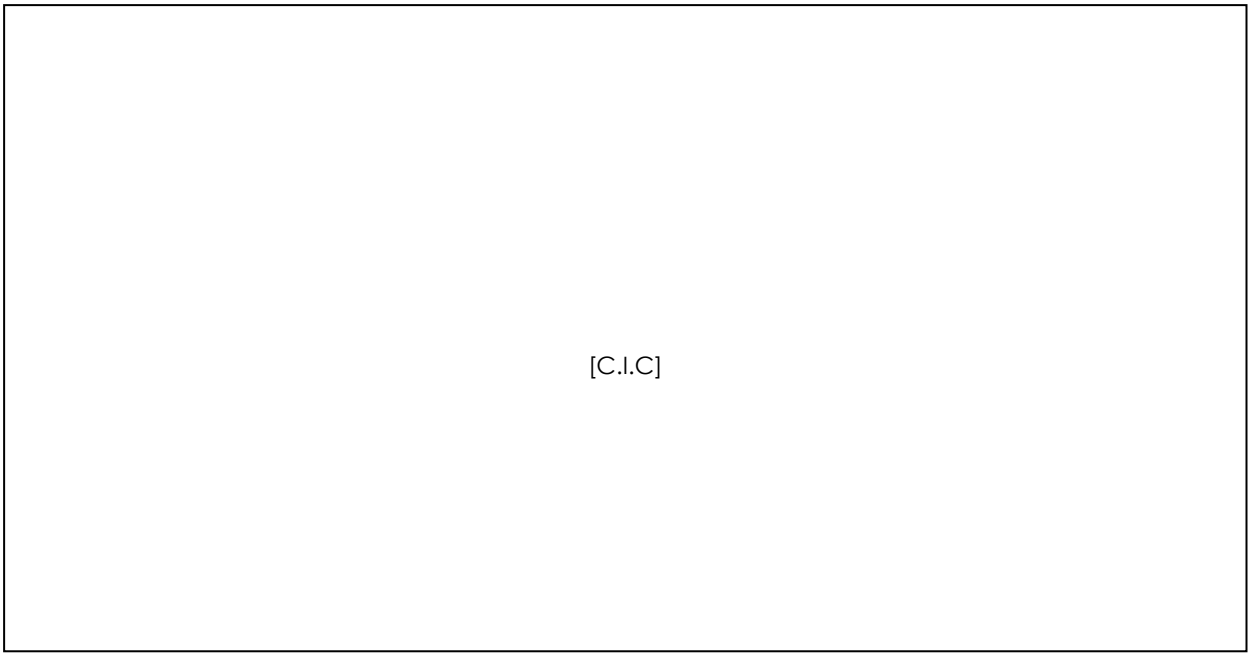


Figure 5: Craigieburn reinforcement - Option 2

4.3.1. Cost Estimations

[C.I.C]

4.3.2. Capacity

Table 4: Option 2 – Cragieburn Identified Network Reinforcement

2024/25 Forecast Minimum Pressure	Affected Customers	REINFORCEMENT SUMMARY	Post Reinforcement Minimum Pressure
64kPa	6,200	New City Gate and [C.I.C] of 180P10	280kPa

Table 5: Cragieburn Forecast Minimum Network Pressures

2022/23	2023/24	2024/25	2025/26	2026/27	2027/28
141kPa	107kPa	296kPa	293kPa	290kPa	285kPa

2024/25 Before Facility Installation **2024/25 After Facility Installation**

Figure 6: Cragieburn before and after augmentation

4.4. Option 3 – Expansion of Cragieburn City Gate and pipeline reinforcement

An existing nearby AusNet Services' City Gate at "Craigieburn City Gate" is located approximately 10km East of existing Craigieburn network. It is currently in operation to sole supply a large industrial customer of "Brick and Pipe" with a single supply line 150mm steel main and this isolated network can be expanded to connect to existing Craigieburn network to boost its capacity. Due to the long distance of Craigieburn City Gate, in additional to the extension from existing supply mains, a section of pipe looping of existing 150mm steel would also be required to provide adequate capacity to Craigieburn and minimise impact to the existing Brick and Pipe customer, which a 200mm steel mains would be required for both extension and pipe looping component.

Network Reinforcement work comprises of:

- Extension of [C.I.C] of 200mm Steel from Brick Makers Dr to connect to Mt Riddley Rd
- Pipe looping of [C.I.C] of 200mm Steel from existing Craigieburn network to Brick Makers Dr
- Station upgrades including Regulator and Heaters at Craigieburn City Gate to increase flow capacity through City Gate.

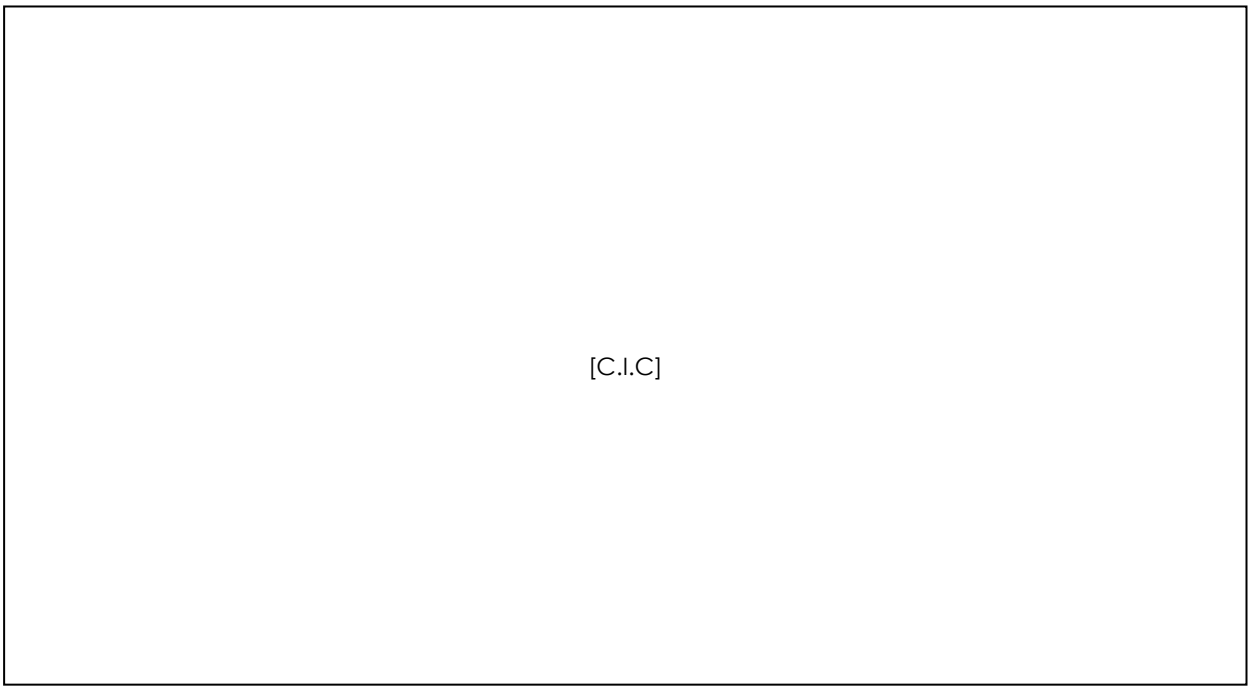


Figure 6: Craigieburn Reinforcement - Option 3

4.4.1. Cost and benefit analysis

[C.I.C]

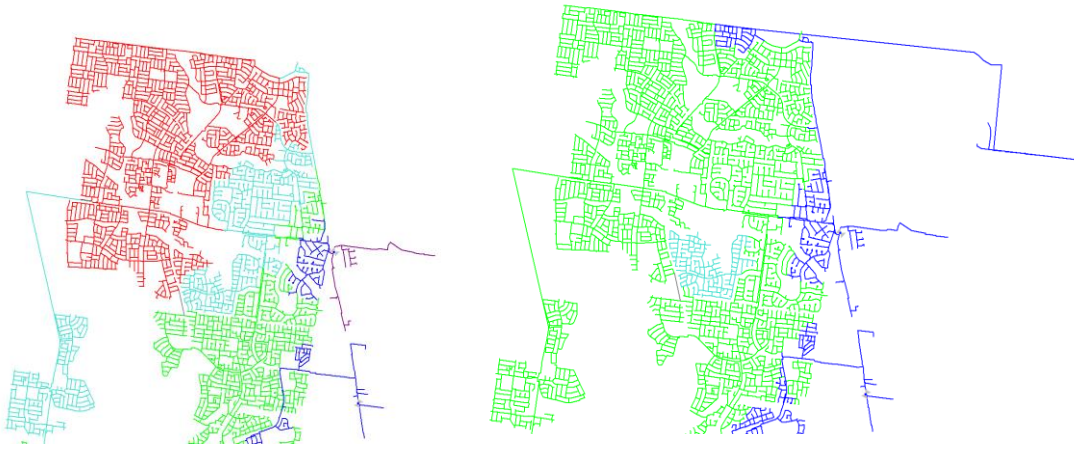
4.4.2. Capacity

Table 6: Option 3 - Cragieburn Identified Network Reinforcement

2024 Forecast Minimum Pressure	Affected Customers	REINFORCEMENT SUMMARY	Post Reinforcement Minimum Pressure
64kPa	6,200	[C.I.C] of 200mm Steel	290kPa

Table 7: Cragieburn Forecast Minimum Network Pressures

2022/23	2023/24	2024/25	2025/26	2026/27	2027/28
141kPa	107kPa	290kPa	280kPa	275kPa	270kPa



2024/25 Before Augmentation **2024/25 After Augmentation**

Figure 9: Sunbury before and after augmentation

4.5. Benefit Assessment

The preferred solution is Option 2 which involves the construction of a new City Gate connected from APA's WORM including a [C.I.C] 180mm polyethylene pipeline along Mt Riddley Rd. This augmentation is considered the most cost-effective solution to augment the capacity of the Craigieburn network and would be required to be in service by winter 2024.

Table 8: Options Assessment Summary

OPTION	BENEFITS	COSTS ($2020)
Option 1	Nil.	Continue accepting Craigieburn capacity shortfall and further customer outages. Compromised safety and reliability of existing network.
Option 2	Preferred solution – addressing current capacity shortfall and provide long-term capacity solution in the growing Craigieburn network – most cost effective.	[C.I.C]
Option 3	Address current capacity shortfall – This option is less cost effective than option 2 with the significantly higher mains reinforcement cost requirements. Therefore, this option is not a recommended long-term solution.	[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

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