Attachment 9.12

Network Augmentation Plan

July 2025

PUBLIC

Australian Gas Networks

1 Network augmentation plan

1.1 Project approvals

Table 1.1: Network augmentation plan – Project approvals

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1.2 Executive summary

The purpose of this document is to provide a clear, coherent and consistent explanation of our network augmentation program for the next access arrangement (AA) period (July 2026 to June 2031). The program comprises two augmentation projects across two key network growth areas over the period as shown in Table 1.2.

Table 1.2: Summary of proposed network augmentations

Network growth area	Customer impact risk	Untreated risk	Project description	Cost estimate ($ million)
Northern Corridor - Angle Vale	>1,000	High	Install [redacted] of DN180mm PE from Coventry Rd to Angle Vale Rd along Dalkeith Rd	[redacted]
Southern Corridor - Seaford Aldinga	>1,000	High	Duplicate [redacted] of DN280 trunk main from McLaren Vale to Aldinga	[redacted]
Total				[redacted]

The purpose of these two projects is essentially the same: mitigating growth-driven delivery pressure decreases in parts of the downstream distribution network.

As the number of customers connected to our network grows, it can cause supply pressures to decline, particularly during peak consumption times. Declining delivery pressures are a particular risk when large numbers of new customers connect in the same area (for example a new housing estate). Put simply, the high pressure (HP) gas supply fed into that section of the network gets spread more thinly, and pressures can fall. If pressures in the gas distribution fall below the minimum HP supply threshold the downstream gas supply to customers may be interrupted and/or gas appliances may become inoperable. This causes reliability issues and in extreme cases, safety risks.

Customers at the fringe of the network tend to be most at risk of substandard delivery pressures. This is because their premises are generally located far away from the district regulator station (supply point) and have a limited route of supply. However, there is potential for all customers connected to that section of network to be impacted. We must therefore invest in our network to augment the HP systems and mitigate downstream issues.

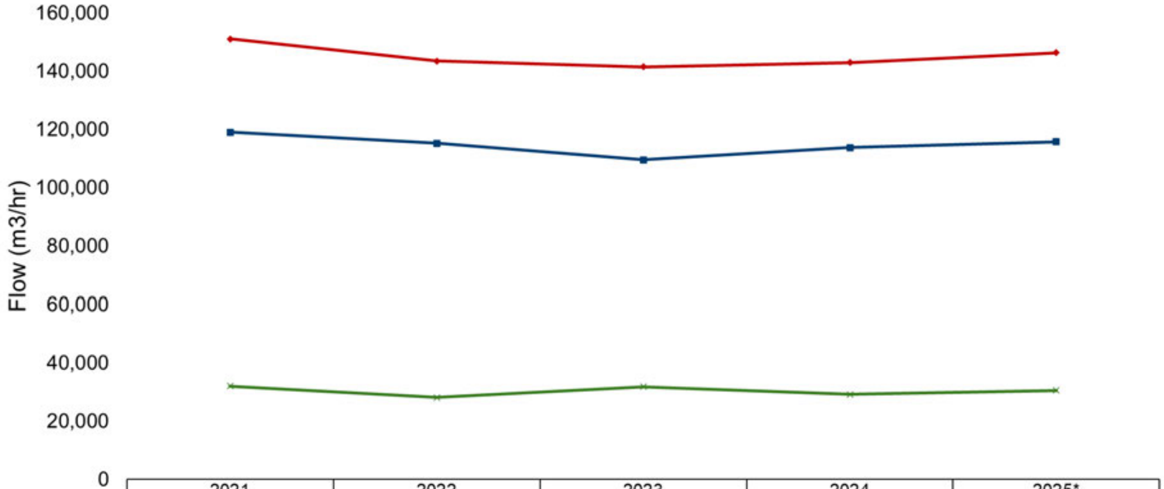
The two key drivers of the need for network augmentation are:

1. Peak hourly gas demand

2. Number of connections

Peak hourly demand has remained stable in recent years, despite the decrease in overall gas consumption (see Figure 1.1).

Figure 1.1: Peak hourly demand 2021-2025



	2021	2022	2023	2024	2025*
Tariff D	32,123	28,170	31,935	29,206	30,579
Tariff V	119,036	115,331	109,588	113,791	115,788
Total Flow	151,159	143,501	141,523	142997	146,367

* Estimate

Customers have continued to connect in the current period, with strong demand particularly at the extremities of the network in new estates. We expect around 34,000 new customers will connect over the next five years. This combination of consistent peak usage per customer and new connections means the overall amount of gas being consumed at the peak is still growing.

We have a duty of care to provide a reliable gas supply and ensure our customers can use their gas appliances safely at all times. This means providing gas at adequate pressures, even during the peak.

The modelling summarised in this document shows that current growth rates indicate the minimum pressure during peak periods will drop below the threshold in several parts of our network within the next five years. We must therefore undertake the works outlined in Table 1.2, to make sure existing customers get the service they expect, and new customers can continue to connect.

Our HP network augmentation program will see the installation of new HP mains in and around, high growth northern and southern metropolitan corridors. For both projects we have considered a primary and a secondary technical solution, as well as the implications of not conducting the works. The main body of this document outlines the overarching augmentation approach and considerations, while the two individual business cases and options analysis are included in section 6.

In each case, we submit the proposed works meet the requirements of National Gas Rules (NGR) 79 and 74, and are consistent with promoting the National Gas Objective. The program is also necessary to meet our supply pressure obligations under Australian Standards.

1.3 Background and context

1.3.1 Growth areas

The key growth areas in the network have continued to be related to the urban sprawl of the Adelaide area North, South and East. The impact of this continuing expansion and increasing network utilisation in these areas requires the investment in two locations:

1. The northern corridor through the Angle Vale area
2. The southern corridor through the Seaford Aldinga area

A high level overview of the growth areas and the proposed augmentations is shown on the map in Figure 1.2.

Figure 1.2: Map highlighting key historic and future growth areas in proximity to proposed augmentations

1.3.2 Augmentation project summary

To keep pace with growth and mitigate delivery pressure risks, we need to undertake two augmentation projects on parts of our HP network. The proposed projects are summarised in Table 1.3.

Table 1.3: Summary of proposed high pressure network augmentations

Project name	Summary description	Estimated cost ($ million)
Angle Vale	Install [redacted] of DN180mm PE from Coventry Rd to Angle Vale Rd along Dalkeith Rd	[redacted]
Seaford Aldinga	Duplicate [redacted] of DN280 trunk main from McLaren Vale to Aldinga	[redacted]
Total		[redacted]

The drivers for both these projects are essentially the same. They are each addressing the same type of risk: mitigating growth-driven delivery pressure decreases in parts of the downstream distribution network.

The similarities between the projects means our asset management approach, risk treatments, and engineering options considered for each project are broadly the same. While the projects are discrete, the approach by which we develop the proposed solutions, estimate costs, and assess risk are common to all.

Therefore, to limit repetition and to promote consistency in the documentation and considerations for this suite of similar projects, we have incorporated the two standalone business cases into one overarching strategic document. Common elements for each project are covered in the main body of this document. Individual project costings, options analyses and project specifics are provided in section 6.

1.4 Stakeholder engagement

We are committed to operating our networks in a manner that is consistent with the long-term interests of our customers. To facilitate this, AGN conducts regular stakeholder engagement to understand and respond to the priorities of our customers and stakeholders. Feedback from stakeholders is built into our asset management considerations and is an important input when developing and reviewing our expenditure programs.

Our customers have told us their top three priorities are price/affordability, reliability of supply, and maintaining public safety. They also told us they expect AGN to deliver a high level of public safety.

Consistent with our customers' priorities, our network augmentation projects are essential to ensure customers continue to receive a reliable natural gas supply above the minimum acceptable pressure. We have looked at several options to address the pressure drop risk in those sections of the distribution network impacted by load growth, and in each case have selected the solution we believe has the lowest cost impact on customers over the long term.

1.5 Values used in this document

All financial values in this document are expressed in real dollars at January 2025, unless otherwise stated.

Asset information is current as at January 2025 and growth forecasts were prepared in January 2025 based on data from the Customer Care and Billing system, consistent with our demand forecasts provided in Attachments 13.1 and 13.2.

2 Network augmentation planning and design

2.1 Capacity management

We manage network capacity by monitoring network performance, assessing forecast demand and assessing threats to supply. Network capacity issues are addressed according to the risk they present, and are undertaken subject to the requirements of the AGN Risk Management Framework (Attachment 9.11).

The network requires augmentation under two principal circumstances:

1. The minimum pressure in a network falls, or is forecast to fall, below the recommended minimum end of main pressure during design load conditions

2. There is insufficient redundancy within the network, which adversely affects the security of supply to a large number of customers

Our capacity management process involves the activities described in the section below.

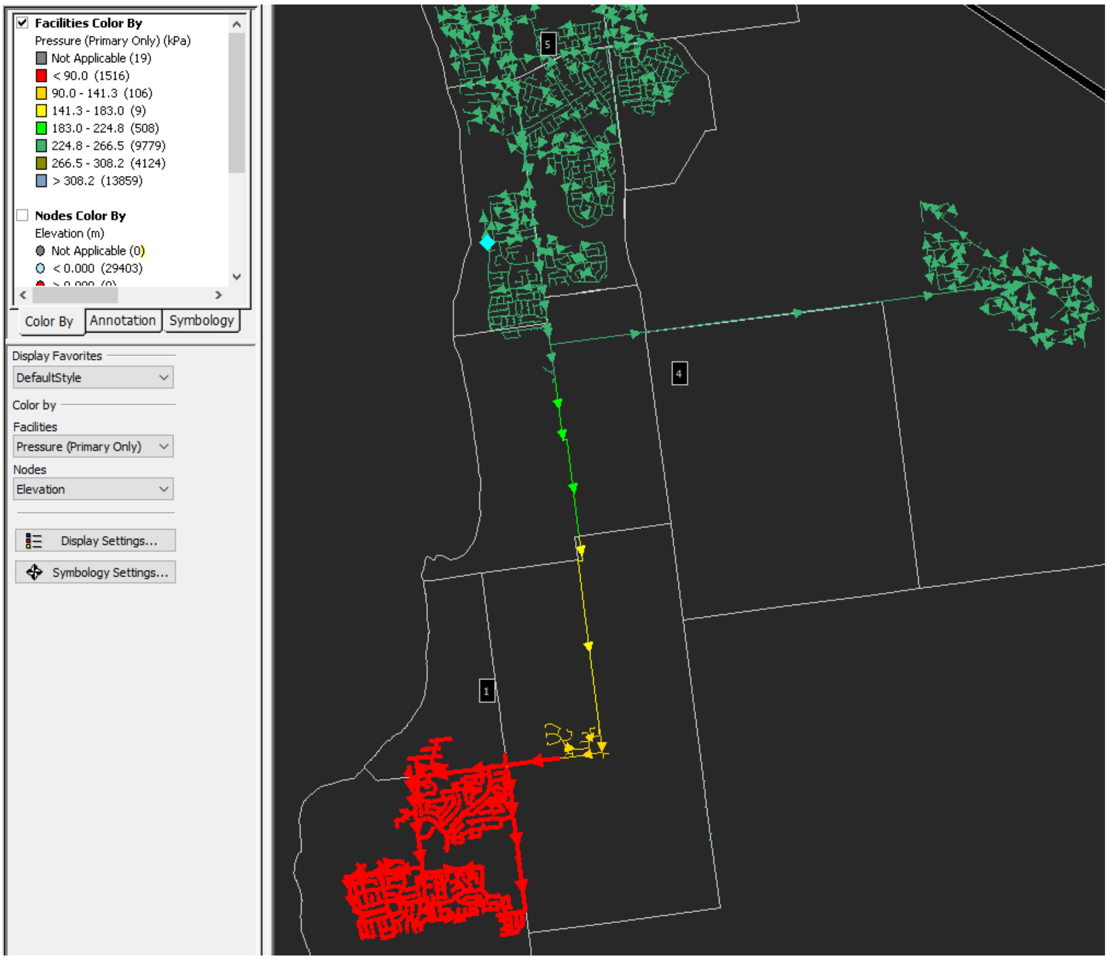
2.1.1 Maintaining baseline capacity models

Network configurations within the Geospatial Information System (GIS) are exported into capacity modelling software ([redacted]). We validate network models against actual field conditions using gate station inputs, large volume customer hourly demand, system pressures, and derived domestic, commercial and industrial loads.

Computer models are iteratively balanced so that modelled pressures match those from the field. This methodology and process is industry best practice to ensure accurate network models and hydraulics are forecast.

Figure 2.1 shows an example of the Seaford – Aldinga area and the impact of growth to the pressures. The red area shows pressures below the minimum acceptable level.

Figure 2.1: Seaford – Aldinga network pressures



2.1.2 Design load assessment

We derive domestic, commercial and small industrial design loads from the validated baseline network load, corrected to allow for additional consumption consistent with a one-in-ten probability winter's day.

Tariff D customer load is normalised based on variation in consumption during the daily peak hour period throughout winter.

In each case we base the design load on a peak hourly load, as this is the important parameter for maintaining supply to the network.

The current hydraulic model aligns with the most recent dynamics of residential consumption.

2.1.3 Forecasting load growth

We develop a forecast of the number and location of new residential connections using a range of sources, including:

- Historical actual trends
- Planning authority publications
- Precinct structure plans

- Publicly available documentation
- Housing Industry Association (HIA) statistics
- Internal marketing and business development data

We use market trend analysis in the affected local areas as well as the wider network to determine the rate of new connections for industrial and commercial (I&C) customers, and demand market sectors.

2.1.3.1 Penetration rates

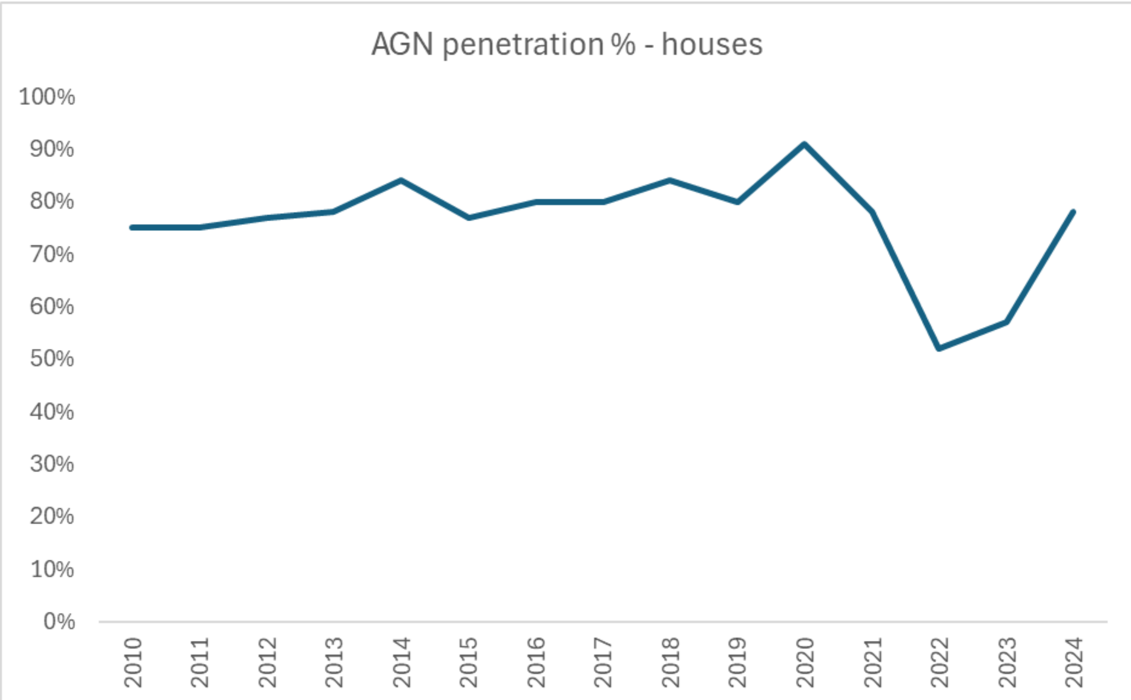
Penetration rates are an important consideration when estimating the impact of connection growth. While new homes are being built all the time, we rely on historical precedent, coupled with emerging trends, to estimate how many of those new customers will connect to the natural gas network.

Emerging trends indicate that multi-user dwellings are declining, with a general shift towards electrification and we are also forecasting a decreasing percentage of total dwellings connecting to the network.

While the penetration rate for different areas can vary depending on climate, cost and demographics, the overall penetration rate for new supply in South Australia remains relatively high.

Figure 2.2 shows historical penetration rate for new housing connections.

Figure 2.2: Historical penetration rates for residential dwellings in the network



The penetration rate has remained strong for an extended period, however penetration rates have been volatile due to the difficulty in delivering housing stock during and after the COVID-19 pandemic.

We saw penetration rates normalise in 2023/24. For the purposes of hydraulic modelling, we have used a conservative penetration rate of 80% as a reasonable forward-looking forecast.

It should be noted that the penetration rates shown in Figure 2.2 are based on the entire metropolitan area, and therefore for those areas affected by poorer pressures, a more local analysis is undertaken. This allows us to account for more micro-trends for example where we see electric-only estates, or we see varying rates such as the current 85% penetration rate in Seaford Heights and Seaford Rise, but only 38% in Port Willunga.

The use of an 80% penetration rate is supported by our experience with new developments in South Australia (see Table 2.1).

Table 2.1: Penetration rates for recent developments in South Australia

Suburb	Gas	No Gas	Total	Penetration rate
Angle Vale	2,522	412	2,934	86%
Munno Para	1,327	146	1,473	90%
Riverlea Park	443	68	511	87%
Virginia	630	305	935	67%
Seaford Heights	649	112	761	85%
Seaford	1687	303	1990	85%
Aldinga	2420	709	3129	77%
Total	**9,678**	**2,055**	**11,733**	**82%**

2.1.4 Hydraulic modelling solutions

We use hydraulic modelling to understand the impact of new connections on our network. Additional connections are converted to the forecast hourly demand within the network to develop an annual load growth profile, which we superimpose on the network model to identify future capacity constraints.

The industry standard hydraulic computer modelling software, [redacted] is used to evaluate various load scenarios and augmentation options. Capacity shortfalls are identified, and solutions modelled to confirm augmentation requirements.

The first considered solution by our hydraulic asset management engineers is always to rebalance the network through the manipulation of HP regulating equipment to improve the flow dynamics in the network. This may include changing network input pressures at multiple locations, or increasing supply pressures. However, once the network is operating towards its maximum allowable operating pressure (MAOP), this no longer becomes a viable long-term solution and the incremental increase in pressure can no longer be undertaken. At this point additional infrastructure is required.

Once pressure alterations and numerous network flow balancing options have been exhausted, further hydraulic modelling is completed to determine various pipeline and regulating equipment combinations and solutions that could mitigate the low pressure risks.

2.1.5 Project scoping

Once the various capacity, replacement and security of supply issues are assessed and options considered, they are transferred to business cases for formal consideration and approvals.

We review projects annually to ensure the latest available information is used to inform asset management decisions with the best available information at the time of investment.

3 Risk assessment

Risk management is a constant cycle of identification, analysis, treatment, monitoring, reporting and then back to identification (as illustrated in Figure 3.1). When considering risk and determining the appropriate mitigation activities, we seek to balance the risk outcome with our delivery capabilities and cost implications. Consistent with stakeholder expectations, safety and reliability of supply are our highest priorities.

Figure 3.1: Risk management principles

Our risk assessment approach focuses on understanding the potential severity of failure events associated with each asset and the likelihood that the event will occur. Based on these two key inputs, the risk assessment and derived risk rating then guides the actions required to reduce or manage the risk to an acceptable level.

Our risk management framework is based on:

- AS/NZS ISO 31000 Risk Management – Principles and Guidelines
- AS 2885 Pipelines-Gas and Liquid Petroleum
- AS/NZS 4645 Gas Distribution Network Management

The *Gas Act 1997* and *Gas Regulations 2012*, through their incorporation of AS/NZS 4645 and the *Work Health and Safety Act 2012*, place a regulatory obligation and requirement on AGN to reduce risks rated high or extreme to low or negligible as soon as possible (immediately if extreme). If it is not possible to reduce the risk to low or negligible, then we must reduce the risk to as low as reasonably practicable (ALARP).

When assessing risk for the purpose of investment decisions, rather than analysing all conceivable risks associated with an asset, we look at a credible, primary risk event to test the level of investment required. Where that credible risk event results in a risk event rated moderate or higher, we will consider investment to reduce the risk.

Seven consequence categories are considered for each type of risk:

1. **Health & safety** – Injuries or illness of a temporary or permanent nature, or death, to employees and contractors or members of the public
2. **Environment** (including heritage) – Impact on the surroundings in which the asset operates, including natural, built and Aboriginal cultural heritage, soil, water, vegetation, fauna, air and their interrelationships

3. **Operational capability** – Disruption in the daily operations and/or the provision of services/supply, impacting customers
4. **People** – Impact on engagement, capability or size of our workforce
5. **Compliance** – The impact from non-compliance with operating licences, legal, regulatory, contractual obligations, debt financing covenants or reporting / disclosure requirements
6. **Reputation & customer** – Impact on stakeholders' opinion of AGN, including personnel, customers, investors, security holders, regulators and the community
7. **Financial** – Financial impact on AGN, measured on a cumulative basis

Our Risk Management Framework, including definitions, has been provided in Attachment 9.11.

The identified risk relating to an increasing number of customer connections and associated load growth is that load growth without network reinforcement or augmentation causes delivery pressures to drop, leading to substandard supply or loss of supply to customers. This may also lead to customers' gas appliances becoming inoperable or damaged in certain circumstances

A drop in supply pressures can, in certain circumstances, lead to a gas-in-building event and ultimately a safety risk. However, a safety event due to pressure drop is unlikely. Therefore, the primary risk being addressed in all the HP network augmentation projects is the potential for thousands of customers being without supply.

The risk rating is determined by the total number of customers affected. By way of example, the disruption to supply risk in the Aldinga area of our network, which services around 3,980 customers, results in a significant consequence rating under the risk matrix.

Given load growth occurs over several years, the likelihood of a major disruption to customer supply will also change over time if no network reinforcement or augmentation is conducted. For example, the likelihood of a supply risk at the beginning of a growth period may be considered occasional, (every couple of years). However, if no action is taken, the likelihood may increase to frequent, pushing the overall risk rating higher.

It is therefore imperative that network reinforcement/augmentation to address the supply risk posed by load growth is undertaken prior to the risk materialising.

The untreated risk[1] rating for a pressure drop impacting >1,000 customers is shown in Table 3.1.

Table 3.1: Risk rating – untreated risk

Untreated risk	Health & Safety	Environment	Operations	People	Compliance	Rep & Customer	Finance	Risk
Likelihood	Unlikely	Rare	Occasional	Rare	Occasional	Occasional	Occasional	Moderate (non ALARP)
Consequence	Minor	Minimal	Significant	Minimal	Significant	Significant	Minor	
Risk Level	Low	Negligible	Moderate	Negligible	Moderate	Moderate	Low	

[1] Untreated risk is the risk level assuming there are no risk controls currently in place. Also known as the 'absolute risk'.

Note that a moderate risk rating still requires treatment to reduce it to ALARP, and would therefore signal that network augmentation or a suitable alternative risk treatment is required.

The risk assessments for each of the projects covered in this document follow the same pattern, in that the primary risk is to operations (disruption to supply). Compliance and reputational risks are also key considerations.

The likelihood of a supply disruption if no action is taken is rated occasional in all instances. The severity of risk in each case varies according to the number of customers potentially impacted.

The specific risk ratings for each project (and options considered) are provided in section 6. The overall untreated risk ratings are summarised in Table 3.2.

Table 3.2: Summary of risk rating for network augmentation projects

Project name	Potential number of customers impacted	Untreated risk rating
Angle Vale	3,500	Moderate (non-ALARP)
Seaford Aldinga	3,980	Moderate (non-ALARP)

In all instances, we recommend action be taken to address the untreated supply risk within the next five years. Projects will be prioritised by risk. Any project currently considered a moderate (not ALARP) risk, must be completed prior to the risk escalating to high due to the increased likelihood of a major supply disruption.

4 Options assessment

Mitigating the risk of pressure drop caused by load growth, typically requires one or more of the following actions:

- Installing additional HP polyethylene (PE) pipelines to increase the supply of gas to the affected area of the distribution network
- Upgrading or installing new regulating equipment
- Reinforcing, upsizing or reconfiguring parts of the distribution network

These potential risk mitigations are considered for each of the HP augmentation projects and are used to develop credible asset management solutions.

For both augmentation projects required over the next five years, a primary solution (Option 1) and a secondary solution (Option 2) has been developed, as well as considering the impact of maintaining the status quo (taking no new action to address the risk – Option 3).[2]

[2] Note the options for each business case have been presented in the same order (Option 1 - primary solution, Option 2 - secondary solution, Option 3 – status quo) simply to aid the reader. This does not necessarily reflect the order in which the options were developed by our engineering teams, or the manner in which options are developed/presented in other business cases.

Our approach requires at least two credible engineering solutions to be defined and costed, and then assessed according to:

- Cost
- Risk reduction
- Consistency with our vision objectives
- Satisfaction of the tests specified under the NGR

Additional solutions (such as increasing supply pressures or major reconfigurations) may be considered during initial planning stages. However, we aim to distill our HP augmentation business cases down to two fully costed, credible, engineering options where possible, with the 'status quo' option acting as a baseline for comparison.

4.1 Comparison of options against cost and risk

For each network augmentation project, we compare the various costs and risks to inform which is the most prudent and efficient solution. The individual cost and risk assessments for each project, as well as a description of the proposed solutions, are provided in section 6.

For convenience, the overall cost and risk comparisons are summarised in Table 4.1.

Table 4.1: Summary of risk rating for HP augmentation projects

Project name	Option 1 – primary		Option 2 - secondary		Option 3 – status quo	
	Cost ($M)	Risk rating	Cost ($M)	Risk rating	Cost ($M)	Risk rating
Angle Vale	[redacted]	Low	[redacted]	Low	-	Moderate (non-ALARP)
Seaford Aldinga	[redacted]	Low	[redacted]	Low	-	Moderate (non-ALARP)

In all instances, the residual risk rating after implementing either the primary or secondary engineering solutions results in a low risk rating. However, the primary solution would be the preferred option as it typically delivers the required risk reduction for a lower cost.

4.2 Comparison of options against our vision objectives and the NGR

The same risk criteria, vision objectives and NGR assessments are applied to all options for both projects. While the risk assessment and cost of each option may vary between projects, we found that the outcomes of our assessment against our vision objectives and the NGR were consistent across each of the primary, secondary and status quo options. Therefore, rather than present vision objective alignment and NGR considerations separately in each business case, the outcomes of the options assessments for each project against our vision objectives and the NGR are summarised in the following sections.

The following table provides an overview of how the various options considered align with our vision objectives.

Table 4.2: Summary of how various augmentation options align with our vision objectives

Vision objective	Option 1 (primary)	Option 2 (secondary)	Option 3 (status quo)
Customer Focussed – Public Safety	Y	Y	N
Customer Focussed – Customer Experience	Y	Y	N
Customer Focussed – Cost Efficient	Y	N	N
A Leading Employer – Health and Safety	Y	Y	N
A Leading Employer – Employee Experience	-	-	-
A Leading Employer – Skills Development	-	-	-
Operational Excellence – Profitable Growth	-	-	-
Operational Excellence – Benchmark Performance	Y	N	N
Operational Excellence – Reliability	Y	Y	N
Sustainable Communities – Enabling Net Zero	-	-	-
Sustainable Communities – Environmentally Focussed	-	-	-
Sustainable Communities – Socially Responsible	-	-	-

For each project, both the primary and secondary options satisfy most of the vision objectives in terms of being *Customer Focussed* and demonstrating *Operational Excellence*. As a prudent operator, the engineering solutions put forward in each case provide a credible technical solution, mitigate reliability risks to customers and our employees, and represent a reasonable option.

The key difference between the primary and secondary options is that the secondary option is typically more expensive and therefore would not be consistent with our objectives of:

- *Customer Focussed* objective of being cost efficient (i.e. delivering a solution for the lowest sustainable cost)
- *Operational Excellence* as they would not reflect benchmark performance

The status quo option does not satisfy our vision objectives, as taking no action will not reduce the risk associated with delivery pressure drop caused by load growth. While 'doing nothing' results in a lower short-term cost, it does not meet our objectives, as the cost of reactive or piecemeal works in response to a supply failure are typically more expensive over the longer term than proactive works.

4.3 Consistency with the National Gas Rules

When considering each of the options against the NGR, specifically NGR 74 and 79, the outcomes across the primary, secondary and status quo options are the same. The following table summarises how the various primary, secondary and status quo engineering solutions meet the requirements of the NGR.

Table 4.3: Summary of how various augmentation options satisfy NGR 74 and 79

Option	Satisfies NGR 74*	Satisfies NGR 79(1)	Satisfies NGR 79(2)	Comments
Option 1 (primary solution)	Y	Y	Y	**NGR 79(1)** – The primary solution represents a credible engineering solution, consistent with good engineering practice, that addresses the identified risk. Several practicable options have been considered and market rates have been tested. The primary solution will enable AGN to keep pace with load growth and the associated risk for the lowest practicably sustainable cost. **NGR 79(2)** – The proposed capex is justifiable under NGR 79(2)(c)(ii), as it is necessary to maintain the integrity of services.
Option 2 (secondary solution)	Y	N	Y	**NGR 79(1)** – The secondary solution represent a credible engineering solution, consistent with good engineering practice, that addresses the identified risk. Several practicable options have been considered and market rates have been tested. The secondary solution will enable AGN to keep pace with load growth and the associated risk, however, it does so at a higher cost than the primary solution (Option 1). As a result, while Option 2 may represent a reasonable cost, it will not enable us to achieve the lowest practicably sustainable cost of providing services and would therefore not represent the most prudent and efficient solution under NGR 79(1). **NGR 79(2)** – The proposed capex is justifiable under NGR 79(2)(c)(ii), as it is necessary to maintain the integrity of services.
Option 3 (status quo)	Y	N	N	Taking no action to address the delivery pressure drop risk caused by load growth would not meet any of the criteria under NGR 79(2), nor would it represent the actions of prudent service provider as required by NGR 79(1).

* Note all options are developed on a reasonable basis using the best information available at the time of making the forecast. For each augmentation project, the forecast costs are based on the most recent market rate testing, and project options consider the current network condition and risk as per the Asset Management Strategy. The forecasts are therefore consistent with the requirements of NGR 74.

5 Cost estimation method

Given the similar nature of the various engineering solution proposed for each of the network augmentation projects, the method we use to estimate the costs of each project is the same. The unit rates and project forecast costs are for all network augmentation projects include the internal labour, external labour and materials/other costs forecast.

Cost estimations for augmentation work are based on individual bottom-up builds for each project. This allows each estimate to cater for the unique variables that the project may bring, including the degree of urbanisation, ground conditions and complex junctions and timing.

The work is delivered by a combination of internal project management and governance practices, as well as the use of contractors with the appropriate capability and skill sets that are procured through market testing tender processes. The unit rates and project forecast costs used in the estimates are based on the following key assumptions:

- Internal labour – These costs are based on standard internal labour rates for direct labour and project management and administration.
- External labour – Where possible, labour costs have been based on the unit rate achieved as the result of competitive tender between external contractors. This is assumed to reflect the most efficient delivery cost achievable. AGN has a panel of market tested contractors, who are experienced in delivering the activities and provide the required quality at the most efficient cost. The contractor panel is reviewed every year for changes, as well as a full re-tender completed every three to five years. The rates utilised in costing these activities are based on current vendor and contractor rates in 2025 as well as benchmarking to historical similar projects. For specialist services, the cost estimate is derived from reviewing the cost for similar projects.
- Materials – Where possible, the cost of the materials required is based on the price achieved for comparable works completed elsewhere in the network. Where a suitable cost estimate from outcomes is unavailable, the material cost is estimated from recent quotes received for other similar works and previous cost experience.

This approach enables us to produce robust cost estimates that are based on an appropriate mix of historical costs, current market pricing and expert external estimation.

A summary of the overall proposed capital cost per project of the five-year network augmentation program is provided in Table 5.1.

Table 5.1: Summary of proposed network augmentation project costs, $ million January 2025

Project	26/27	27/28	28/29	29/30	30/31	Total
Angle Vale	-	[redacted]	-	[redacted]	-	[redacted]
Seaford Aldinga	-	[redacted]	-	[redacted]	-	[redacted]
Total	-	[redacted]	-	[redacted]	-	[redacted]

6 Proposed projects

6.1 Angle Vale augmentation

6.1.1 Project overview

Table 6.1: Angle Vale augmentation – Project overview

Description of the problem / opportunity	The Angle Vale High Pressure (HP) network supplies gas to approximately 3,500 customers and incorporates the suburbs of Angle Vale, Munno Para, Munno Para Downs, Munno Para West and Andrews Farm. Historical growth in these areas has accelerated over the past five years, with the number of total new connections in 2023 increasing to 850. The suburb of Angle Vale has experienced the highest growth within the region (29% in 2023). Growth is expected to continue in these areas with land availability and greenfield development opportunities driving the increase. The historical growth in residential connections has decreased the amount of spare capacity in the Angle Vale HP network. During this current period (2021 to 2026) various trunk main extensions or headwork projects have been proposed to support sustained growth, however additional works are required in the next period to maintain customer supply pressures. Forecast continued growth will exhaust the amount of spare capacity in the Angle Vale HP network. Increases in expected load and continued network expansion will drive pressures below safe operating parameters by winter 2028. To ensure supply pressures are maintained above the acceptable minimum of 90 kPa, augmentation is necessary before 2028/29. This business case considers options to augment the Angle Vale HP network in 2027/28.
Untreated risk	As per risk matrix = Moderate (non-ALARP)
Options considered	• **Option 1** – Install [redacted] of DN180mm PE from Coventry Road to Angle Vale Road along Dalkeith Road [redacted] • **Option 2** – Construct a new city gate supplied from the SeaGas Transmission Pipeline [redacted]) • **Option 3** – Maintain status quo (no upfront cost)
Proposed solution	Option 1 is the proposed solution. It will support continued load growth within Angle Vale HP network without impacting existing customers' supply and is the lowest direct cost option to augment the network.
Estimated cost	The forecast direct cost (excluding overhead) during the next five-year period (July 2026 to June 2031) is [redacted].
Basis of costs	All costs in this business case are expressed in real unescalated dollars at January 2025 unless otherwise stated.
Treated risk	As per risk matrix = Low

$'000 Jan 2025	26/27	27/28	28/29	29/30	30/31	Total
Angle Vale	-	[redacted]	-	-	-	[redacted]

6.1.2 Background

The suburb of Angle Vale and surrounding areas bordering the Northern Expressway are major residential growth areas for Adelaide's northern metropolitan area. Over the past five years, the number of customer connections in the Angle Vale HP network has grown by an average of 530 new residential connections per year with growth increasing at higher rates in recent years. High growth is expected to continue over the forthcoming period.

In addition to Angle Vale, infill in and around the Northern Expressway is growing, generated by the completion of the motorway. Both regions highlighted as urban growth opportunities in the City of Playford's Growth Area Structure Plan[3]. Forecasts suggest there will be 7,600 new dwellings built in this general vicinity by the year 2033[4]. Development has already begun and will continue to grow over the next five years.

Increases in demand will have the greatest impact on the north-eastern extremity point of the Angle Vale HP network, particularly the area serviced by the DN110 PE trunk main on Angle Vale Road, Angle Vale, supplying Riverbanks College and around 500 domestic customers. The fringe point of the network is 4 km from the nearest district regulator station (supply point) with limited trunk infrastructure supplying gas delivery to the area.

The HP network in the Angle Vale network supplies more than 3,500 customers (see Appendix A).

6.1.2.1 Impact of historical growth

Historical growth in residential connections has decreased the amount of spare capacity in the Angle Vale HP network. Prior to winter 2028, augmentation is required to maintain customer supply pressures above minimum acceptable levels.

The suburb of Angle Vale is particularly susceptible to pressure drop due to increased growth rates, lack of trunk infrastructure and distance away from the supply point.

The Angle Vale Township is connected to the nearest district regulator station (DRS R133 by 5 km of DN100 steel trunk main. The distribution network servicing Angle Vale is a combination of DN50/63/110/125 PE mains.

The larger diameter trunk lines located in the north-eastern extremity is broken up by sections of DN50/63 mains, thus creating bottlenecks in the system. The long length of supply main, coupled with the bottlenecks, will result in low customer supply pressures if growth in the area continues as forecast.

Figure 6.1 shows the historical growth in new connections in the Angle Vale network since 2014.

[3] Playford North Extension: Residential Growth Area · City of Playford

[4] Dwellings and development map | City of Playford | Population forecast (id.com.au)

Figure 6.1: Historical connection growth in Angle Vale HP network, 2014 to 2023

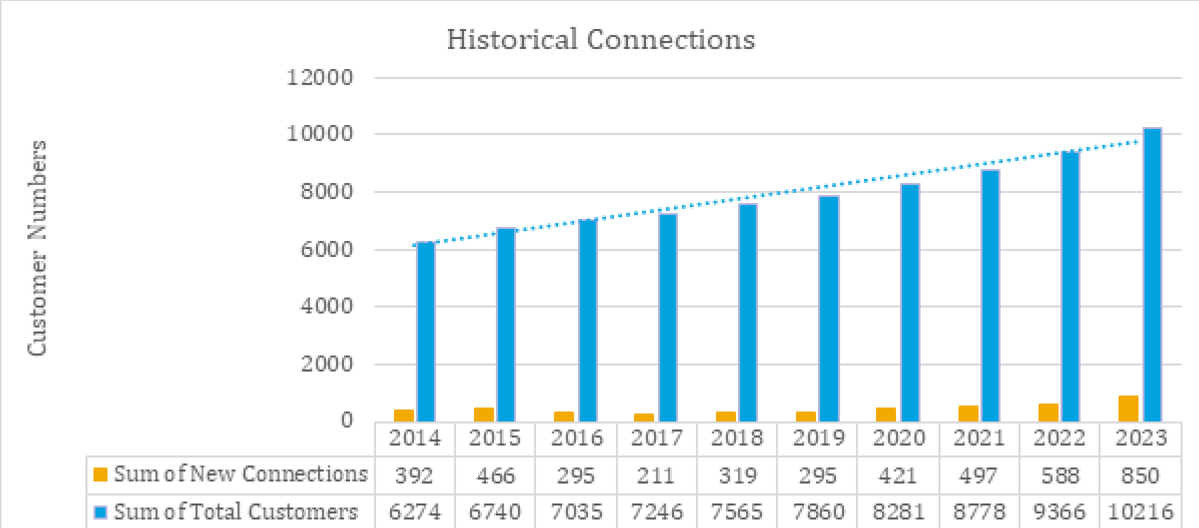
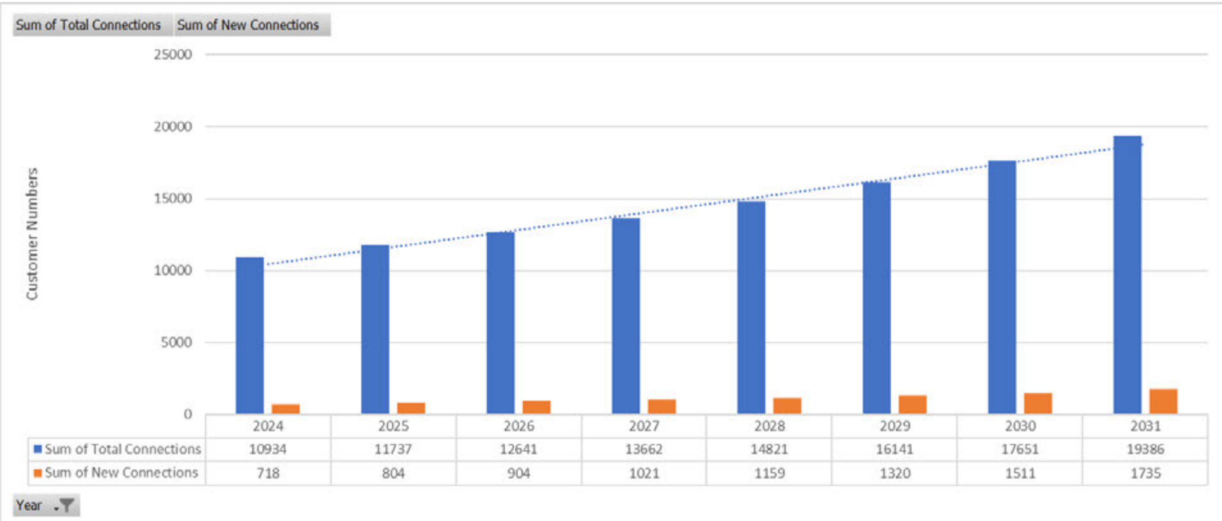


Figure 6.2 shows the estimated increase in connections until the end of the access period.

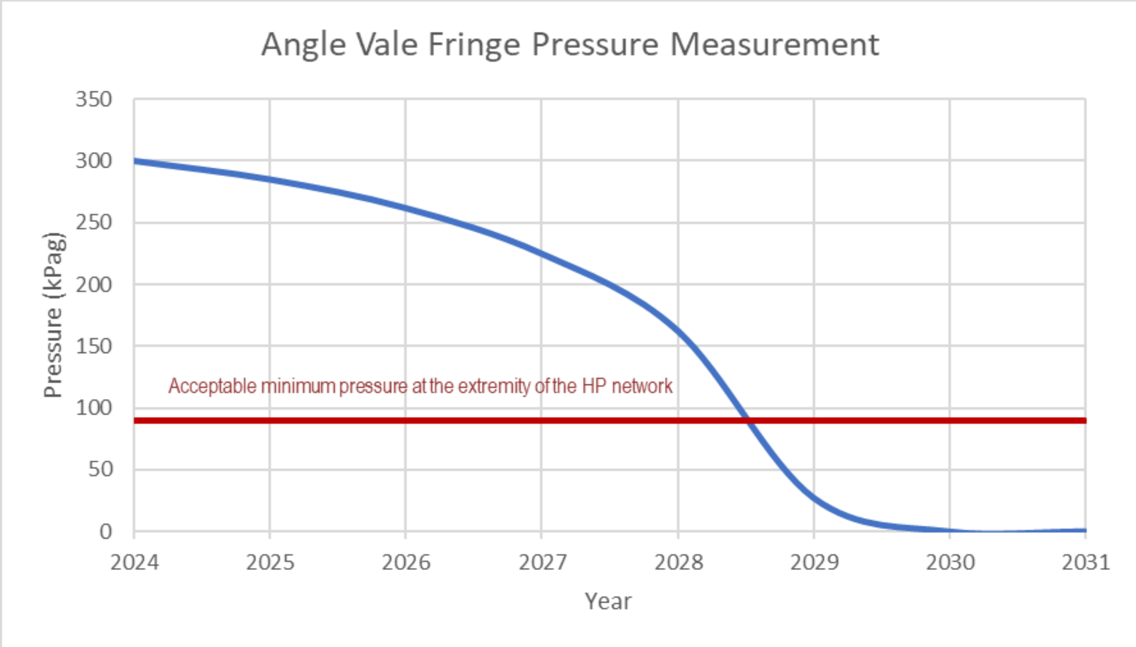
Figure 6.2: Estimated growth in new connections based on historical data



If assumed growth rates in new connections (as outlined above) continues, estimated pressure levels in the Angle Vale HP network will fall below the minimum acceptable pressure of 90 kPa by 2028/29) if the network is not augmented.

Figure 6.3 illustrates the steep decline in pressure after 2028. Augmenting the network in 2027/28 will ensure fringe pressures, particularly sensitive to increases in demand, are maintained and stable ahead of predicted unsafe limits reached in 2028/29.

Figure 6.3: Estimated impact on pressures in Angle Vale if the network is not augmented



6.1.2.2 Future growth

There is evidence to suggest future growth in connections will continue at a faster pace compared to historical growth in the Angle Vale network. City of Playford, recently published their 2024/25 Long Term Financial Plan. The document states, "*We are one of South Australia's fastest growing council areas, and we can now expect on average 10 new people a day to call Playford home until 2046*".[5]

The increase in connections combined with the smaller diameter reticulation (bottlenecks) is causing capacity constraints in the outer high growth areas of Angle Vale, aligning with the urban growth areas detailed in City of Playford's Area Structure Plan (see Appendix A).

In 2024, commercial enquiries for Miravale Estate, River Edge Estate, Riverbanks Estate, Hillsview Estate and Frisby Road Subdivision were received. These developments are expected to accommodate over 1,800 allotments alone. Further development opportunities to 2031 include (based on Forecast.id[6]):

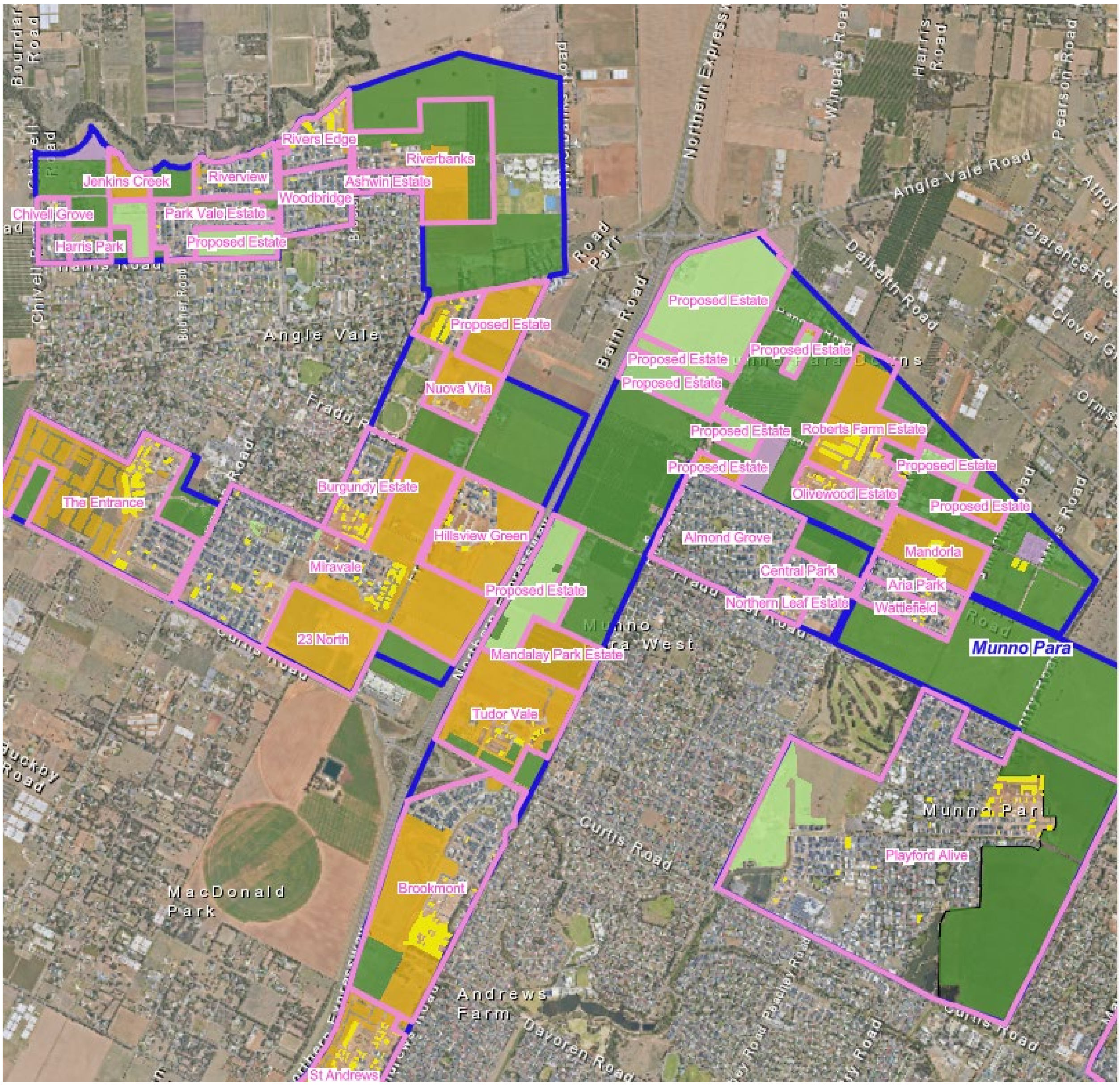
- Burgundy Estate - 191 dwellings
- Chivell Grove Estate - 37 assumed dwellings
- Harris Park Estate - 52 assumed dwellings
- Parkvale Estate - 152 assumed dwellings
- Rivers Edge Estate - 123 assumed dwellings

[5] 03-LTFP-24-25.pdf (playford.sa.gov.au)

[6] Residential development | City of Playford | Population forecast

- Woodbridge Estate - 33 assumed dwellings
- Lovegrove Estate - 44 assumed dwellings
- The Entrance Estate - 747 assumed dwellings
- 23 North Estate - 300 assumed dwellings

Figure 6.4: Map of development opportunities



Note: Plan produced by PlanSA, the Land Supply Dashboard is updated quarterly, and reports on land supply and development activity within selected greenfield and strategic monitoring areas across Greater Adelaide.[7]

The associated dwelling estimates produced by Forecast.id for the City of Playford high growth areas also indicate a growth rate greater than the historical average[8].

[7] PlanSA Land Supply Dashboard (geodata.sa.gov.au)

[8] Dwellings and development map | City of Playford | Population forecast (id.com.au)

Table 6.2 shows the forecast growth in the number of dwellings in the high growth areas supplied by the Angle Vale HP network from 2024 to 2033.

Table 6.2: Forecast dwellings

City of Playford	2024		2033		Change between 2024 - 2033	
Area	**Number**	**%**	**Number**	**%**	**Number**	**%**
Angle Vale (Growth Area)	484	1.1	3,125	5.6	+2,642	+545.8
Munno Para West - Munno Para Downs	2,525	5.8	5,915	10.6	+3,390	+134.3
Playford North Extension	3,160	7.3	4,729	8.4	+1,570	+49.7
Total Growth					**+7,602**	

The historical average penetration rate for new greenfields developments where gas is available is 80-95%. For the purposes of modelling we have assumed a conservative 80% penetration rate. This results in an estimate of ~1,348 new gas connections per year.

6.1.3 Risk assessment

The risk identified for the natural gas distribution network in the Angle Vale region is that load growth without network reinforcement or augmentation will cause delivery pressures to drop, leading to substandard supply or loss of supply to up to 3,500 customers. This may lead to customers' gas appliances becoming inoperable or damaged in certain circumstances.

The primary consequence category affected by this risk is operations, as a pressure drop can cause outages to >1,000 customers, thereby carrying a significant consequence rating under the risk matrix.

Given load growth is ongoing, if the risk is left untreated the likelihood of a pressure drop impacting >1,000 customers is rated occasional (every couple of years), however the frequency of supply interruptions will likely increase the longer the load growth risk is not addressed.

Any significant customer outage would then give rise to a moderate reputational and compliance risk.

The untreated risk rating is shown in Table 6.3.

Table 6.3: Risk assessment – Untreated risk

Untreated risk	Health & Safety	Environ-ment	Operations	People	Compliance	Rep & Customer	Finance	Risk
Likelihood	Unlikely	Rare	Occasional	Rare	Occasional	Occasional	Occasional	Moderate (not ALARP)
Consequence	Minor	Minimal	Significant	Minimal	Significant	Significant	Minor	
Risk Level	Low	Negligible	Moderate	Negligible	Moderate	Moderate	Low	

6.1.4 Options considered

The following options have been considered:

- **Option 1** – Install [redacted] of DN180 PE from Coventry Road to Angle Vale Road along Dalkeith Road

- **Option 2** – Construct a new City Gate Station supplied off the SeaGas Transmission Pipeline
- **Option 3** – Maintain status quo

Other options considered and excluded from this submission include:

- Duplication of the existing DN100 steel main along Curtis Road and Heaslip Road
- Extension of APA's transmission pipeline along Fradd Rd and installation of a new TP-HP DRS at a similar location to the Option 1 new gate station
- Extension of an existing DN160 PE trunk main in Curtis Rd via multiple routes

These options are ineffective long term, deferring augmentation by another one or two years. We consider delaying capex could prove more costly in the long run.

Extending the transmission network was also infeasible as it required large scale reinforcement.

Options 1 and 2 both accommodate long term growth, address capacity issues on all fringe points locations, improve security of supply.

The three options considered viable are discussed in the following sections.

6.1.4.1 Option 1 – Install [redacted] of DN180 PE from Coventry Road to Angle Vale Road along Dalkeith Road

Under Option 1, a new section of DN180 PE main commencing at the intersection of Coventry Road and Dalkeith Road, will be direct laid along Dalkeith Road and Angle Vale Road. A directional bore will be required to cross the Northern Expressway (bypassing the Angle Vale Road on/off ramp) and will connect into existing DN125 PE trunk main located on Angle Vale Road at the intersection of Riverbanks Road. The new PE trunk main will be [redacted] in length.

This main will extend critical HP trunk main infrastructure and provides a vital back-feed to supply the fringe of the network. It will eliminate restrictions within the system as gas is redirected and distributed through the trunk system. This substantially increases the amount of gas being delivered to the fringe point in the Angle Vale HP network.

The alignment of the new main is centrally located to future urban growth areas identified for development. Further looping of the trunk system will be achieved once Munno Para Downs/West infill along the Northern Expressway is complete, strengthening overall security of supply.

6.1.4.1.1 Cost assessment

The estimated direct capital cost of this option is $3.7 million.

Table 6.4: Cost assessment – Option 1, $ '000 January 2025

	2026/27	2027/28	2028/29	2029/30	2030/31	Total
Labour	-	[redacted]	-	-	-	[redacted]
Material	-	[redacted]	-	-	-	[redacted]
Total	-	[redacted]	-	-	-	[redacted]

6.1.4.1.2 Risk assessment

Option 1 would reduce the loss of supply (operational) risk from moderate to low. The likelihood of a pressure drop impacting >1,000 people would reduce from occasional to remote. The risk consequence rating remains unchanged. Option 1 reduces the likelihood of a pressure drop leading to compliance or reputational impacts from occasional to rare, reducing the risk from moderate to negligible. It also reduces the likelihood of a safety incident from remote to rare.

Table 6.5: Risk assessment – Option 1

Option 1	Health & Safety	Environ-ment	Operations	People	Compliance	Rep & Customer	Finance	Risk
Likelihood	Rare	Rare	Remote	Rare	Rare	Rare	Remote	Low
Consequence	Minor	Minimal	Significant	Minimal	Significant	Significant	Minor	
Risk Level	Negligible	Negligible	Low	Negligible	Negligible	Negligible	Negligible	

6.1.4.2 Option 2 – Construct a new City Gate Station supplied off the SeaGas Transmission Pipeline

Under this option a city gate station (similar to Gawler Gate Station) will be constructed and commissioned on Fradd Road, Angle Vale between Frisby Road and the Northern Expressway. Land acquisition will be necessary therefore site location is approximate; noting the outlet tie-in point will be a connection onto the existing DN125 PE HP main located in Fradd Road, east of Frisby Road.

This is required by 2027/28 to ensure commissioning is scheduled ahead of loss of supply risks in the network. Design, land acquisition and the front end engineering and design (FEED) study is required in the years prior to the delivery phase of the project.

6.1.4.2.1 Cost assessment

The direct cost of this option is $13.7 million.

Table 6.6: Cost estimate – Option 2, $'000 January 2025

	2026/27	2027/28	2028/29	2029/30	2030/31	Total
Labour	[redacted]	[redacted]	-	-	-	[redacted]
Materials	[redacted]	[redacted]	-	-	-	[redacted]
Total	[redacted]	[redacted]	-	-	-	[redacted]

Note tables may not sum due to rounding

6.1.4.2.2 Risk assessment

Option 2 would reduce the loss of supply (operational) risk from moderate to low. The work would reduce the likelihood of a pressure drop impacting >1,000 people from occasional to remote. The risk consequence rating remains unchanged.

Option 2 reduces the likelihood of a pressure drop leading to compliance or reputational impacts from occasional to rare, reducing the risk from moderate to negligible. It also reduces the likelihood of a safety incident from unlikely to rare.

Table 6.7: Risk assessment – Option 2

Option 2	Health & Safety	Environ-ment	Operations	People	Compliance	Rep & Customer	Finance	Risk
Likelihood	Rare	Rare	Remote	Rare	Rare	Rare	Remote	Low
Consequence	Minor	Minimal	Significant	Minimal	Significant	Significant	Minor	
Risk Level	Negligible	Negligible	Low	Negligible	Negligible	Negligible	Negligible	

6.1.4.3 Option 3 – Maintain Status Quo

Under Option 3, no proactive capacity expansion is undertaken to reduce the loss of supply risk in the Angle Vale HP network. Instead, the network is managed reactively, and any supply issues are addressed when they occur.

Given the current load growth forecasts, it is likely capex would be required in the next five years to reactively address supply shortfalls, as minimum pressure limits are reached by winter 2028.

Maintaining the status quo is not a viable solution, as it inefficiently defers capacity expansion expenditure, impacts our ability to maintain network minimum pressures, causes reliability issues for existing customers as well as potentially resulting in high-cost reactive works. Should we not include a forecast for proactive augmentation works in the next period, we would need to reprioritise our forward works program to undertake these works reactively. This would prevent other planned works from progressing, and merely shift the risk to another area.

6.1.4.3.1 Cost assessment

There are no additional upfront costs associated with maintaining status quo. However, as mentioned above, greater reactive maintenance costs will emerge as pressures decrease.

While it is not possible to quantify the reactive costs incurred at this time, our experience suggests a project conducted reactively is around 3.2 times more expensive than one conducted proactively. [9] This assumption is consistent with the commonly accepted asset management principle that reactive asset maintenance can be around two to five times higher than proactive planned maintenance. [10]

Following reactive works, if the network continually experiences substandard pressures, one of the solutions described under Option 1 or 2 need to be adopted.

6.1.4.3.2 Risk assessment

Under Option 3, the risk level would remain the same as the untreated risk as there are no controls in place to mitigate the pressure drop risk (other than not connecting new customers, which is not a viable option).

The following table shows the risk level if status quo is maintained.

[9] For example, this is typically due to the additional premia for faster acquisition of long lead time materials, emergency response, labour costs, additional traffic management/permit costs, resource scheduling, etc.

[10] Marshall Institute, Omega engineering, ARMS reliability

Table 6.8: Risk assessment – Option 3

Option 3	Health & Safety	Environ-ment	Operations	People	Compliance	Rep & Customer	Finance	Risk
Likelihood	Unlikely	Rare	Occasional	Rare	Occasional	Occasional	Occasional	Moderate (not ALARP)
Consequence	Minor	Minimal	Significant	Minimal	Significant	Significant	Minor	
Risk Level	Low	Negligible	Moderate	Negligible	Moderate	Moderate	Low	

Option 3 is not consistent with our risk management framework, which requires action must be taken to reduce risks to low or ALARP. A moderate rating for operations or safety is not ALARP.

6.1.5 Summary of cost benefit assessment

The following table presents a summary of how each option compares in terms of the estimated cost, the residual risk rating, and alignment with our objectives. Option 1 is preferred as it is the lowest cost option that addresses the operational capability risks of the growing Angle Vale HP network.

Table 6.9: Comparison of options

Option	Estimated cost	Residual risk rating	Alignment with vision objectives
Option 1	$3.7 million	Low	Aligns with *Customer Focussed* and *Operational Excellence*
Option 2	$13.7 million	Low	Aligns with *Customer Focussed* and *Operational Excellence* but less so than Option 1 as it is a higher overall cost
Option 3	No upfront capex	Moderate (not ALARP)	Does not align with our objectives

For each project, both the primary and secondary options satisfy most of the vision objectives in terms of being *Customer Focussed* and *Operational Excellence*. As a prudent operator, the engineering solutions put forward in each case provide a credible technical solution, mitigate reliability risks to customers and safety risks to the public and our employees, and represent a reasonable option.

The key difference between the primary and secondary options is that the secondary option is typically more expensive and therefore would not be consistent with our C*ustomer Focussed* objective of being cost efficient (i.e. delivering a solution for the lowest sustainable cost) or delivering *Operational Excellence* as they would not reflect benchmark performance.

The status quo option does not satisfy our vision objectives, as taking no action will not reduce the risk associated with delivery pressure drop caused by load growth. While 'doing nothing' results in a lower short-term cost, it does not meet our objectives, as the cost of reactive or piecemeal works in response to a supply failure are typically more expensive over the longer term than proactive works.

6.1.6 Proposed solution

Option 1 is the recommended solution as it will address network capacity constraints, reduce demand on DRS R133, allow for future growth and network expansion, and improve security of supply.

Option 1 was selected over Option 2 as it is a more cost-effective option whilst achieving a commensurate risk reduction (from moderate to low).

Option 3 is not viable as it is not consistent with our Risk Management Framework, which requires action to be taken to reduce any moderate (non-ALARP) risks to low or ALARP.

6.1.7 Why is the proposed option prudent?

Forecasted growth for the Angle Vale HP network will cause low pressures and potential supply issues in Angle Vale. Increased load will also increase flows and velocities through the supply point, DRS R133.

Option 1 and 2 address all supply issues by:

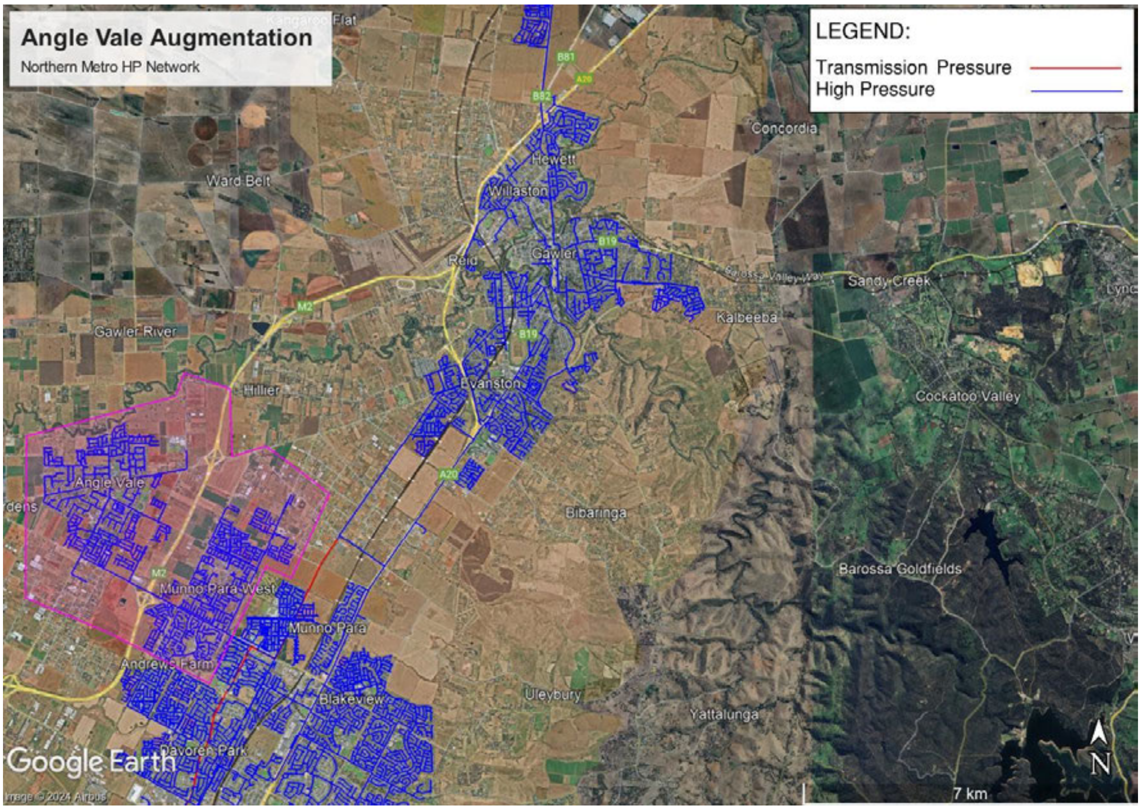
- Providing additional supply capacity sufficient for the expected growth in the area
- Providing an additional feed into areas of low pressures
- Redistributing network flows to optimise current equipment performance by reducing demand on DRS R133
- Servicing network expansion and growth for the next 10 years and beyond
- Removing the reliance of Angle Vale (currently approximately 3,500 customers) on a single supply trunk main (2.9 km DN 100mm steel main with no alternative supply method should the main be isolated or supply impacted in anyway)

Option 1 is preferred because:

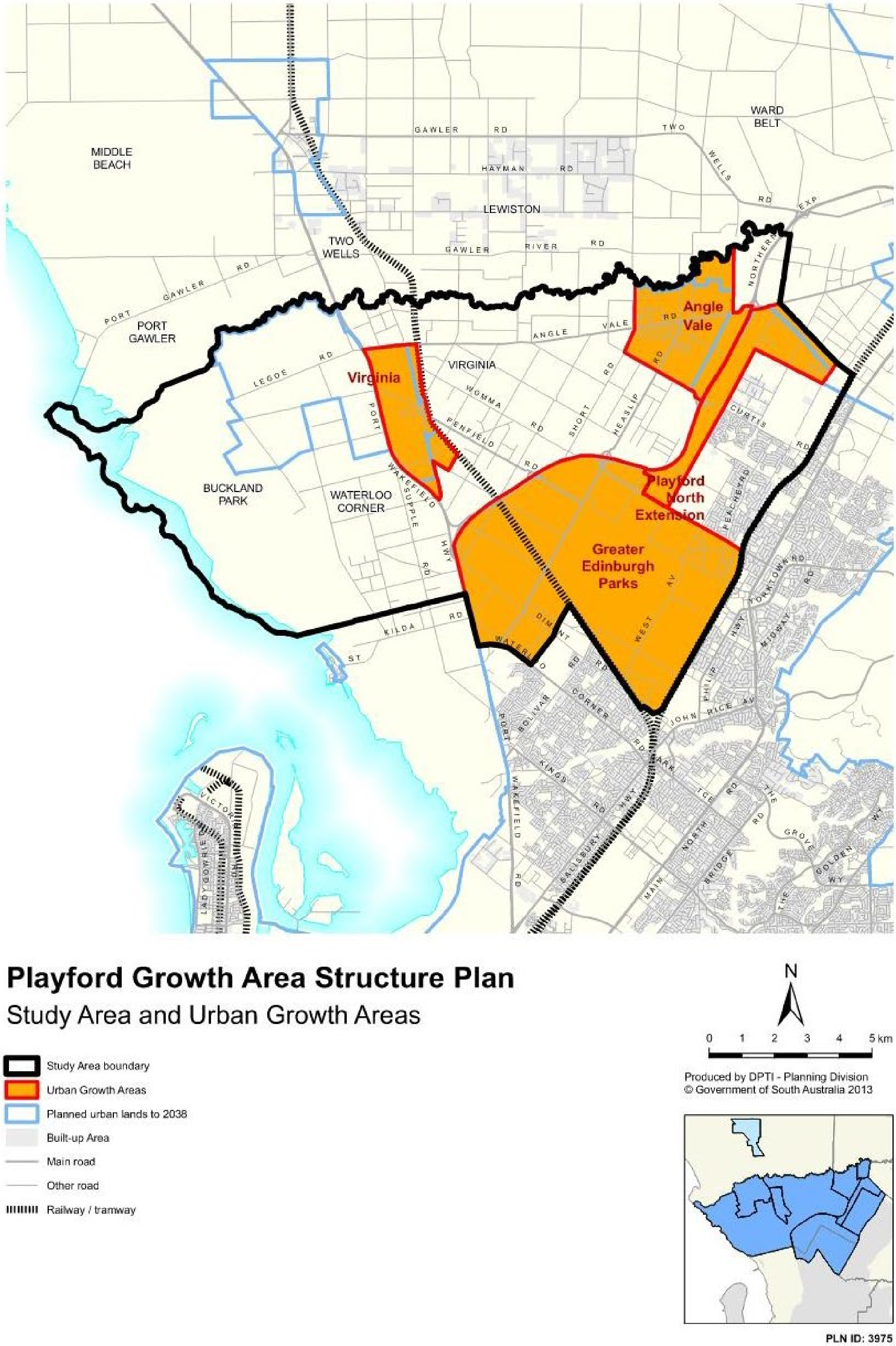
- It is the most prudent, cost-effective option
- It provides sufficient capacity to support the forecast organic growth over the remainder of the access arrangement period at a significantly lower cost than Option 2
- Option 1 avoids assets being installed in developing areas that could prove costly and disruptive to third parties and residents if augmentations are required in the future
- Land acquisition for Option 2 is based on rural zoned block outside of the main township with council rezoning and urban development potentially proving difficult to secure land

Appendix A Asset location maps and growth zone

Angle Vale HP network map

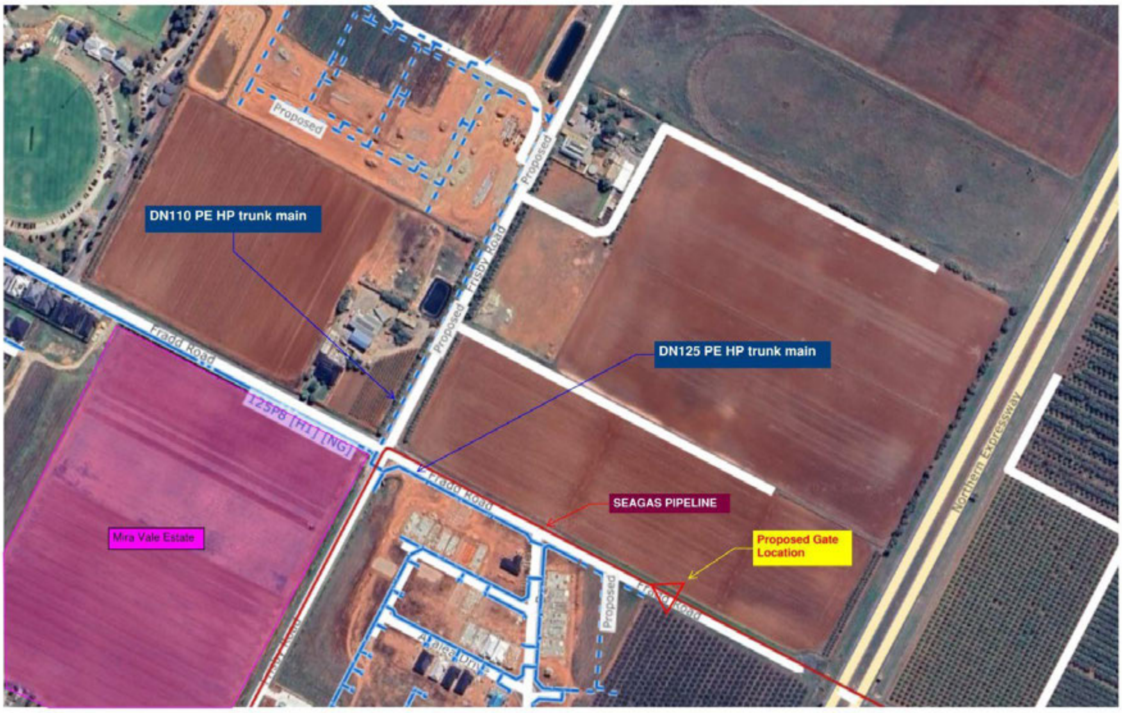


High growth region

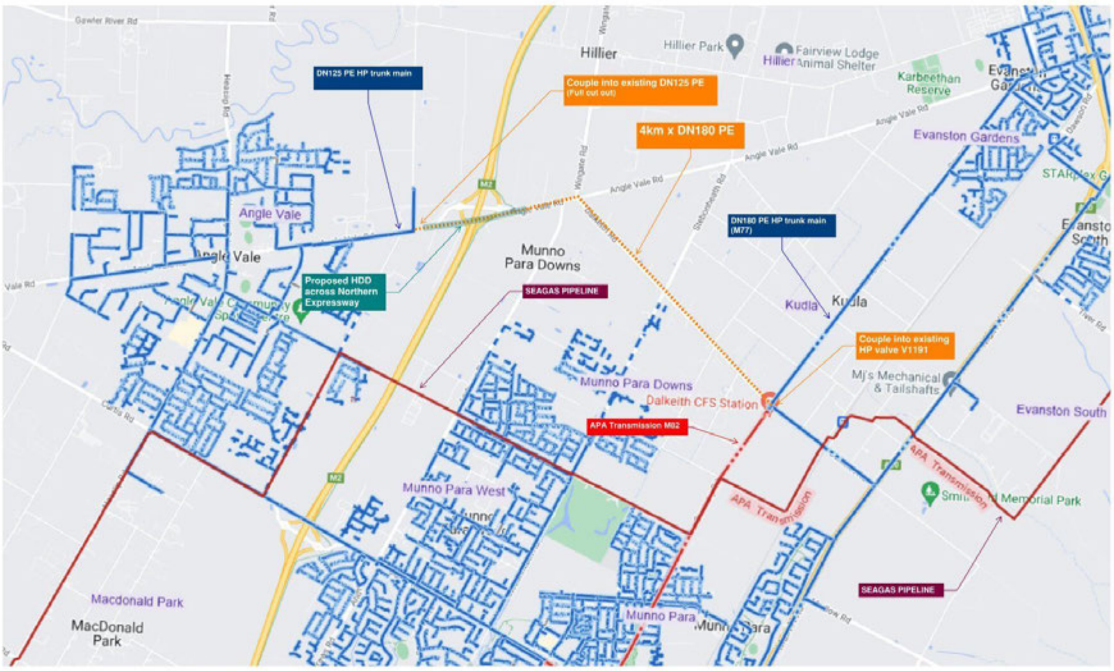


Appendix B Option diagrams

Option 1 (Primary)



Option 2 (Secondary)



Appendix C Cost estimate of proposed solution

Labour

Category	Description	No. Items / Metres	Unit Rate ($/unit)	Total Unit Cost
Labour - Contractor	Contractor mainlaying	[redacted]	[redacted]	[redacted]
Labour - Contractor	Tie ins	[redacted]	[redacted]	[redacted]
Labour - Consultant	Hydro testing	[redacted]	[redacted]	[redacted]
Labour - Contractor	Project Manager - External	[redacted]	[redacted]	[redacted]
Labour - Consultant	Engineer - External	[redacted]	[redacted]	[redacted]
Labour - Internal	APA Supervisor	[redacted]	[redacted]	[redacted]
Labour - Contractor	Reinstatement	[redacted]	[redacted]	[redacted]
Labour - Contractor	Survey and Geotech	[redacted]	[redacted]	[redacted]
Labour - Internal	Commissioning	[redacted]	[redacted]	[redacted]
Labour - Contractor	Trench cutting and rubble removal	[redacted]	[redacted]	[redacted]
Labour - Contractor	Traffic Management	[redacted]	[redacted]	[redacted]
Labour - Contractor	HDD	[redacted]	[redacted]	[redacted]
			TOTAL LABOUR COST $	[redacted]

Materials

Category	Description	No. Items / Metres	Unit Rate	Total Unit Cost
Materials - Pipe	180mm Polyethylene SDR 11 PMT	[redacted]	[redacted]	[redacted]
Materials - Fittings	Syphon box	[redacted]	[redacted]	[redacted]
Materials - Valves	Valves	[redacted]	[redacted]	[redacted]
Materials - Fittings	Miscellaneous fittings	[redacted]	[redacted]	[redacted]
Materials	Delivery and crane	[redacted]	[redacted]	[redacted]
			TOTAL MATERIAL COST $	[redacted]
Total Project Costs				[redacted]
Total AA Budget				$ [redacted]

6.2 Seaford Aldinga augmentation

6.2.1 Project overview

Table 6.10: Seaford Aldinga augmentation – Project overview

Description of the problem / opportunity	The southern suburbs of metropolitan Adelaide, from Noarlunga down to Sellicks Beach, is a major residential growth area. Over the past ten years, the number of customer connections in the region has grown by an average of 498 new residential connections per year. We expect growth to continue at this rate (as a minimum) over the next five-year period (July 2026 to June 2031). This historical growth in residential connections has decreased the amount of spare capacity in the Seaford Aldinga HP network, and we are reaching the point where augmentation is required to maintain customer supply pressures. The continued improvement of infrastructure to the area related to the Main South Road upgrade stage 2, and Main South Road duplication close to the Southern Expressway, combined with forecast residential growth in the City of Onkaparinga, indicates that residential growth will continue to be strong and natural gas demand in the region will continue to increase. Continued load growth in the region increases the risk of pressures dropping below 90 kPa, which is the minimum level necessary to maintain a safe and reliable customer supply. Based on the growth rates in the area, we estimate that unless action is taken to augment the southern network, pressures will fall below 90 kPa in winter 2030. The load increase will have the greatest impact on the southern extremity of the Seaford Aldinga HP network, particularly in and around Aldinga, Aldinga Beach and Port Willunga, which is home to around 3,980 customers. Network augmentation is therefore required before winter 2030 to ensure customer supply is not affected. This business case considers options to augment the Seaford Aldinga HP network during 2029/30.
Untreated risk	As per risk matrix = Moderate (non-ALARP)
Options considered	• **Option 1** - Duplicate [redacted] of DN280 trunk main from McLaren Vale to Aldinga ($2.2 million) • **Option 2** – Duplicate 2.8 km of DN280 trunk main from McLaren Vale to Aldinga ($3.8 million) • **Option 3** – Maintain status quo (no upfront costs)
Proposed solution	Option 1 is the proposed solution, as it will support continued load growth in the southern metropolitan area without impacting existing customers' supply. This option is designed to consider that network hydraulics may change over time and therefore is not investing in more reinforcement mains until such time that the demand requires it (unlike Option 2). Therefore Option 1 is the lowest direct cost option.
Estimated cost	The forecast direct cost (excluding overhead) during the next five years (July 2026 to June 2031) is $2.2 million.
Basis of costs	All costs in this business case are expressed in real unescalated dollars at January 2025 unless otherwise stated.
Treated risk	As per risk matrix = Low

$'000 Jan 2025	26/27	27/28	28/29	29/30	30/31	Total
Seaford Aldinga HP augmentation	-	-	-	2,197	-	**2,197**

Table may not sum due to rounding

6.2.2 Background

The southern suburbs of metropolitan Adelaide, from Noarlunga down to Sellicks Beach, is a major residential growth area. Over the past five years, the number of customer connections in the region has grown by over 350 new residential connections per year (average), and we expect this to continue at this rate, as a minimum, over the next five years.

The HP network in the southern suburbs (comprising most of the City of Onkaparinga local government area) supplies more than 17,000 customers (see Appendix A).

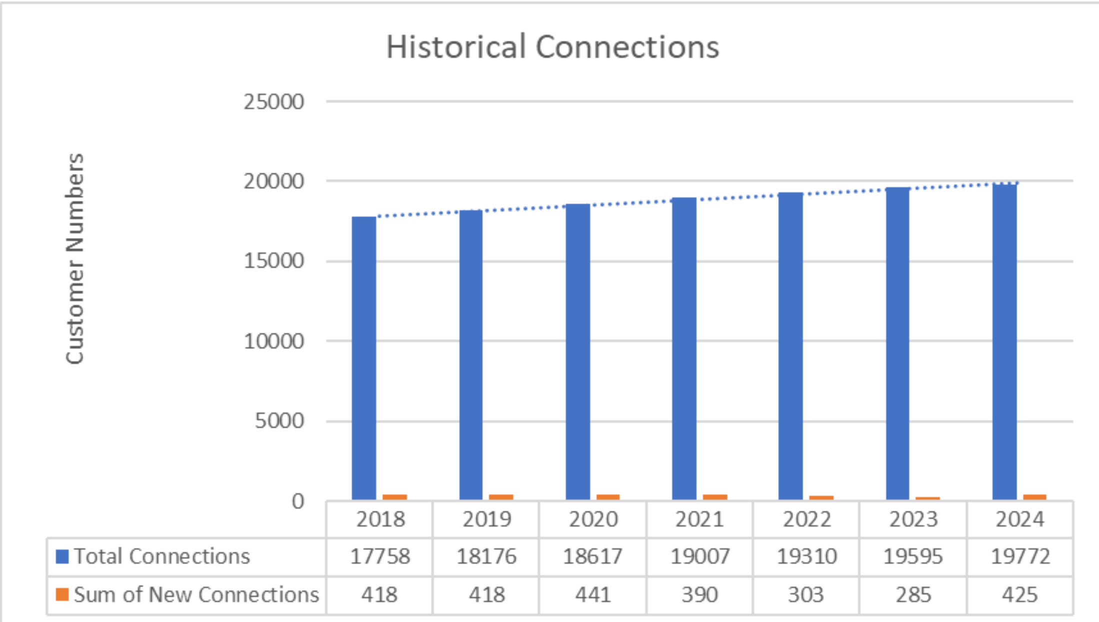
6.2.2.1 Impact of historical growth

Historical growth in residential connections has decreased the amount of spare capacity in the Seaford Aldinga HP network. The southern extremity of the network, in and around Aldinga, is particularly susceptible to pressure drop. We are reaching the point where augmentation is required to maintain customer supply pressures above minimum acceptable levels. This augmentation is a continuation of a program to strengthen the southern fringe of the Adelaide network with multiple augmentation projects completed over the last 15 years.

Aldinga is connected to the nearest district regulator by a single 15 km trunk main and connects around 3,980 customers. A DN80 / DN100 nominal diameter trunk main supplies gas to the area. The first 4 km of this trunk main is duplicated with a DN280 PE trunk main along Commercial Road. A pressure telemetry point at the Aldinga fringe location is used to monitor the performance of the network. Due to the length of the pipeline and limited spare capacity in the network, a relatively minor increase in load can lead to substandard pressures and supply issues.

Figure 6.5 shows the historical growth in new connections in the region[11] since 2018.

Figure 6.5: Historical connection growth in southern HP network, 2018 to 2024

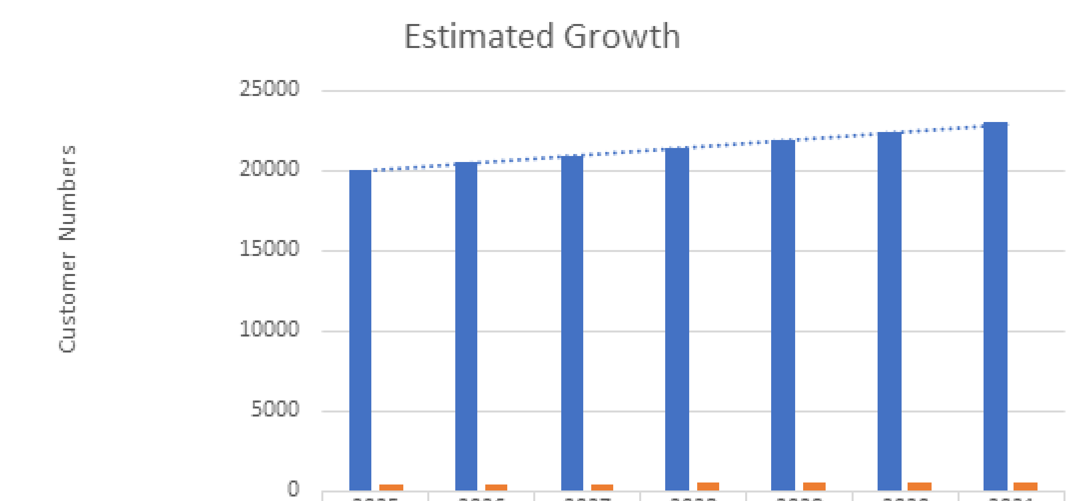


	2018	2019	2020	2021	2022	2023	2024
Total Connections	17758	18176	18617	19007	19310	19595	19772
Sum of New Connections	418	418	441	390	303	285	425

[11] This analysis covers Noarlunga, Hackham, Huntfield Heights, Old Noarlunga, Seaford, Moana and Aldinga.

Figure 6.6 shows the estimated increase in connections until the end of the access period.

Figure 6.6: Estimated growth in new connections in the southern suburbs

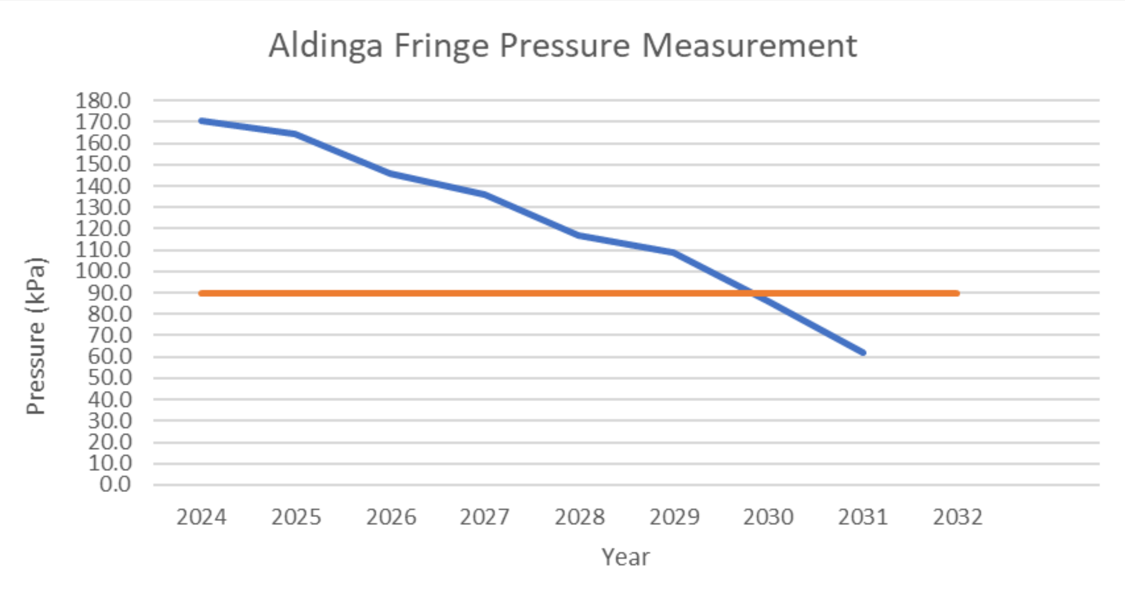


	2025	2026	2027	2028	2029	2030	2031
Sum of Total Connections	20078	20494	20934	21400	21896	22427	23000
Sum of New Connections	356	416	439	466	496	531	572

If growth rates in new connections continue as forecast, estimated pressure levels in the Seaford Aldinga HP network will fall below the minimum acceptable pressure of 90 kPa by 2029/30 if the network is not augmented.

Figure 6.7 shows a steep decline in pressure from 2028 onwards. Augmenting the network in 2029/30 will ensure fringe pressures, particularly sensitive to increases in demand, are maintained and stable ahead of predicted unsafe limits reached in 2030/31.

Figure 6.7: Estimated impact on pressures in Aldinga if the network is not augmented



6.2.2.2 Future growth

There is evidence to suggest future growth in connections may be higher than the historical rate.

The continued improvement of infrastructure to the area, combined with forecast residential growth in the City of Onkaparinga[12], indicates that residential growth will continue to be strong and natural gas demand in the region will continue to increase.

The Department for Infrastructure and Transport SA has completed Stage 1 of the Main South Road duplication from Seaford to Aldinga and are now developing Stage 2[13]. Stage 2 proposes to extend the highway further into Sellicks Beach (approximately 5 km south of Aldinga).

Consideration is also being given to a rail extension from Seaford to Aldinga. These projects are likely to stimulate growth and generate infill connections in these suburbs and along these corridors. With new subdivisions approved, our market research indicates this will provide opportunity to extend natural gas supply to Sellicks Beach, with potential for another 1,500 residential connections over the next 15 years.

Aldinga Payinthi College opened in Aldinga in 2022. It is able to accommodate 1,675 B-12 students, the school is currently at 50% capacity and is expected to continue growing.[14] The projected enrolment demand coming from strong population growth in Aldinga Beach, Sellicks Beach and surrounding areas.

Gas penetration rates for the area are over 80%, with some pockets over 90%. Given this forecast growth and load increase, network augmentation is required to ensure customers' supply is not affected. This business case therefore considers options to augment the Seaford to Aldinga HP network during 2029/30.

6.2.3 Risk assessment

The risk identified for the natural gas distribution network in the Seaford Aldinga region is that load growth without network reinforcement or augmentation will cause delivery pressures to drop, leading to substandard supply or loss of supply to up to 3,980 customers. This may lead to customers' gas appliances becoming inoperable or damaged in certain circumstances.

The primary consequence category affected by this risk is operations, as a pressure drop can cause outages to >1,000 customers, thereby carrying a significant consequence rating under the risk matrix.

Given load growth is ongoing, if the risk is left untreated the likelihood of a pressure drop impacting >1,000 customers is rated occasional (every few years), however the frequency of supply interruptions will likely increase the longer the load growth risk is not addressed.

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[12] SAFi Forecast review | Adelaide South | April 2023

[13] https://www.dit.sa.gov.au/infrastructure/road_projects/fleurieu_connections

[14] https://www.education.sa.gov.au/sites-and-facilities/upgrades-and-new-schools/new-school-south

Any significant customer outage would then give rise to a moderate reputational and compliance risk. While there is a moderate health and safety risk posed by falling delivery pressure, safety is not the primary driver of investment in this instance.

The untreated risk rating is shown in Table 6.11.

Table 6.11: Risk assessment – Untreated risk

Untreated risk	Health & Safety	Environ-ment	Operations	People	Compliance	Rep & Customer	Finance	Risk
Likelihood	Unlikely	Rare	Occasional	Rare	Occasional	Occasional	Occasional	Moderate
Consequence	Minor	Minimal	Significant	Minimal	Significant	Significant	Minor	
Risk Level	Low	Negligible	Moderate	Negligible	Moderate	Moderate	Low	

6.2.4 Options considered

We have considered the following options:

- Option 1 – Duplicate 1.5 km of DN280 trunk main from McLaren Vale to Aldinga
- Option 2 – Duplicate 2.8 km of DN280 trunk main from McLaren Vale to Aldinga
- Option 3 – Maintain status quo

These options are discussed in the following sections.

6.2.4.1 Option 1 – Duplicate [redacted] of DN280 trunk main from McLaren Vale to Aldinga

Under this option, we would install a duplicate DN280 HP trunk main, tying into the end of the existing DN280 trunk on Commercial Road at the McLaren Vale offtake, and extending approximately [redacted] south to Aldinga (refer to Appendix A for map). This option would augment the Aldinga network to mitigate the pressure drop risk, and would sustain forecast growth until 2033.

Further trunk duplication along Main South Road will be required to support expected growth in Sellicks Beach. This additional trunk main will also support neighbouring Aldinga and Aldinga Beach, where growth is expected to be strong. However, this can be deferred to 2032 (one year ahead of winter 2033 pressures dropping below the minimum pressure) if we install the initial [redacted] of trunk main in 2028/29.

The advantage of this option is that it reduces the amount of capex required over the next five years, deferring further augmentation to when the forecast growth is expected to occur in Sellicks Beach.

6.2.4.1.1 Cost assessment

The direct cost of this option during the next five years is $2.2 million (see Table 6.12).

Table 6.12: Cost estimate – Option 1, $'000 January 2025

	2026/27	2027/28	2028/29	2029/30	2030/31	Total
Labour	-	-	-	[redacted]	-	[redacted]
Material	-	-	-	[redacted]	-	[redacted]
Total	-	-	-	[redacted]	-	[redacted]

Appendix D provides a more detailed cost breakdown.

6.2.4.1.2 Risk assessment

Option 1 would reduce the loss of supply risk from high to low. This is because having a second source of supply would reduce the likelihood of a pressure drop impacting >1,000 people from frequent to remote. The risk consequence rating remains unchanged.

Option 1 also reduces the likelihood of a pressure drop leading to safety incidents for customers.

Table 6.13: Risk assessment – Option 1

Option 1	Health & Safety	Environ-ment	Operations	People	Compliance	Rep & Customer	Finance	Risk
Likelihood	Rare	Rare	Remote	Rare	Remote	Remote	Remote	Low
Consequence	Minor	Minimal	Significant	Minimal	Significant	Significant	Minor	
Risk Level	Negligible	Negligible	Low	Negligible	Low	Low	Negligible	

6.2.4.2 Option 2 – Duplicate 2.8 km of DN280 trunk main from McLaren Vale to Aldinga

Under this option, we would duplicate the DN280 HP trunk main, tying into the end of the existing DN280 trunk on Commercial Road at the McLaren Vale offtake, and then extending approximately 2.8 km south to Aldinga (see Appendix B). This option would augment the Aldinga HP network to mitigate the pressure drop risk, and would sustain forecast growth for six years.

During the current period we constructed a loop via the extension of the Aldinga trunk with approximately 1.7 km of 110mm trunk in How Road, connecting to an existing 110mm trunk close to the intersection of Quinliven Road. This project was completed in 2023 and has helped defer additional reinforcement until 2030.

Further trunk duplication along Main South Road will be required to support expected growth in Sellicks Beach. This additional trunk main will also support neighbouring Aldinga and Aldinga Beach, where growth is also expected to be strong. However, this can be deferred to 2036 if we install the initial 2.8 km of trunk main in 2028/29.

6.2.4.2.1 Cost assessment

The direct cost of this option is $3.8 million (see Table 6.14).

Table 6.14: Cost estimate – Option 2, $'000 January 2025

	2026/27	2027/28	2028/29	2029/30	2030/31	Total
Labour	-	-	-	[redacted]	-	[redacted]
Material	-	-	-	[redacted]	-	[redacted]
Total	-	-	-	[redacted]	-	[redacted]

6.2.4.2.2 Risk assessment

Option 2 would reduce the loss of supply risk from moderate to low. This is because having a second source of supply would reduce the likelihood of a pressure drop impacting >1,000 people from occasional to remote. The risk consequence rating remains unchanged.

Option 2 also reduces the likelihood of a pressure drop leading to safety incidents for customers.

Table 6.15: Risk assessment – Option 2

Option 2	Health & Safety	Environ-ment	Operations	People	Compliance	Rep & Customer	Finance	Risk
Likelihood	Rare	Rare	Remote	Rare	Remote	Remote	Remote	Low
Consequence	Minor	Minimal	Significant	Minimal	Significant	Significant	Minor	
Risk Level	Negligible	Negligible	Low	Negligible	Low	Low	Negligible	

While Option 2 achieves the same risk rating as Option 1, the solution under Option 2 provides this risk reduction at a higher overall cost.

6.2.4.3 Option 3 – Maintain status quo

Under this option we would not incur any proactive capacity expansion capex to reduce the loss of supply risk in Aldinga. Instead, we would manage the network as per current practice and address any supply issues as and when they occur.

Given the current load growth forecasts, it is highly likely capital costs to address supply shortfall will be incurred during the next five years as minimum pressure limits are expected to be reached in 2029. As the network is already operating at its MAOP, no further network capacity can be enabled through pressure increases.

Maintaining the status quo is not a viable solution, as it inefficiently defers capacity expansion expenditure, impacts our ability to maintain network minimum pressures, causes reliability issues for existing customers as well as potentially resulting in high-cost reactive works. Should we not include a forecast for proactive augmentation works in the next period, we would need to reprioritise our forward works program to undertake these works reactively. This would prevent other planned works from progressing, and merely shift the risk to another area.

6.2.4.3.1 Cost assessment

While there are no additional upfront costs associated if we maintain the status quo, as mentioned above, we are likely to incur greater reactive maintenance costs as pressure issues emerge.

While it is not possible to quantify the reactive costs we would incur at this time, in our experience a project conducted reactively is around 3.2 times more expensive than one conducted proactively.[15] This assumption is consistent with the commonly accepted asset management principle that reactive asset maintenance can be around two to five times higher than proactive planned maintenance.[16]

Following the reactive works, if the network continually experiences substandard pressures, one of the solutions described under Option 1 or 2 would need to be applied.

6.2.4.3.2 Risk assessment

Under Option 3, the risk level would remain the same as the untreated risk as there are no controls in place to mitigate the pressure drop risk (other than not connecting new

[15] For example, this is typically due to the additional premia for faster acquisition of long lead time materials, emergency response, labour costs, additional traffic management/permit costs, resource scheduling, etc.

[16] Marshall Institute, Omega engineering, ARMS reliability

customers, which is not a viable option). Table 6.16 shows the risk level if were to maintain the status quo.

Table 6.16: Risk assessment – Option 3

Option 3	Health & Safety	Environ-ment	Operations	People	Compliance	Rep & Customer	Finance	Risk
Likelihood	Unlikely	Rare	Occasional	Rare	Occasional	Occasional	Occasional	Moderate
Consequence	Minor	Minimal	Significant	Minimal	Significant	Significant	Minor	
Risk Level	Low	Negligible	Moderate	Negligible	Moderate	Moderate	Low	

Option 3 is therefore not consistent with our risk management framework, which requires action must be taken to reduce any moderate (non-ALARP) risks to low or ALARP.

6.2.5 Summary of cost benefit assessment

Table 6.17 presents a summary of how each option compares in terms of the estimated cost, the residual risk rating, and alignment with our vision objectives.

Table 6.17: Comparison of options

Option	Estimated cost	Treated residual risk rating	Alignment with vision objectives
Option 1 – Duplicate trunk [redacted]	$2.2 million	Low	Aligns with *Delivering for Customers* and *Sustainably Cost Efficient*. Allows deferral of further augmentation to 2032.
Option 2 – Duplicate trunk 2.8km	$3.8 million	Low	Aligns with *Delivering for Customers* but is less *Sustainably Cost Efficient* than Option 1. Higher cost within the access arrangement period than Option 1 but allows augmentation to accommodate further augmentation to be deferred to 2036.
Option 3 – Maintain status quo	No upfront capital costs	Moderate (non-ALARP)	Does not align with *Delivering for Customers* or *Sustainably Cost Efficient*.

6.2.6 Proposed solution

Option 1 which will see the duplication of [redacted] of trunk is the proposed solution.

6.2.7 Why is the recommended option prudent?

Duplicating the [redacted] DN280 trunk by 2029 is the most prudent option as it addresses the pressure drop risk before the minimum acceptable levels arise, while setting an efficient platform for further augmentation when the forecast growth is expected to occur in Sellicks Beach and the regions around Aldinga.

Option 1 and 2 address all supply issues by:

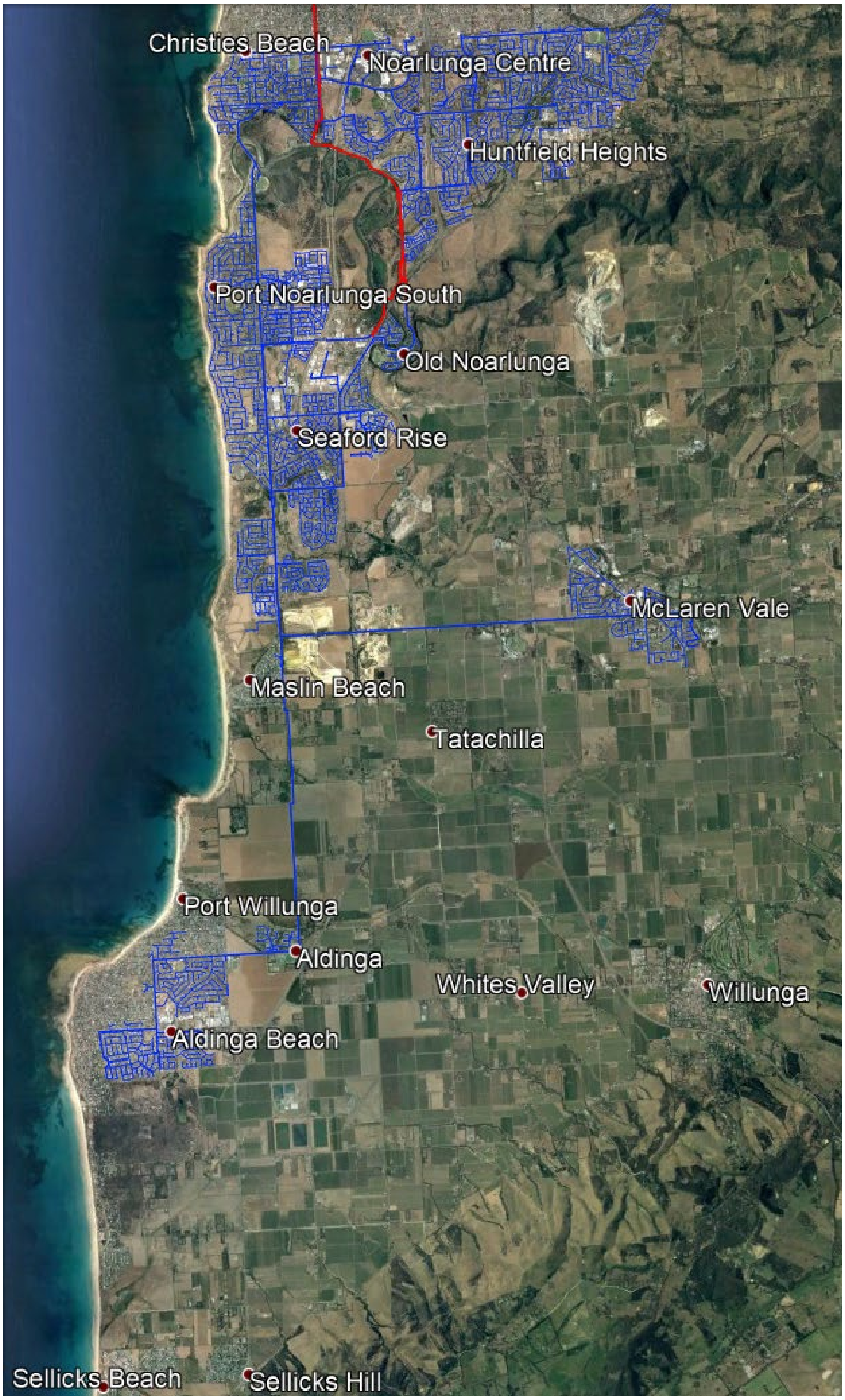
- Providing additional supply capacity sufficient for the expected growth in the area
- Providing an additional feed into areas of low pressures
- Balancing network expansion and growth with capital expenditure over the next 10 years and beyond

Option 1 is preferred because:

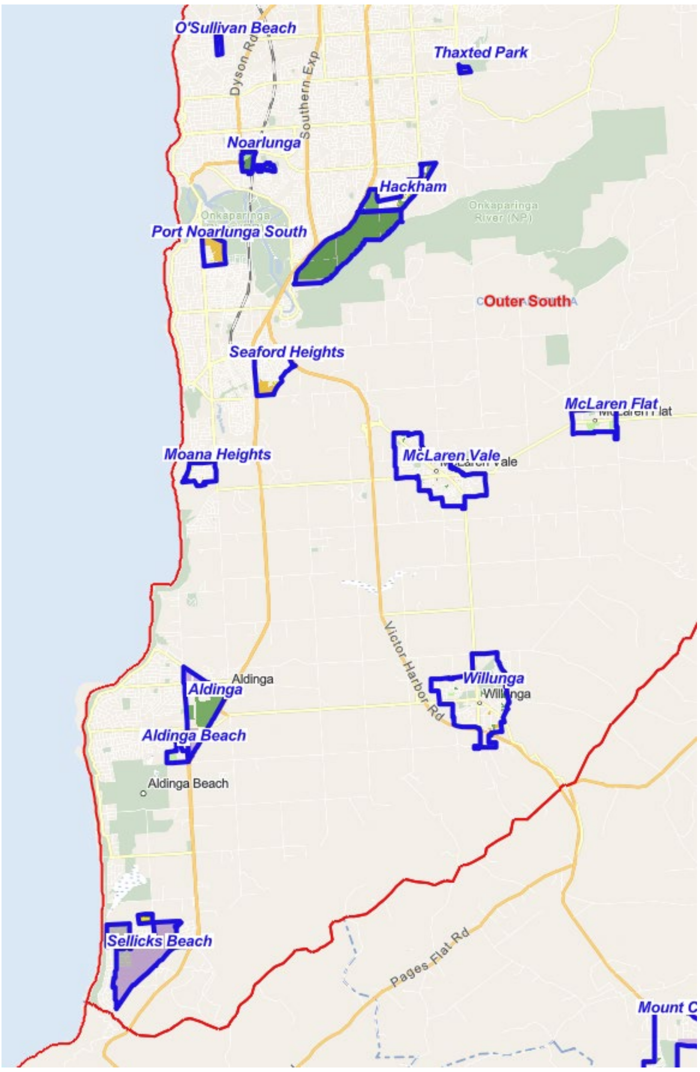
- It is the most prudent, cost-effective option
- It provides sufficient capacity to support the forecast organic growth over the remainder of the AA period at a significantly lower cost than Option 2

Appendix A Asset location maps and growth zone

HP southern network map

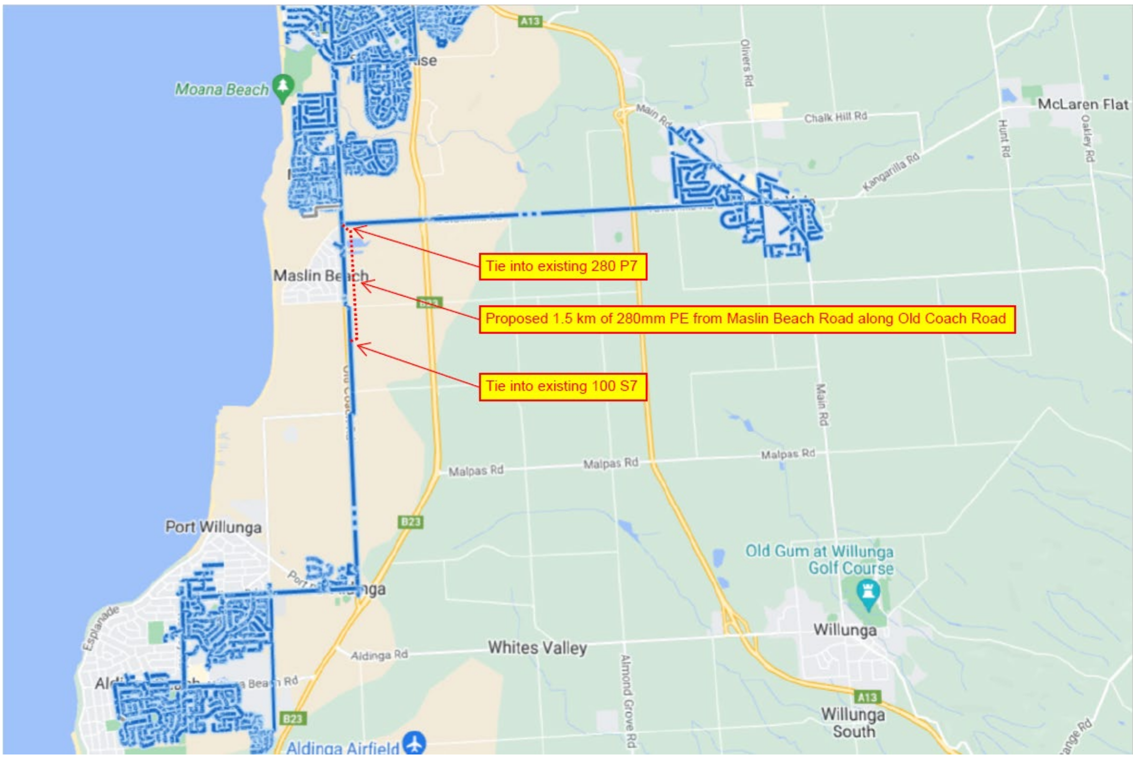


Growth areas – Plan SA

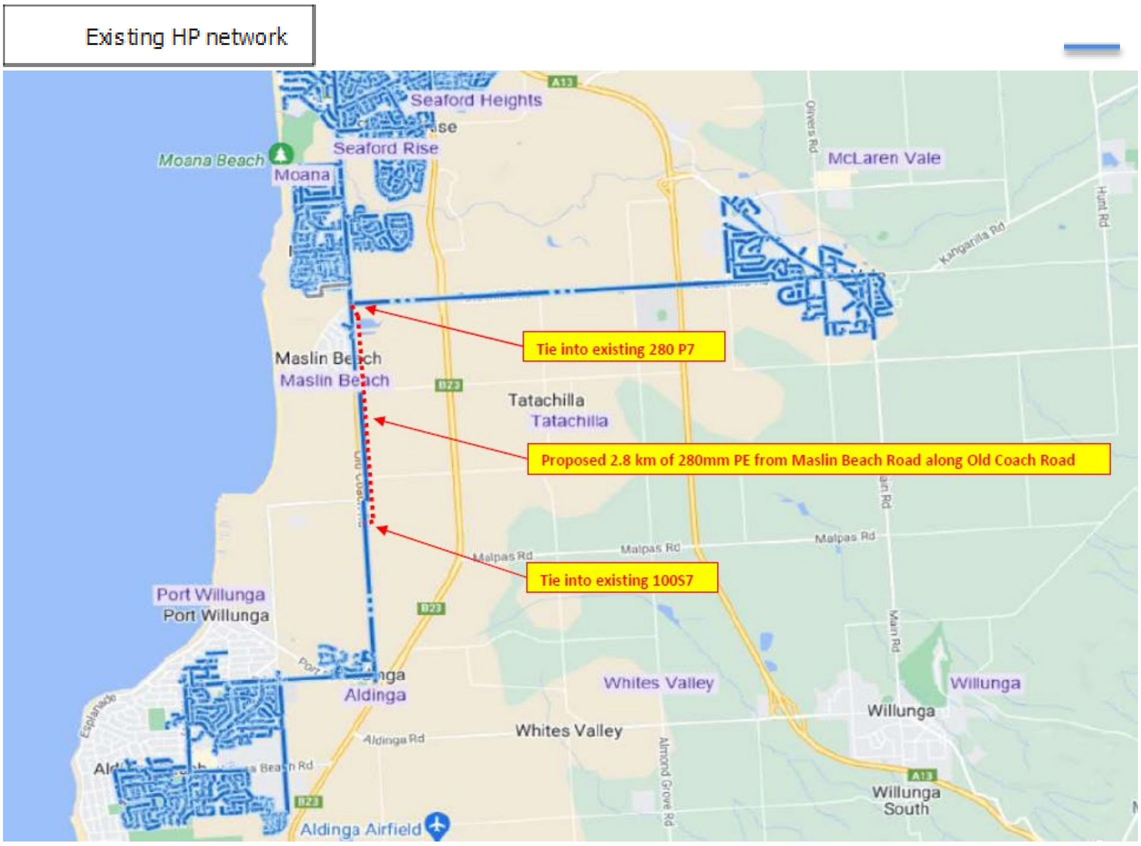


Appendix B Options

HP Southern Network MAP – Option 1 (Primary)

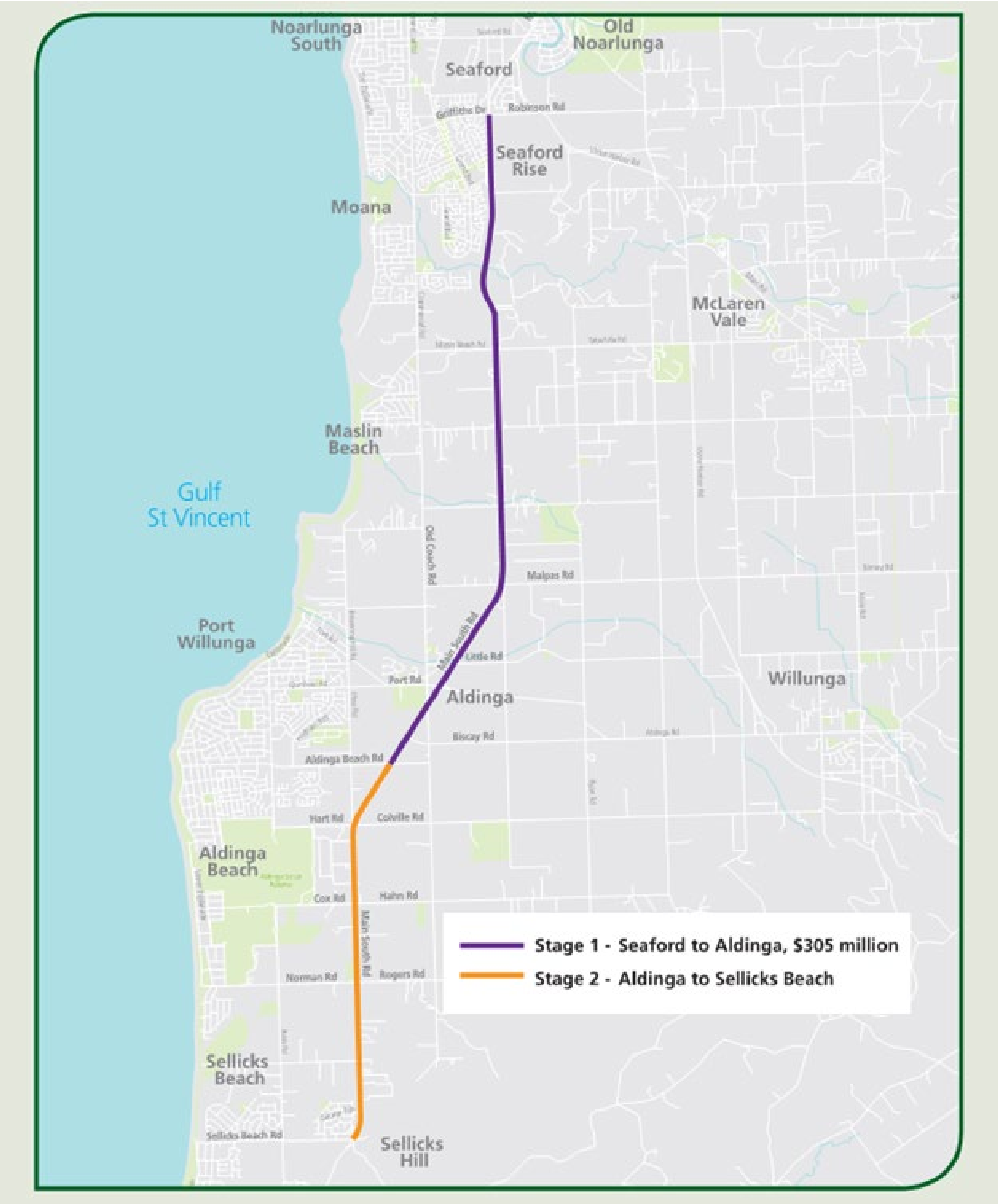


HP Southern Network MAP – Option 2 (Secondary)



Appendix C Main South Road duplication project

Main South Road duplication project map



Appendix D Cost estimate of proposed solution

Labour

Category	Description	No. Items / Metres	Unit Rate ($/unit)	Total Unit Cost
Labour - Contractor	Contractor mainlaying	[redacted]	[redacted]	[redacted]
Labour - Contractor	Tie ins	[redacted]	[redacted]	[redacted]
Labour - Consultant	Hydro testing	[redacted]	[redacted]	[redacted]
Labour - Contractor	Project Manager - External	[redacted]	[redacted]	[redacted]
Labour - Consultant	Engineer - External	[redacted]	[redacted]	[redacted]
Labour - Internal	APA Supervisor	[redacted]	[redacted]	[redacted]
Labour - Contractor	Reinstatement	[redacted]	[redacted]	[redacted]
Labour - Contractor	Survey and Geotech	[redacted]	[redacted]	[redacted]
Labour - Internal	Commissioning	[redacted]	[redacted]	[redacted]
Labour - Contractor	Trench cutting and rubble removal	[redacted]	[redacted]	[redacted]
Labour - Contractor	Traffic Management	[redacted]	[redacted]	[redacted]
			TOTAL LABOUR COST $	$ [redacted]

Materials

Category	Description	No. Items / Metres	Unit Rate	Total Unit Cost
Materials - Pipe	180mm Polyethylene SDR 11 PMT	[redacted]	[redacted]	[redacted]
Materials - Fittings	Syphon box	[redacted]	[redacted]	[redacted]
Materials - Valves	Valves	[redacted]	[redacted]	[redacted]
Materials - Fittings	Miscellaneous fittings	[redacted]	[redacted]	[redacted]
Materials	Delivery and crane	[redacted]	[redacted]	[redacted]
			TOTAL MATERIAL COST $	[redacted]
Total Project Costs				[redacted]
Total AA Budget				[redacted]