

AER Access Arrangement 2019

AGN Capital Expenditure

Prepared for



12 November 2020 Zincara P/L 11 Alexandra Street St Kilda East 3183 Telephone 03 9527 4921

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1. EXECUTIVE SUMMARY

In July 2020, Australian Gas Network (AGN) submitted its Access Arrangement (AA) for its gas distribution network in South Australia. The AA is to apply from 1 July 2021-30 June 2026. The AER engaged Zincara P/L (Zincara) to provide technical advice on some aspects of the forecast capital expenditure (capex). They include:

- Mains Replacement
- Meter replacement
- Augmentation
- Growth
- Other Distribution System
- Regulators

Mains Replacement

AGN proposes to completely replace all of the old cast iron (CI) and unprotected steel mains (UPS) in the next AA period. It also intends to completely replace the smaller diameter first generation plastic (HDPE) pipes and continue with its inline inspection of the early generation 50mm HDPE.

The two areas where we have some concerns are the accelerated CI/UPS replacement program and the replacement of the HDPE575 DN40 pipes.

Details of the CI/UPS mains replacement are provided in the table below.

| Category | Current Period (km) | Next Period (km) | |
|----------------------|---------------------|------------------|--|
| Block – Low pressure | 288 | 520 | |
| CBD – Adelaide | 53 | - | |
| CBD – North Adelaide | - | 38 | |
| Trunk | 59 | - | |
| Medium Pressure (MP) | 4 | - | |
| Total CI/UPS/Other: | 404 | 558 | |

Table 1-1: CI/UPS/Other mains replacement – AGN program

(Source: DMSIP: table 1 (proposed) and table 2 (current period)

The block replacement also includes over 30% of other types of pipe material. These pipes are interspersed in the low pressure system probably from repairs carried out at some stage.

We concluded from our analysis of the asset condition that the North Adelaide gas mains should be replaced in the next AA period. However, we also consider that asset condition for the LP pipes proposed for block replacement do not justify the accelerated replacement. Our alternative program is based on replacing 405km of the block replacement in the next AA period and the remaining 115kms to be carried out in the subsequent period. Our alternative program will not have any material impact on risk or the maintenance program.

Our analysis of the HDPE575 DN 40 MP pipes showed that there had only three squeeze off failures since 2005 with the latest occurring in 2011. This does not constitute a recurring failure and as such we do not recommend replacing the 90km proposed by AGN.

With respect to HDPE575 DN40 HP pipes, our analysis showed that there is a history of squeeze off failures, particularly relating to pipes laid prior to 1991 and therefore we support a prioritised replacement program. However, the analysis shows that 150 kilometres (pre-1991 pipes) to be prudent and efficient, rather than the 198 kilometres (pre-1993) proposed by AGN.

There have been useful engagements with both AGN and the Office of Technical Regulator (OTR) on these subjects and any future advice from either party will be considered after the AER's draft decision.

Our review on the unit rates used for calculating the capex has identified a concern of the unit rates used for:

- CI/UPS North Adelaide. We have calculated a unit rate of **second** instead of AGN's proposed unit rate of **second**. This is due to the variation in the labour component cost estimate including the impact of additional scope components.
- HDPE575 DN40 MP. We have calculated a unit rate of instead of AGN's proposed unit rate of . This is due to variation in labour component.
- non AMRP services¹. We have calculated a unit rate to be comprising the current year labour rate and three-year materials/other rate) instead of AGN's proposed unit rate of components.

Details of Zincara's recommendations are provided below.

| | AGN's Proposal | Zincara revision | Variance |
|---|----------------|------------------|----------|
| Mains Replacement | 238.11 | 164.93 | -73.18 |
| Inspection/Reinforcement HDPE 575 DN50 | 8.16 | 8.16 | - |
| Service Renewal | 11.7 | 11.34 | -0.36 |
| Total | 258.01 | 184.43 | -73.58 |

Meter Replacement

The replacement of meters is required to ensure that customers continue to be billed accurately as required under the South Australian Metering Code and the National Measurement Act.

¹ AMRP services are services that are associated with the mains replacement program. A non-AMRP service replacement is an ad-hoc service replacement due to leaks or damage.

AGN proposed a capex of \$18.15million for the replacement of the domestic meters and the I&C meters.

We have examined AGN's methodology for forecasting the domestic meter volumes for replacement and the unit rates used to calculate the forecast capex. We consider the forecast of meter replacement volume and the unit rates to be reasonable and therefore recommend acceptance of the meter replacement capex.

Details of the meter replacement capex are shown in the table below.

| | AGN's Proposal | Zincara revision | Variance |
|---------------------------------|----------------|------------------|----------|
| Domestic meters | 16.74 | 16.74 | - |
| I&C meters | 1.41 | 1.41 | - |
| I&C meters (>25m ³) | 1.41 | 1.41 | - |
| Total | 18.15 | 18.15 | - |

Table 1-3: Zincara's Recommended Meter Replacement Capex (\$2019/20 million)

Augmentation

AGN proposed to two projects to augment its network as shown in the table below.

| Business case | Project name | Capex |
|---------------|--|-------|
| SA115 | Northern Metro HP main and Gawler Gate Station | 7.13 |
| SA116 | Southern Metro HP augmentation | 3.07 |
| Total: | | 10.21 |

 Table 1-4: AGN proposed Augmentation program (\$2019/20 million)

(Source: Capex forecast model)

The business cases provided details of the projects including projected growth and the steps needed to ensure that the network has adequate supply in the respective areas. Zincara recommends acceptance of the projects.

Growth

AGN forecast its growth capex for the next AA period to be \$129.36million. The capex is essentially being calculated by the volume of connections multiplied by the unit rates.

The volume forecast was carried out by an external consultant, Core Energy. The Core Energy forecast included Concordia and Kingsford estate but not Mt Barker. However, the AGN forecast does include Mount Barker. The forecast had also adjusted for Covid-19.

We have not identified any issues with the forecast but we believe that the long term effect of Covid-19 is unknown and recommend that the forecast be updated prior to the AER's final decision.

In relation to the unit rates for each class of customers, AGN had generally used the current year actuals as the basis for its proposed forecast. A number of price pressure issues were identified including:

- New internal APA installation procedures have been introduced in recent year(s), including use of meter bar and brackets;
- New internal APA meter location compliance procedure introduced in July 2019;
- External pricing pressures through additional administrative and safety standards;
- Larger estate developments requiring larger diameter mains;
- Existing homes connections closer to the CBD or in more complex locations; and
- I&C < 10 TJ connections closer to CBD areas with more complex requirements.

We examined whether a multi-year average should be used instead of the most current year and sought additional information on a number of issues. Following AGN's response, Zincara concurred with the approach adopted by AGN as the price pressures listed above would put an upward pressure on the unit costs. We therefore recommend accepting the unit rates.

In relation to Mount Barker, we have included the capex in our recommendation but AGN is still to confirm whether project is to proceed.

Details of the capex for the growth are shown in the table below.

| | AGN's Proposal | Zincara revision | Variance |
|-----------------------------|-------------------|---------------------|----------|
| Meters | 11.98 | 11.98 | - |
| Services | 65.77 | 65.77 | - |
| Mains | 20.92 | 20.92 | - |
| Growth areas: | | | |
| Concordia Reticulation | 3.06 | 3.06 | - |
| Kingsford Industrial Estate | 2.66 | 2.66 | - |
| Mt Barker Reticulation | 24.97 | 24.97 | - |
| Total | 129.36 | 129.36 | - |

Table 1-5: Recommended Growth Capex (\$2019/20 million)

Other Distribution Capex

The capex for this category is essentially for work with the TP pipelines. AGN had proposed 11 projects in this category and had provided business case for each of the project. We have examined the justification for each project and the estimated costs.

We have recommended acceptance of nine projects and a part acceptance of two. The two projects that we propose part acceptance are the replacement of valves and the TP modification of the pipelines for inline inspection.

In relation to the replacement of frozen valves and the proactive replacement of other valves (SA103), we have recommended acceptance of the frozen valves. It is unclear why the valves that were repaired are now proposed to be replaced proactively. This means that we are recommending the replacement of 16 frozen valves and at this stage not recommending the replacing of the other 16 proactive replacement valves.

The project SA105 Pipe Modification for Inline Inspection, we are recommending accepting the modification for pipeline M12/M84 to enable inline inspection but are not recommending proceeding with the $FEED^2$ for the other pipelines that AGN are proposing to modify in the subsequent AA period.

In regard to the project SA104 TP M53, we have been advised that the South Australian Department for Planning, Transport and Infrastructure (DPTI) had agreed to fund for the replacement of the portion of the M53 as part of the lowering of the road bridge across Main South road. As the capex has been submitted as part of AGN's submission, we will continue to recommend the project from a technical perspective. We refer the decision on how to treat the funding to the AER.

| Table 1-6: Recommended Other Distribution Capex (\$2019/20 million) | | | | | | | |
|---|---------------------------------------|-------|---------|------------|--|--|--|
| Code | Name | AGN | Zincara | Difference | | | |
| SA101 | DCVG Dig Up and Repair TP | 1.26 | 1.26 | - | | | |
| SA103 | Replacement of Valves | 4.97 | 2.78 | 2.19 | | | |
| SA104 | TP M53 Replacement | 1.57 | 1.57 | - | | | |
| SA105 | Pipeline Mod for ILI | 31.99 | 23.88 | 8.11 | | | |
| SA107 | Additional emergency isolation valves | 1.77 | 1.77 | - | | | |
| SA108 | I and C Meter Set Refurbishment | 1.34 | 1.34 | - | | | |
| SA112 | CP Assets Replacement | 1.65 | 1.65 | - | | | |
| SA126 | CP Remote Monitoring | 0.48 | 0.48 | - | | | |
| SA127 | Isolated Steel Sections from CP | 1.17 | 1.17 | - | | | |
| SA129 | I&C Overpressure risk reduction | 2.46 | 2.46 | - | | | |
| SA131 | Slab Sensitive TP Areas | 0.27 | 0.27 | - | | | |
| | Total | 48.93 | 38.63 | 10.30 | | | |

Our recommended capex is shown in the table below.

Table 1. 6. Recommended Other Distribution Coney (\$2010/20 million)

Regulators

The capex for this category is for the replacement or upgrade of AGN's gate and district regulator stations. AGN had submitted two projects in this category:

² FEED stands for Front End Engineering Design which is carried out to determine the technical issues with the project and to firm up the cost estimate.

- DRS overpressure risk reduction.
- DRS operability risk reduction.

The DRS overpressure risk reduction project is for the installation of a valve and a regulator on a bypass line which is currently unregulated. During maintenance of the DRS, there is a risk of over-pressurizing the network when the valve of a bypass line is open to ensure continuity of supply to the customers. Having an additional valve and regulator prevents such accidents. We consider the project to be prudent and our review of the cost has not shown any issues of concern. We therefore commend acceptance of the costs as efficient.

The DRS operability reduction project is associated with the installation of butterfly lids on 25 existing DRS with fully enclosed Gatic cover. Accessing such DRS is a safety hazard and is inconsistent with SA Confined Space Code of Practice. We consider these reasons are good justifications why the butterfly lids should be installed. We have reviewed the costs and consider the costs to be efficient. We therefore recommend accepting the project as prudent and efficient.

The recommended capex is shown in the table below.

| Business case | Business case Project name | |
|---------------|---------------------------------|------|
| SA106 | DRS Overpressure risk reduction | 3.10 |
| SA109 | DRS Operability Risk Reduction | 1.97 |
| Total: | | 5.07 |

Table 1-7: Recommended Regulator Capex (\$2019/20 million)

Summary

A summary of Zincara's recommended capex is provided in the table below.

| | AGN | Recommended | Difference |
|--------------------|--------|-------------|------------|
| Mains Replacement | 258.01 | 184.43 | -73.58 |
| Meter Replacement | 18.15 | 18.15 | - |
| Augmentation | 10.21 | 10.21 | - |
| Growth | 129.36 | 129.36 | - |
| Other Distribution | 48.93 | 38.63 | -10.30 |
| Regulators | 5.07 | 5.07 | - |
| Total | 469.72 | 385.84 | -83.88 |

 Table 1-8: Summary of Zincara's Recommended Capex (\$2019/20 million)

Note: Mt Baker capex has been included in the recommended capex notwithstanding that AGN is to advice whether it is proceeding with the project.

2. INTRODUCTION

2.1 BACKGROUND

In July 2020, Australian Gas Networks (AGN) submitted its Access Arrangement (AA) for the period 2021-2026 for the natural gas distribution system in South Australia to the Australian Energy Regulator (AER). The AER engaged Zincara P/L (Zincara) to advise on some aspects of the forecast capex. In particular, the AER sought advice on the following:

- Mains Replacement
- Meter replacement
- Augmentation
- Growth
- Other Distribution System

2.2 SCOPE OF THE CONSULTANCY

The focus of the review is to provide the AER with a view on whether the capex meets the requirements of the National Gas Rules (NGR) and in particular NGR 79.

2.3 NATIONAL GAS RULES

Zincara has used NGR 79 as guidance to determine the reasonableness of the capex. The relevant part of NGR 79 which has been applied is:

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

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

(b) the capital expenditure must be justifiable on a ground stated in subrule (2); and

(c) the capital expenditure must be for expenditure that is properly allocated in accordance with the requirements of subrule (6).

2.4 DEFINITION FOR PRUDENCE AND EFFICIENCY

As NGR 79 does not define the prudence, efficiency and good industry practice, Zincara has adopted the following definitions:

"Prudence", means "caution in managing one's activities to avoid undesirable consequences³". Zincara has interpreted this to mean that for the project to be prudent, the decision is made on the basis that it is timely for the project to proceed to rectify ongoing safety and reliability issues.

'Efficiency' means functioning or producing effectively and with the least waste of effort³. This means that the choice of which option to adopt for the project must be made on the basis that the most effective solution has been adopted. The "least amount of effort" refers to the cost of the project and in that context the project must be carried out at market rates.

"Good industry Practice" means that the actions that a prudent operator would adopt in in similar Australian conditions.

2.5 APPROACH

The key steps of our approach are:

- Review the relevant documents provided by AGN in its submission. The documents include the capital submission, the asset management plan, the business plans supporting the projects and other related spreadsheets.
- Identify what are the strategic objectives for each project.
- Determine whether the most efficient option has been adopted and the appropriateness of the timing of the project.
- Ensure that the estimated cost for the project meets the efficiency test.

Zincara's analysis is based on the AGN's submission and Zincara has assumed the data to be accurate. Zincara has not verified the accuracy or veracity of the data.

In carrying out the review, Zincara considered:

- the efficiency and prudence of the size, scope and timing of AGN's proposed capital expenditure (capex) allowances;
- the justification for each project or area of forecast capex ;
- the relationship of the capex allowances to the respective drivers of capex, and the efficiency and prudence of the service provider's proposed capex allowances in relation to these drivers;

³ Australian Concise Oxford Dictionary

- the efficiency and prudence of the service provider's proposed capex allowances in relation to any capex—opex (operating costs) interactions and potential trade-offs; and
- the appropriateness of the service provider's methods for determining its proposed capex allowances, including whether the forecasts were arrived at on a reasonable basis and represent the best forecast or estimate possible in the circumstances.

2.6 COST REPORTING

All costs shown in this report are in real 2019/20 dollars unless otherwise stated. Any reference to direct cost means that the cost includes labour, material and contractors but does not include overheads.

This report is presented in regulatory years (e.g. July 2020-June 2021). The sections of the report which is presented in calendar years will have a notation CY.

It should also be noted that some totals in the tables may differ slightly with the addition of the numbers on the tables. This is due to rounding errors.

2.7 STRUCTURE OF THE REPORT

The Report covers the following:

- Description of AGN Gas Networks
- Asset Management Practices
- Mains Replacement
- Meter Replacement
- Augmentation
- Growth
- Other Distribution Systems

3. AGN GAS NETWORKS

AGN is a gas distributor who supplies to over 1.3million residential, commercial and industrial customers across South Australia, Victoria, Queensland (mainly Brisbane), New South Wales (Albury, Wagga Wagga) and the Northern Territory (Alice Springs).

AGN forms part of the Australian Gas Infrastructure Group (AGIG), one of the largest gas infrastructure groups in Australia.

The South Australian gas network supplies more than 450,000 customers and consists of more than 8,000km of distribution mains and 200km of transmission mains.

The map below shows the South Australian gas network.

Figure 3-1: South Australian Gas Network



Source: AGNSA_Attachment 8.2 SAMP_20200701_Public

The main classes of assets are described in the sections below.

Gas supply

The South Australian gas network gets its gas supply from three sources:

- Moomba via the Moomba to Adelaide Pipeline (MAPS) and the Queensland to South Australia/New South Wales (QSN) Link.
- Bass Strait (via Longford and Bassgas), Port Campbell and South and New South Wales (via the Victorian Northern Interconnect (VNIE)), transported to Adelaide via the SEA Gas Pipeline.
- South East South Australia (SESA) pipeline.

Transmission Pipelines

AGN's transmission pipeline supplies the gas distribution network with pressures ranging from 1,750kpa to 2,500kpa. The Adelaide Metro pipelines is approximately 193km. The age of sections of the pipeline vary from 0-10 years old to 50-60 years old.

Distribution Mains and Services

AGN's South Australian network (excluding Mildura and Alice Springs) consists of 8,140km of mains and approximately 470,000 services, operating from 1.7kpa to 350kpa. These mains and services deliver gas to residential, commercial and industrial customers.

The table below shows the installed mains as at 30 June 2019.

| Network | MAOP | CI | UPS | HDPE | HDPE | HDPE | PE | PS and | Total |
|---------|------|-----|-----|------|-------|-------|-------|--------|-------|
| | kpa | | | 250 | 575 | 100 | 100 | copper | |
| Low | 7 | 373 | 36 | 155 | 48 | 12 | 58 | 15 | 697 |
| Medium | 140 | 17 | 4 | 125 | 491 | 396 | 1,387 | 481 | 2,901 |
| High | 420 | | | | 765 | 711 | 1,926 | 1,140 | 4,542 |
| Total | | 390 | 40 | 279 | 1,304 | 1,118 | 3,372 | 1,636 | 8,140 |

Table 3-1: Installed Mains 1 July 2019 (km)

Source: AGNSA_Attachment 8.2 SAMP_20200701_Public

Meters

The meters used in the gas network include:

- Diaphragm meter for domestic and small I&C customers;
- Rotary meters for medium to large I&C customers;
- Turbine meters for very large I&C customers; and
- Coriolis meters for very large I&C customers.

Meters are measured in the field to an accuracy of \pm 2% whilst the meter manufacturers test their meters to \pm 1%. Meters with a capacity up to 25m³/hr are sample tested in accordance with AS/NZS 4944 to determine its field life.

3.1 OUTSOURCING ARRANGEMENT

AGN's assets are operated by APA Asset Management (APA) under a long term Operating and Management Agreement (OMA). The services provided under the OMA include:

- Operating and maintaining each network;
- Planning, designing and constructing the network extensions;
- Preparing and settling the budget for each financial year in consultation with AGN;
- Providing regular information on financial and other management issues; and
- Reading meters and billing retailers.

APA is paid for the actual costs of providing the services plus a margin and an incentive payment.

4. ASSET MANAGEMENT PRACTICES

4.1 ASSET MANAGEMENT SYSTEM OVERVIEW

AGN's Strategic Asset Management Plan (SAMP) provides a consolidated view of AGN's asset classes in South Australia, Northern Territory and Mildura in Victoria. The gas networks are operated and maintained by the APT O&M Services Pty Ltd (APA).

The policies and the associated Asset Management Framework in the SAMP are based on ISO 55000⁴.

AGN's objectives as set out in the SAMP are:

- Operate and invest in the assets to keep the public and employees safe;
- Maintain continuity of supply to customers;
- Improve customer service experience in line with their expectations;
- Balance network performance and costs to deliver affordable services;
- Promote gas usage to ensure the networks remain sustainable; and
- Ensure innovation and work towards net-zero emissions.

The SAMP adopts a lifecycle approach for the assets and describes the policies and key drivers for each class of assets which underpins the projects proposed for the next AA period. For example, the section on the mains replacement program provides a history of mains in the gas network, the reasons for the replacing the mains and details of the gas mains to be replaced in the next AA period.

The risk management process in the SAMP is in accordance with APA Risk Management Policy and Risk Management System. The SAMP says that all network assets are regularly assessed for a range of identified risks and risk mitigation strategies developed as necessary.

Underpinning the SAMP are a raft of documents including:

- Annual Distribution System Performance Report;
- Distribution Mains and Services Integrity Plan;
- Five Yearly Meter Replacement Plan; and
- Annual capital planning and budgeting cycle and related processes.
- Formal Safety Assessment.

⁴ ISO 55000 is an international standard covering management of assets. It was launched in 2014 and has replaced the Publicly Available Specification (PAS 55) which was published by the British Standards Institution in 2004 for physical assets.

4.2 GOVERNANCE

AGN has financial controls in place to ensure that all new projects have undergone the approval processes. In summary the approval processes include:

- All domestic mains extensions, Industrial & Commercial (I&C) connections are evaluated using a Net Present Value (NPV) model, while mains replacement projects are evaluated on a risk-based approach;
- All capital expenditure projects are subject to a formal business case/justification requiring management approval, and in the case of growth projects, a standard financial model;
- A defined delegation of authority is in place to determine the approval requirements (by either APA or AGN) for all projects; and
- APA reports to AGN monthly on progress against capital budget and schedule for major capital projects.

AGN also has a procurement policy⁵ for all its procurement activities. The procurement policy sets out the key requirements and objectives for any project and operations. The objectives include obtaining the lowest total cost for goods and services whilst maintaining the quality and educating the personnel in procurement management to ensure that they perform their role effectively.

4.3 PERFORMANCE INDICATORS

AGN has a raft of Performance Indicators (PIs) for the various class of assets. These PIs are used by the relevant operating departments whilst the Key Performance Indicators (KPI) are reported to the senior managers. The Office of Technical Regulation OTR) also receive relevant data. The KPI include:

- No of 3rd party damage for transmission pipelines and distribution network.
- Leaks/km of mains surveyed for survey for the distribution network.
- Supply outages to five or more customers
- No of gas in buildings
- UAFG levels

4.4 CONCLUSION

AGN has adopted a lifecycle approach for the assets and there is reasonable line of sight between the asset policies and the proposed projects. It is also noted that the steps undertaken are consistent with ISO 55000. AGN has a clear procurement policy and steps to ensure that all projects under an investment framework. The performance indicators are what you would expect in the gas industry.

Our review of the SAMP and other related documents have not identified any material that will cause us to be of concern about AGN's asset management processes.

⁵ AGNSA_Attachment 8.5_procurement policy and procedure_20200701_Public

5. MAINS REPLACEMENT

5.1 INTRODUCTION

AGN's proposed mains replacement program is summarised in the following table:

| Asset category | Volume | Capex | Comment | |
|----------------------------------|----------------|------------|---|--|
| Mains replacement: | | \$ million | | |
| CI/UPS - block | 520km | | Replace all remaining LP mains. | |
| CI/UPS North Adelaide | 38km | | Risk reduces from High to Low. | |
| HDPE 250 remaining | 14km | | Risk reduces from High to Low | |
| HDPE 575 DN40 HP – insertion | 198km | | Remove 288 km and monitor | |
| HDPE 575 DN40 MP – direct burial | 90km | | Intermediate (ALARP) | |
| Sub-total (Mains Replacement): | 860km | \$238.11 | | |
| | | | | |
| Inspection/reinforcement: | | | | |
| HDPE 575 DN50 - inspection | 316km | | Risk reduces from High to Intermediate (ALARP) | |
| | | | | |
| Services renewal: | | | | |
| MUS – priority group 1 | 457 sites | | Risk reduces from High to Low | |
| Non-AMRP service replacement | 2,450 sites | | | |
| Sub-total (Service Renewal): | | 11.7 | | |
| Total capex | | \$258.01 | | |

| Table 5-1: AGN | proposed | mains re | placement | program | (\$2019/20, | million) |
|----------------|----------|----------|-----------|---------|-------------|----------|
| | p | | | P 0 | (+,,, | |

(Source: DMSIP and Unit Rates Report)

Note: Piecemeal mains replacement is covered within Opex and so not included in this table.

AGN's forecast program will:

- Complete all LP cast iron, unprotected steel and other LP mains. As a result all low and medium pressure cast iron and unprotected steel mains will have been removed from the network by the end of next period which AGN says represents a significant safety milestone.
- Complete replacement of all remaining high risk early generation HDPE 250 mains.

- Continue inline inspection and reinforcement of high risk (priority one) early generation 50mm HDPE 575.
- Continue replacement of 40mm HDPE 575 (both HP and MP), which is too small for inline camera inspection and reinforcement.

5.2 ASSET CONDITION

AGN estimates that there will be 1,645 kilometres of high and intermediate risk mains remaining in the network by 30 June 2021. The mains can be divided into two categories:

- Cast iron (CI) and Unprotected Steel (UPS)
- High Density Polyethylene (HDPE) mains

By June 2026, AGN's program is expected to eliminate all remaining high risk mains, leaving 159 kilometres of intermediate risk mains to replace, along with 626 kilometres of HDPE 575 DN50 mains that will have been inspected and reinforced, with these mains forecast for replacement from 2027 onwards.

5.2.1 Cast Iron (CI) and unprotected steel (UPS)

The following figure demonstrates the impact the cast iron and unprotected replacement program has had on reducing the volume of cracks and breaks on the network, as highest risk mains have been removed, with a clear downward trend over the last decade.



Figure 5-1: Cast iron failure history over time

The following figure shows the breaks and cracks reported on remaining mains in the network:

⁽Source: DMSIP figure 2, page 19)



Figure 5-2: Historic breaks and cracks on cast iron mains remaining in the network

(Source: DMSIP figure 3, page 20)

The trends depicted in the above figure show a slightly increasing trend for cracks and a slightly reducing trend for breaks, for those cast iron mains remaining in the network. It is noted that the figure reflects the information up to and including 2018. We have requested⁶ that AGN update the information in DMSIP figures 2 and 3, to include 2019 and YTD 2020.

The following table compares AGN's mains replacement for the current period, with its proposed program for the next AA period, which includes significantly increased rate of Block mains replacement in order to complete replacement of all remaining CI/UPS (low pressure) mains during the next AA period.

| sie 5 2. ei/ of 6/ other mains replacement Add program | | | | | | | |
|--|---------------------|------------------|--|--|--|--|--|
| Category | Current Period (km) | Next Period (km) | | | | | |
| Block – Low pressure | 288 | 520 | | | | | |
| CBD – Adelaide | 53 | - | | | | | |
| CBD – North Adelaide | - | 38 | | | | | |
| Trunk | 59 | - | | | | | |
| Medium Pressure (MP) | 4 | - | | | | | |
| Total CI/UPS/Other: | 404 | 558 | | | | | |

Table 5-2: CI/UPS/Other mains replacement – AGN program

(Source: DMSIP: table 1 (proposed) and table 2 (current period)

It is noted that block replacement also includes mains of other materials where they are interspersed or islanded as a result of prior repairs. The proportion of these mains represents over 30% of the proposed replacement length.

In conjunction with its mains replacement program, AGN undertakes a range of maintenance programs to monitor and manage its remaining mains until they are replaced. Such programs include leak survey which can be varied in frequency to monitor mains in areas considered to be higher risk. AGN responds to gas leaks reported by the public and has performance targets subject to review by internal staff and regulatory authorities such as Office of Technical Regulator.

⁶ AGN – AER meeting 24 September 2020 and further IR

Table 5-2 shows that AGN's proposed CI/UPS Block program for the next AA period is increased from 288 kilometres to 520 kilometres. On the basis of our review of the asset condition, Zincara agrees that the remaining cast iron assets are gradually deteriorating with age and will need to be replaced over time. Based on the currently available information, we do not consider that the current asset condition trends support this increase from AGN's current rate of mains replacement during the next AA period. As an alternate proposal we consider that 405 kilometres of Block replacement (similar to the total CI/UPS program in the current period) along with 38 kilometres North Adelaide mains replacement would enable strong progress on mains replacement during the next AA period. We do not consider this timeframe will have any material risk impact, with maintenance programs continuing to monitor and manage the decreasing length of remaining assets. This alternate program is further discussed in "Section 5.4 Option Assessment" of this report.

5.2.2 High density polyethylene (HDPE) mains

Early squeeze off procedures resulted in "over squeezing" of first generation mains (HDPE 250 and HDPE 575). This coupled with no restriction on release rates, resulted in significant damage to the structural integrity of the main from which slow crack growth (SCG) occurs. AGN notes that these mains have been squeezed off on average every 100 metres and hence pose a risk of SCG. As a result AGN says⁷ that all these mains should be removed in a prioritised manner and is the key driver for its inspection/reinforcement or replacement program. AGN has experienced some incidents of gas in building incidents resulting in explosions in the Adelaide metropolitan area, noting⁸ that "Incident investigations found that the primary cause of these incidents was leakage associated with SCG failures, originating from squeeze off locations in older HDPE mains laid until the 1990s." There are three core categories of early generation HDPE mains:

- HDPE 250
- HDPE 575 DN40
- HDPE 575 DN50

5.2.3 HDPE 250

These mains have a history of leaks and SCG and are considered high risk by AGN. These mains are around 42-46 years old with a high risk of encountering immediate squeeze off damage. Some 291 kilometres have been replaced during the current period, with 14 kilometres of medium pressure mains remaining to be replaced during the next AA period.

⁷ DMSIP section 2.1.2 page 20

⁸ DMSIP section 2.1.2 page 21

5.2.4 HDPE 575

AGN advise that mains with a history of squeeze off failure will have been replaced by the end of the current period⁹. AGN note that the majority of squeeze off failures relate to mains installed before 1993, with the more recent mains benefiting from improved field operational procedures.

During the current period, AGN has used an inline camera to detect damaged squeeze-off locations and applied reinforcement for its DN50 mains. AGN indicate that this method is effective to minimise gas release from slow crack growth (SCG) in HDPE 575 mains, deferring the need to replace these mains by an estimated 10 years. AGN says¹⁰ that there have not been any squeeze off failures recorded on DN50 mains that have been inspected/reinforced, so they are now considered intermediate (ALARP).

AGN says¹¹ that "with DN50s, we can inspect and reinforce where a squeeze off location is identified. Currently, we do not have an inspection program option for DN40s, so replacement is the only way of removing this risk from our Network". As a result, AGN propose their replacement on a prioritised basis.

The following figure shows the squeeze off failure history by year laid and diameter for both DN50 and DN40 mains.



Figure 5-1: HDPE 575 mains – squeeze off failure history by year laid and diameter

(Source: DMSIP Figure 8, p25)

Failure history¹² over time shows a marked downward trend for DN50 mains, with most of the earlier mains now replaced/reinforced and the more recently laid mains not as susceptible to failures, due to change of operational practice. DN40 mains have a significantly lower level of failures, similar or lower than that of the newer DN50 mains, with a steady downward trend in more recently laid mains.

⁹ DMSIP section 2.1.2.2, page 22

¹⁰ DMSIP page 24

¹¹ DMSIP page 24

¹² DMSIP Figure 6, p24

Figure 5-1 above, does not show the respective history split by pressure to ascertain whether there are variations, particularly for DN40 mains which are proposed to be replaced by insertion or direct burial techniques. Having requested¹³ more specific, pressure related squeeze off data, Zincara has undertaken a more detailed analysis of DN40 MP and HP mains. The data shows for DN40 MP there have been three failures since 2005 and each of these related to mains laid in 1986. It also shows that the last squeeze off failure was reported in 2011, some nine years ago. On this basis, Zincara considers that the DN40 MP mains have not demonstrated an ongoing issue with squeeze off failures. We consider that AGN's leak management practices, particularly with respect to leak survey and analysis of leak reports, the risks of further failures can continue to be effectively managed without the requirement, at this stage, to implement a full mains replacement strategy. In summary, the asset condition of HDPE 575 DN40 MP mains, as it relates to squeeze off failures, does not support the proposal to replace 90 kilometres by direct burial during the next AA period.

With respect to DN40 HP mains, there have been forty reported squeeze off failures since 2005. For mains laid after 1990 there has been five reported failures since 2005 with the most recent being in 2016, some four years ago. On this basis, Zincara considers that replacement of mains because of squeeze off failures can be prioritised to those laid before 1991, totalling approximately 150 kilometres, rather than AGN's proposed program of 198 kilometres (pre-1993 mains). As with DN40 MP mains the risk mitigation strategy also includes ongoing leak surveys and analysis of leak reports as included in AGN's maintenance and operations practices.

By way of comparison, data shows that DN50 (MP and HP) mains recorded 207 squeeze off failures since 2005.

Zincara also sought further information¹⁴ from AGN relating to other types of reported leaks for DN40 mains. The following table summarises leak data for DN50 and DN40 mains by pressure. This data indicates that overall, there aren't material differences across the various categories of HDPE 575 mains.

| Category | Leak repairs per km per year | | | | | | |
|-----------|------------------------------|-------|-------|-------|--|--|--|
| | Crack | Break | Joint | Total | | | |
| DN50 (HP) | 0.043 | 0.015 | 0.052 | 0.110 | | | |
| DN50 (MP) | 0.063 | 0.018 | 0.066 | 0.147 | | | |
| | | | | | | | |
| DN40 (HP) | 0.025 | 0.004 | 0.021 | 0.050 | | | |
| DN40 (MP) | 0.065 | 0.028 | 0.053 | 0.146 | | | |
| | 0.005 | 0.028 | 0.055 | 0.140 | | | |

Table 5-3: HDPE 575 – leak repairs per kilometres per year

(Source: IR016)

The above table shows that for DN40 HP mains the leak repair rate is relatively low compared to DN50 mains. For DN40 MP mains the leak repair rate is similar to that found on DN50 mains, which are not subject to a replacement program during the next AA period.

On the basis of the above information Zincara considers that other mains replacement prioritisation options may be prudent for HDPE 575 DN40 mains. Also noting that AGN operations and maintenance processes have been and are expected to continue managing

¹³ IR004

¹⁴ IR016

these assets to ensure their safety and integrity are maintained while also maximising asset life.

5.2.5 Multi user services (MUS)

These services run through unit developments and commercial premises that supply multiple users. Prior to 2012, renewal of these internal services was not within the scope of the mains replacement program and as a result there is an inventory of older MUS that were not replaced during 1993 and 2012. AGN has undertaken further analysis of these assets and have now prioritised these assets into three risk based categories based on:

- Age,
- Public safety,
- Supply security
- Compliance.

Additional monitoring controls have also been introduced for the priority 1 and 2 groups until replacement is completed. Zincara agrees that the prioritisation of these sites is prudent and allows AGN to focus replacement on those of highest priority. There are approximately 2,110 priority group 1 and 2 services as at July 2021 which require specific action because they have reached the end of their useful life, found to be non-compliant or location poses risk. Following review and sample replacement, AGN has classified MUS as:

- Priority group 1. 457 low pressure with high risk;
- Priority group 2. 1,653 low pressure with intermediate risk; and
- Priority group 3. 361 low pressure with low risk.

During the next period, AGN is proposing replacement of all priority 1 MUS. While Zincara considers the prioritisation of MUS as prudent, we sought further information from AGN relating to the determination of priorities. AGN's response¹⁵ has provided further clarification and as a result Zincara recommends acceptance of AGN's proposed volume of priority MUS replacements.

5.2.6 Non-AMRP services

During the current period AGN replaced an average of 490 services per year and have assumed a similar level of replacement for the next period, totalling 2,450 over the period.

¹⁵ IR004

5.3 RISK ASSESSMENT

AGN acknowledged¹⁶ that there is an inherent risk associated with gas mains as a gas leak has a potential negative impact on the customers, community or environment. In relation to the CI/UPS mains, AGN has classified the risk as high and the HDPE mains as high or medium.

AGN has therefore used this risk profile to develop its mains replacement program.

We do not dispute the need to examine the different types of gas pipes and develop replacement programs as appropriate. However, we are aware that the risk profiles of these mains have been in place since the decision was taken to replace the gas mains. In addition, over time, AGN has progressively replaced its poorer condition mains and also higher risk mains such as the Adelaide CBD. Given AGN's extensive maintenance program to manage leaks, we question the need to replace the mains at the speed that AGN is proposing or can the replacement program be carried out at a slower pace.

5.4 OPTION ASSESSMENT

Based on Zincara's asset condition analysis and having reviewed each of the options assessed by AGN, we consider that there are further options, particularly relating to CI/UPS mains replacement timeframes and the replacement program for HDPE 575 DN40 mains. We consider that the alternate proposals are prudent, in accordance with good industry practice, and risks mitigated through AGN's ongoing maintenance and operations programs. Zincara's recommended options also reduce the capex impact during the next AA period.

5.4.1 Mains Replacement

AGN's mains replacement program includes:

- Block replacement of cast iron and unprotected steel
- Early generation HDPE replacement and inspection/reinforcement

5.4.1.1 CI/UPS – block

Due to significantly different unit rates for CI/UPS, AGN splits the replacement work into two categories:

- CI &UPS Block
- CI & UPS North Adelaide

AGN forecast mains replacement of 558 kilometres, comprising 520 kilometres (Block) and 38 kilometres (North Adelaide CBD). During the current period AGN completed 405 kilometres including, Block (288 kilometres), Adelaide CBD and a number of trunk mains (refer Table 5.2 above).

¹⁶ DMSIP p36

As a result of several years of high levels of mains replacement there is now a significantly reduced length of CI/UPS remaining in the network, along with an overall reduced level of leaks being reported.

On the basis of our review of the asset condition, Zincara agrees that the remaining cast iron assets are gradually deteriorating with age and will need to be replaced over time. However, we question whether AGN's proposal to increase the block replacement category during the next AA period from 288 kilometres to 520 kilometres is prudent. As an alternate proposal we consider that 405 kilometres of Block replacement (similar to the total CI/UPS program in the current period) along with 38 kilometres North Adelaide mains replacement would enable strong progress on mains replacement during the next AA period with potential completion of the remaining 115 kilometres during the following AA period. We do not consider this changed timeframe will have any material risk impact, with maintenance programs continuing to monitor and manage the decreasing length of remaining assets. Where necessary increased frequency of leak surveys will enable close monitoring of asset condition and proactive leak repairs.

As noted in the asset condition section of this report, we have requested that AGN update the information provided in DMSIP figures 2 and 3, to include 2019 and YTD 2020. The current rates of cracks and breaks, along with trends, provide a valuable insight into the condition of these cast iron assets and one of the key aspects in making our final recommendations to the AER. There have been useful engagements with both AGN and the Office of Technical Regulator (OTR) on these matters and any future advice from either party will be considered after the AER's draft decision.

Given the characteristics and complexity of the North Adelaide area, Zincara does not propose any changes to AGN's mains replacement for this category.

5.4.1.2 HDPE 250

With 291 kilometres replaced during the current period, there are only 14 kilometres of medium pressure HDPE 250 mains remaining in the network at the beginning of the next AA period. Given that this is an ongoing program and with only a small volume remaining to be replaced, we recommend approval.

5.4.1.3 HDPE 575 DN40

There are approximately 447 kilometres of HPDE 575 DN40 (MP and HP) remaining in the network. AGN's key driver is to address the risks associated with squeeze off failures. For DN50 mains this is being achieved via internal inspection and reinforcement of squeeze off locations. For DN40 mains, which are too small to use the inline camera, AGN's proposed risk treatment is prioritised replacement of all of these mains, with replacement of 288 kilometres, comprising 198 kilometres of HP by insertion and 90 kilometres of MP by direct burial, during the next period and the remaining 159 kilometres during the following period. AGN has rated

these mains as Intermediate risk¹⁷ and propose that it is cost effective to reduce to ALARP though replacement, and monitoring in the meantime, for those mains awaiting replacement.

In its DMSIP, AGN typically groups the HDPE 575 DN40 MP and HP as a single category. However, given the different mains replacement techniques required (i.e. insertion for HP and direct burial for MP and associated difference in unit rates), Zincara has analysed squeeze off data based on mains pressure, to ascertain whether they exhibit similar or differing failure history.

For HDPE DN40 MP¹⁸ there have been three squeeze off failures that occurred between 2005 and 2011 but no further reported failures since that time. We consider that this data does not demonstrate an ongoing or recurrent problem with respect to squeeze off failure. AGN advise that replacement of these mains will need to be by direct burial, as the insertion technique will not enable supply capacity to be maintained. Direct burial is the most expensive method of mains replacement which AGN estimates as **1**, compared with insertion at **1**. Based on the squeeze off failure history and cost of replacement for this category of mains, we consider that the cost of AGN's proposed risk mitigation is disproportionate to the risk being managed, during the next AA period. We consider that AGN's leak management practices can effectively manage these mains and therefore the risk rating can be considered ALARP. We therefore recommend that this program to replace 90 kilometres of HDPE DN40 MP be deferred beyond the next AA period.

For HDPE DN40 HP there have been 40 squeeze off failures since 2005, with five reported on mains laid after 1990, with the most recent being in 2016, some four years ago. The data does not reflect any significant benefit will be achieved by replacing mains laid in 1991-1993 period during the next AA period. On this basis, Zincara considers that replacement of these mains because of squeeze off failures for the forecast AA period can be prioritised to those laid before 1991, totalling approximately 150 kilometres, rather than AGN's proposed program of 198 kilometres (pre-1993). As with DN40 MP category of mains, AGN's leak management practices can effectively manage these mains and therefore the risk rating can be considered ALARP.

In summary, the asset condition of DN40 MP mains, does not support the proposal for a prioritised replacement program by direct burial during the next AA period as prudent or cost effective. For DN40 HP mains the failure history tends to support an alternate prioritisation of mains for replacement totalling 150 kilometres (pre-1991) during the next AA period.

5.4.1.4 Piecemeal mains replacement

Note AGN undertake reactive small piecemeal replacement sections of mains (less than 100 metres) under its Opex program.

¹⁷ DMSIP table 3, page 11/12

¹⁸ IR004

5.4.2 Mains inspection and reinforcement

HDPE 575 DN50 HP and MP. AGN propose to inspect and reinforce approximately 316 kilometres (57 kilometres of HP and 259 kilometres of MP). During the current period, AGN completed 310 kilometres of inspection and reinforcement. AGN say that continuation of the lower cost inline camera inspection (and reinforcement) program enables effective management of these mains, rather than immediate replacement. AGN currently anticipate that reinforcement of the mains should extend operational life by about 10 years. They also note that they haven't recorded any further failures of mains reinforced to date. Zincara considers this program to be prudent and recommend approval.

5.4.3 Service replacement

MUS – **priority 1.** During the current period AGN decided to undertake an assessment of Multi-User services that were not replaced as part of mains replacement programs pre-2012. As a result, they have assigned three priority levels, and propose that the 457 priority 1 MUS be replaced during the next period, with 1,653 priority 2 MUS being considered for replacement during the following period. There are also 361 priority 3 MUS. AGN completed 233 MUS replacements during the current period, compared with the AER allowance of 1,328.

Additional leak surveys and awareness campaigns have been implemented for Priority 1 and Priority 2 MUS until they are replaced, to ensure that new failures or changes in condition are identified in a timely manner and re-prioritisation of replacement or other risk mitigation can occur if required. While Zincara considers the prioritisation of MUS as prudent, we sought further information from AGN relating to the determination of priorities. AGN's response¹⁹ has provided further clarification and as a result Zincara recommends acceptance of AGN's proposed volume of priority MUS replacements.

Non-AMRP services. AGN forecast reactive service replacements based on current historical levels averaging 490 replacements per year, resulting in forecast of 2,450 services to be replaced. During the current period AGN completed 2,749 reactive service replacements. We recommend approval.

5.5 UNIT RATES

AGN indicate that upward pressures on unit rates include:

• Additional administrative and safety standards – traffic control, access and permit requirements, third party approval processes resulting in higher contractor costs. Also more requirements to use non-destructive excavation.

¹⁹ IR004

- Road reinstatement requirements are becoming more stringent, including requirement to reseal full lane with profiling, for roads under five years old.
- AGN introduced a new meter location compliance procedure in July 2019 that imposes additional requirements to relocate or protect gas meters.
- South Australian Power Networks has imposed additional terms relating to excavations around its assets. As this is only recently imposed, costs are only reflected in the recent few months.

Contracts: The current mains replacement panel contract commenced in 2017.

5.5.1 CI/UPS – Block

The 3-year weighted average unit rate is **Exercise**, while the current actual unit rate (AGN proposed) is **Exercise**. The current period AER allowance is around **Exercise**. If the 3-year average unit rate was applied to the forecast volume of 520 kilometres then the capex reduction would be approximately **Exercise**.

AGN note that the impacts on unit rates in recent timeframes have resulted in the higher unit rate in the current year, particularly with respect to labour component, which is above the 3-year average. AGN have also undertaken a bottom-up check on the impact of recent changes which confirms the unit rates increases are reasonable. On the basis of AGN's competitive tender process in arriving at the current contract and panel, Zincara accepts AGN's unit rates for CI/UPS – Block replacement as reasonable and recommends their acceptance.

5.5.2 CI/UPS – North Adelaide

AGN note that the area is heritage zoned and work is within congested areas, similar to the Adelaide CBD. Some of the works will be required to be undertaken at night. There are currently no tendered rates for North Adelaide mains replacement project, so AGN has used the Adelaide CBD as the basis of costs (excluding trunk mains). The 3 year weighted average unit rate is **and current actual (AGN proposed)** is **and current actual (AGN proposed)**. We consider that fully applying the Adelaide CBD unit rates would have the potential to over price the North Adelaide CBD mains replacement works.

The labour component is the main variance between the 3-year average and current actuals being a **second** increase, which AGN attributes to the SAPN excavation requirements and meter location compliance procedure. In the CI/UPS – Block category, AGN estimate these activities impact in the order of **second**, so allowing for premium costs associated with the North Adelaide area we estimate these costs impact in the order of **second**. Other aspects of the Adelaide CBD would be expected to be complex and therefore the 3-year average along with the noted premium additional costs suggest a unit rate of **second**.

Zincara considers that a unit rate of **sector** is more likely to reflect the costs in the North Adelaide mains replacement program.

5.5.3 HDPE 250

The 3-year weighted average unit rate is **and current actuals (AGN proposed)** is **and current actuals (AGN proposed)**. Given the recent changes and their potential cost impact, we consider that AGN's proposed unit rate is reasonable in the circumstances.

5.5.4 HDPE 575 – DN50 camera inspection and reinforcement

The 3-year weighted average unit rate is **and the current actual (AGN proposed)** is **and the current actual (AGN proposed)**. The AER allowance during the current period is **actual**. The recent years of this program have been reasonably consistent and basically reflect the current actuals unit rate. Zincara therefore consider that AGN's proposed unit rate of **actual** is reasonable.

5.5.5 HDPE 575 – DN40 HP

The work involves replacement of these mains by the insertion method. During the current period AGN has not differentiated between DN40 HP and DN50 mains replacement but estimate the works to be very similar. It is also noted that there has been some direct burial, which would have the effect of increasing the average unit rate. The 3-year weighted average unit rate is **and** the current actual (AGN proposed) is **and**. The AER allowance for the current period is in the range of **accurate**. If the 3-year weighted average unit rate is applied then the proposed capex would be **accurate**, which is approximately **below** the current actuals capex. The increased labour rate between 2018/19 and 2019/20 **accurate**.

By way of comparison we consider that the unit rates for replacement of HDPE 575 DN40 HP and HDPE 250 should be very similar. There is no clear information to say why there are different labour unit rates, with materials being virtually the same. We sought clarification from AGN as to why these categories have differing unit rates. AGN's response²⁰ reiterated details provided in its Unit Rates report and the fact that the unit rates reflect "the achieved pricing outcomes across the numerous HDPE packages of work delivered for each of the categories in each year." While we can see no reason as to why these differences exist, we acknowledge that the unit rates are based on competitively tendered pricing and as a result recommend AGN's proposed unit rate of **Comparison**.

5.5.6 HDPE 575 – DN40 MP

Due to the size of these mains and their operating pressure it is not possible to replace them by insertion without impacting network capacity. These mains will need to be replaced by open excavation (direct burial). As there is no similar program of works for AGN to establish historical unit rates and no competitive tender process has been conducted to date, they have developed a bottom-up estimate. This has involved using the current year labour rates for insertion of HDPE 575 and then applying a cost differential in the schedule of rates contract prices across the panel area and then applying a cost differential in the schedule of rates similar to the HDPE 575 program

We sought further details regarding the calculation of the proposed unit rates for this category on the basis that applying a schedule of rates for direct burial would typically only apply to small sections of work, rather than the proposed 90 kilometres, and hence some discount would usually apply to the larger program of direct burial works. AGN's response²² advised that they do not anticipate further discounts because:

- The competitive/volume discounts apply to the base rate, reflecting insertion technique, used in the estimate, rather than the incremental cost of direct burial
- The overall program of 90 kilometres will comprise numerous small packages of relatively small volumes, as the HDPE DN40 MP mains are scattered across the network in small lengths (map provided).

Zincara does not agree with AGN's response on the basis that the volume discount should be applied across the whole scope of works, in this case only by direct burial, compared with a very minor portion (around 4% associated with insertion program). Secondly, while the mains are scattered across the network, there should be sufficient grouping of work to provide economic quantities to enable competitive unit rates lower than the proposed. We therefore consider that it would be reasonable to apply a volume discounted rate to the schedule of rates, within a range of approximately proposed. For the purposes of this assessment we have assumed a discount on the cost differential, giving (rather than proposed). The resulting alternate unit rate is proposed.

5.5.7 Multi-user sites

A program to replace multi-user services (MUS) commenced during the current AA period. The cost of replacing assets at each multi-user site varies depending on the number of individual delivery points associated with each service. AGN have developed average unit rates for a range of delivery points, based on historical costs. They have also conducted a survey of sites to determine a likely scope of works (percentage of each delivery point range) to be delivered during the next AA period²³. The program for the next period relates to the

²¹ Unit rates report table 4.13, p56

²² IR020

²³ Unit rates report table 4.15, p59

"high risk" multi-user sites which AGN say have added complexity and relocation requirements of non-compliant meters.

As a result, the weighted average of historical costs unit rate of **sectors**, is relatively high compared to the AER allowance unit rate of **sectors** for the current period. AGN propose to use of the weighted average given the variability of the work and the relatively lower volume. The approach to determination of the unit rate appears reasonable and based on best information available in the circumstances. Based on the information provided, Zincara recommends AGN's proposed unit rate.

5.5.8 Non AMRP service replacement

The 3-year weighted average unit rate is **and the current actual (AGN proposed) is and the current actual (AGN proposed) is and the current actual unit rates from year to** year during the current period. Assessing the historical average unit rates, the labour component of the current year appears reasonable as a forecast, however, there is significant variability in the materials/other component and the current year is significantly higher than the other years and almost double the 3-year weighted average.

We consider that using the 3-year weighted average is more likely to reflect the rates in the next AA period. Combining this with the current actual labour rate, results in a unit rate of

5.6 CONCLUSION

It is noted that AGN is expecting to achieve over 1,000 kilometres of mains replacement during the current period and 860 kilometres during the next AA period. In Zincara's experience this rate of mains replacement is relativity high in comparison to other Australian gas networks, resulting in a high capex impact. Following our review of the DMSIP and associated information for each category of proposed mains replacement, Zincara recommends an alternate program which we consider to be prudent and manages the risks highlighted by AGN in its assessments. As a result, we have proposed a reduction in the kilometres of mains replacement across some categories, which still enables AGN to continue to address its higher risk assets, and at the same time reduces the capex during the next AA period.

We consider that AGN's maintenance and monitoring programs will enable risks to be effectively managed, as they have been during the current period. Where appropriate this may include some increased leak survey frequency to ensure appropriate monitoring of assets.

As part of the assessment process the AER (and Zincara) have held discussions with both AGN and OTR, particularly relating to our draft recommendations for mains replacement. As a result of these discussions and feedback to date, we have sought updated information relating to cast iron mains failures in particular. These further communications along with any other responses received following the AER Draft Decision will be considered in our final recommendations to the AER prior to their publication of the AER Final Decision.

The following table provides a summary of Zincara's recommendations for the categories of the mains replacement program.

| Asset category | AGN Volume | AGN Rate | AGN Capex | Zincara Volume | Zincara rate | Zincara Capex |
|-------------------------------|---------------|-------------|--------------|-------------------|-----------------|------------------|
| Mains replacement: | | | | | | |
| CI/UPS - block | 520km | | | 405km | | |
| CI/UPS North Adelaide | 38km | | | 38km | | |
| HDPE 250 remaining | 14km | | | 14km | | |
| HDPE 575 DN40 HP – insert | 198km | | | 150km | | |
| HDPE 575 DN40 MP – direct | 90km | | | Nil km | | |
| Mains Replacement: | 860km | | \$238.11m | 607km | | \$164.93m |
| | | | | | | |
| Inspection/reinforcement: | | | | | | |
| HDPE 575 DN50 - inspection | 316km | | | 316km | | |
| | | | | | | |
| Services renewal: (sites) | | | | | | |
| MUS – priority group 1 | 457 | | | 457 | | |
| Non-AMRP service replace | 2,450 | | | 2,450 | | |
| Service Renewal: | | | \$11.7m | | | \$11.34m |
| Total capex | | | \$258.01m | | | \$184.43m |
| Capex reduction: | | | \$73.58 mi | llion (28%) | | |

Table 5-4: Assessment summary: mains replacement program (\$2019/20, million)

(Source: Capex Forecast Model and Zincara)

Zincara's recommendations are summarised as follows:

5.6.1 CI & UPS – Block

The overall cast iron failure history has greatly improved as a result of the mains replacement program, and Zincara agrees that the remaining cast iron assets are deteriorating with age and will need to be replaced over time. However, we do not consider that the current asset condition trends information support AGN's proposal to increase the block replacement category during the next AA period from 288 kilometres to 520 kilometres. Zincara recommends an alternate proposal to replace 405 kilometres of Block replacement (similar to the total CI/UPS program in the current period). This will result in approximately 115 kilometres remaining at the end of the next AA period and in effect extending completion of
this program into the following AA period. We do not consider this changed timeframe will have any material risk impact, with maintenance programs continuing to monitor and manage the decreasing length of remaining assets. The resultant capex reduction is approximately

Note that we have sought further details from AGN relating to asset condition, along with feedback from the OTR that will be incorporated into our considerations when making our final recommendations to the AER.

5.6.2 CI & UPS – North Adelaide

Zincara proposes acceptance of AGN's forecast to complete this program during the next period. However, based on the information provided we consider that the proposed unit rate is excessive, being based fully on Adelaide CBD together with additional requirements, and propose a revised rate of **Constant**, resulting is a capex reduction of **Constant**.

CI/UPS summary. The following table shows a summary of the CI/UPS mains replacement lengths covering the current period, AGN's proposed program for the next AA period and Zincara's recommended alternate program for the next AA period:

| Category | Current Period | AGN Next Period | Zincara (km) |
|----------------------|----------------|-----------------|--------------|
| | (km) | (km) | |
| Block – Low pressure | 288 | 520 | 405 |
| CBD – Adelaide | 53 | - | - |
| CBD – North Adelaide | - | 38 | 38 |
| Trunk | 59 | - | - |
| Medium Pressure | 4 | - | - |
| (MP) | | | |
| Total CI/UPS/Other: | 404 | 558 | 443 |

 Table 5-5: CI/UPS mains replacement program - kilometres

(Source: DMSIP: Table 1 (AGN proposed) and Table 2 (current period); Zincara recommendation)

5.6.3 HDPE 250

Zincara recommends accepting AGN's program to complete the replacement of these mains and also the unit rate.

5.6.4 HDPE 575 – DN40 HP

The squeeze off failure of these mains is significantly lower than that of the HDPE 575 – DN50 mains. Zincara notes that there have been forty squeeze off failures since 2005. Of these, there have been five failures on mains laid since 1991 with the last reported failure in 2016, some four years ago. Recognising the history of squeeze off failures on the older mains, Zincara considers that an alternate prioritised program of 150 kilometres, compared with

AGN's forecast of 198 kilometres, enables the earlier laid mains (pre-1991) to be replaced, while reducing the capex impact during the next AA period. While recognising the timeframe of improved squeeze off practices, we consider that the data did not show any benefit of prioritising those mains laid between 1991 and 1993 for replacement during the next AA period. This results in a capex reduction of

5.6.5 HDPE 575 – DN40 MP

Assessment of squeeze off failures for this category and pressure of mains shows that there have been three squeeze off failures since 2005 with the last failure occurring in 2011, some nine years ago. We consider that this data does not demonstrate a recurring or ongoing problem with respect to squeeze off failures for this category of mains. Unlike the DN40 HP mains, these mains cannot be inserted while maintaining supply capacity. As a result they would need to be replaced using the more expensive direct burial technique. Considering the information provided by AGN and in particular the squeeze off failure data for this category of mains we recommend that this mains replacement program can be deferred, while at the same time AGN's leaks management practices would continue to monitor and manage these mains. In addition, the replacement method of direct burial for this category of mains is relatively expensive compared with insertion and we therefore consider that the cost of replacement is disproportionate to the risk mitigation, for mains not exhibiting signs of squeeze off failure during the last nine years.

Further, AGN does not have similar mains activity to benchmark unit rates and have applied its insertion rates along with additional "direct burial premium" rate which is based on schedule of rates in mains replacement contracts, to develop its estimate for this category of work. In response to our question, AGN advised that any competitive/volume discounts already apply to the base rate (for insertion) and the mains are scattered in small lengths across the network, negating any potential for volume discount. Zincara does not agree with the response and has developed an alternate unit rate of **active**.

On the basis of our analysis of the squeeze off data showing no indication of any recurring failures since 2011, Zincara recommends deferral of this 90 kilometre mains replacement program during the next AA period, resulting in a capex reduction of **analysis**.

5.6.6 HDPE 575 DN50 inspection and reinforcement

Zincara recommends accepting AGN's program and unit rate pricing to continue with the inspections and reinforcement off these mains.

5.6.7 MUS Priority 1

Zincara recommends accepting AGN's program and unit rate pricing for the replacement of these high priority services.

5.6.8 Non-AMRP service

The volume of service replacements is based on historic averages and as such we propose acceptance of the volume. However, while the current actual labour component of the unit rates appears reasonable in the circumstances, we consider that the materials/other component for the current actual year is not reflected in previous years and not likely to reflect the forecast for the next AA period. As a result we propose using the current actual labour rate together with the 3-year material/other rate, giving a revised unit rate of (AGN propose **Context actual**). This revision results in a capex reduction of

6. METER REPLACEMENT

6.1 INTRODUCTION

The proposed meter replacement program is summarised in the following:

| Asset category | Volume | Unit Rates | Сарех |
|--|--------|------------|-----------------|
| Domestic meters: | | | |
| Low volume | 1,258 | | |
| End-of-life | 46,685 | | |
| Initial in-service compliance | 258 | | |
| FLE testing | 1,272 | | |
| Forecast fail FLE test | 31,001 | | |
| Reactive replacement | 10,000 | | |
| Domestic meters total: | 90,474 | | |
| | | | |
| I&C meters: | | | |
| Low volume | 1,222 | | |
| End-of-life | 1,362 | | |
| Initial in-service compliance | 145 | | |
| FLE testing | 266 | | |
| I&C meters (>25m ³) total: | 2,995 | | |
| | | | |
| Meter Replacement total | 93,469 | | \$18.15 million |

 Table 6-1: AGN proposed meter replacement program (\$2019/20)

(Source: Meter Replacement Plan; Capex forecast model)

AGN say that they expect to replace more than 140,000 meters during the current period at a total cost of **control**. The decrease in volumes for the next period in part due to:

- Installing domestic meters that have a longer 18-year life;
- Undertaking more FLE tests (smaller meter families) and extending the life of more meters.

Changes noted for the forecast period include:

- Higher proportion of I&C meters; and
- Changed work practices that require more ancillary and associated works when attending each meter replacement

The Meter Replacement Plan (Attachment 8.3) shows broadly three key activities of work:

- Periodic meter changes (PMC) where meters are replaced at the end of their deemed useful life or compliance period;
- Meter testing which includes initial in-service compliance testing and field life extension testing; and
- Reactive replacement of defective meters.

6.2 Regulatory obligations

AS 4944 (Gas meters – in-service compliance testing) applies to diaphragm meter families with a capacity of 25m³ per hour or less. This includes domestic and small/medium I&C meters. These meters are subject to AS 4944, the South Australian Metering Code and National Measurement Act. Meters greater than 25m³ per hour are medium/large I&C meters, which are subject to the South Australian Metering Code and National Measurement Act.

In accordance with AS 4944 all diaphragm meters up to $25m^3/hr$, installed prior to 2006 are deemed to have an initial life of 15 years. New meters installed after 2006 are required to undergo compliance testing of a meter family sample within a period of three to five years from installation.

The Office of the Technical Regulator (OTR) accepts this standard on the basis that:

- All new domestic meters must be within ±2% accuracy and are deemed to have an initial service life of 10 years; and
- Compliance testing showing accuracy ±1.5% or better may extend the service life to 18 years.

With respect to meters >10m³/hr, typically I&C meters are deemed to have an initial service life of 10 years, although AGN indicates that this practice is being reviewed to determine if meters up to $25m^3$ /hr could have an initial service life of 15 years (SAMP p.40).

Meter $\leq 10 \text{ m}^3/\text{hr}$. Testing includes:

- Acceptance tests before a new / refurbished / serviced meter is placed into service.
- Initial in-service compliance testing (3 to 5 years following installation). If test outcomes show accuracy ±1.5% or better the meter family may extend the service life to 18 years. If test outcomes show accuracy ±2.0% or better the meter family may extend the service life to 15 years.
- Field life extension (FLE) testing (also referred to as ongoing in-service compliance testing). If test outcomes show accuracy ±2.0% or better the meter family may extend

the service life by a further 5 years. If the meter family fails then the family must be removed during the next year.

 Age profile of meters²⁴ shows all meters no older than 16-19 years, with average age of 6.3 years, reflecting the fact meter families subject to FLE testing were installed from 2006.

AGN also uses refurbished meters to reduce the need for new meters, which they advise results in an overall cost saving around 14% over the anticipated asset life. It is estimated that around 60% of meters removed from the field are returned as refurbished meters.

6.3 FORECAST METHODOLOGY

Forecasting approach

The meter replacement volume forecast includes the following steps:

- Forecast the number of PMCs for meters with low installed volumes. It is not economical to conduct in-service or FLE testing for meter families with very low volumes;
- Forecast the number of PMCs for domestic meters and includes:
 - End of life meter families requiring replacement;
 - Initial in-service compliance test requirements;
 - FLE test requirements and forecast the extensions that may flow from this testing;
 - Failed FLE testing with meter families requiring replacement;
 - Defective meters that will need to be replaced on a reactive basis.
- Forecast the number of PMCs for I&C meters and includes:
 - End of life meter families requiring replacement;
 - Initial in-service compliance test requirements;
 - o FLE test requirements and forecast the extensions that may flow from this testing;
 - Note that AGN forecast that all I&C meters selected for FLE testing will pass.

6.4 DOMESTIC METER - VOLUMES

Following the steps outlined in Methodology section above, the following relate to the various categories of the meter replacement program. Note that the Meter Management Plan (Appendix A) shows the volumes, meter types and associated details relating to the domestic PMC forecast.

²⁴ Meter Replacement Plan: table 3.2

6.4.1 Low volumes.

Families that have a small population and require replacement. There are 1,258 domestic meters within this category.

6.4.2 End-of-life

For domestic meters there are 46,685 meters that will reach the end of their field life during the forecast period. These are refurbished meters that have already been refurbished several times and the casing and/or components are no longer suitable for further refurbishment. They are not subject to further FLE testing.

6.4.3 Initial in-service compliance testing

The testing is usually carried out in the year prior to when the approved number is forecast to be exceeded, and within three to five years of installation. AGN has forecast 258 domestic meters to be removed from the field and subject to the compliance testing.

6.4.4 FLE testing

AGN has made a number of assumptions in forecasting the number of meters to be removed from the field to enable FLE testing and assumption regarding successful test outcomes:

- the initial service life of newly manufactured meters is 18 years and meter accuracy is maintained as follows:
 - FLE test is conducted at the commencement of year 18 and result in a five-year extension with the meter family being removed at the end of year 23; and
- the initial service life of refurbished meters is assumed to be 15 years and meter accuracy is maintained as follows:
 - FLE test is conducted in at the commencement of year 15 and result in a threeyear extension with the meter family being removed at the end of year 18.

Noting the sample size requirements within AS 4944 along with other considerations, AGN forecast 1,272 domestic meters from 19 families, will need to be removed to enable this testing.

With respect to the above assumptions, AGN indicate that performance of the new meters purchased for a number of years supports an 18 year initial life and they expect to achieve one field life extension of five years. AGN has confirmed that there are currently no meter families that have been tested at 18 years.

6.4.5 FLE test failures

The outcome of the FLE test will determine whether the meter family can be extended by five years (pass FLE test) or the family is required to be removed during the following year (fail FLE test). AGN has applied some assumptions such as:

• Newly manufactured meters have a 23-year life (ie. initial service life of 18 years plus one FLE extension of 5 years); and

• Refurbished meters have an 18 –year life (ie. initial service life of 15 years plus one FLE extension of 3 years).

AGN has forecast that 31,001 domestic meters will fail or reach the end of extended life. Zincara has considered these assumptions and within the constraints of the Code requirements we accept that they are reasonable.

6.4.6 Reactive meter replacements

Meters that become faulty in the field need to be replaced on a "reactive" basis. AGN advise that historically there are approximately 1,500 meters per annum that require replacement. However, over the last three years there has been an average of 2,500 meters replaced. These are mainly refurbished meters and AGN anticipates that this "spike" will decline, reverting back to the longer term average. As such AGN has forecast a reducing annual volume over the period with an overall total of 10,000 meters. As an option, if we consider a total of 1,750 reactive replacements per year the capex reduction would be approximately \$0.3 million, which can be considered to be relatively immaterial for the overall meter replacement program. Given that aging meters can deteriorate in the field at varying rates we therefore consider that AGN's forecast is reasonable.

6.4.7 I&C meters

Similar to the comments above which relate to domestic size meters, the following categories apply to I&C meters.

Low volumes. Families that have a small population and require replacement. There are 1,222 I&C meters within this category.

End-of-life. AGN forecast 1,362 I&C meters will have reached the end of their life during the next period. They will not be FLE tested as they have been refurbished several times and no longer suitable for further refurbishment.

Initial in-service compliance testing. Using similar approach as for domestic meters, AGN forecast 145 meters will need to be removed from the field during the next period to enable this testing.

FLE testing. Only I&C meters less than 10m³/hr typically undergo FLE testing. Similar to approach for domestic meters, AGN makes the following assumptions in order to forecast the number of meters to be removed to enable FLE testing:

- Initial service life for new meters is either 10 years or 18 years and if meter accuracy is maintained in the FLE test at the commencement of year 10 or 18 and result in a five year extension with the meter family removed at the end of year 15 or 23.
- Initial service life of refurbished meters is assumed to be 10 years and if meter accuracy is maintained in the FLE test at the commencement of year 10 and result in a three year extension with the meter family removed at the end of year 13.

Using these assumptions along with consideration of previous history AGN estimate 266 meters (from 12 meter families) will need to be removed for FLE testing during the next period.

In total PMCs for I&C meters is forecast to be 1,773 during the next period.

Note that AGN forecast that all I&C meters selected for FLE testing will pass.

6.5 UNIT RATES

6.5.1 Methodology

With respect to unit rate, AGN say they have adopted the same forecasting approach accepted by the AER for Victoria (AA period commencing 2018):

- **Current actuals** are used where the category involves high volumes of work, is subject to regular and ongoing changes to industry practices, the work is subject to increasing requirements and administrative standards by third parties, or other upward cost pressures.
- Three year weighted average of historical averages (by volume) are used where there are lower volumes and also scope and complexity of work is subject to a high degree of variability. Based on 2017/18 and 2018/19 financial years and the first nine months of 2019/20.

On this basis AGN say that the methods "provide a reasonable basis for the forecast unit rates and represent the best forecast or estimate possible in the circumstances".

6.5.2 Contracts

AGN's major meter replacement related contracts include:

- Meter acquisitions. Contract commenced in June 2016 with the four year term expiring June 2020. A one-year extension has been applied with the existing suppliers.
- Domestic meter fitting. Contract commencing May 2019 has a three-year term expiring May 2022 with two by one-year extension options. Another contract commencing April 2019 has a five-year term expiring April 2024.

6.5.3 Domestic meters – unit rates

The three-year weighted average is **and** current actuals (AGN proposed) is **boom**. The current period AER allowance is around **boom**, or **boom** below the proposed unit rate for next period. During the current period AGN's actual unit rate has been above the AER allowance for each year.

For comparison, if the three-year average is applied then the proposed capex of would reduce by **a second second**.

There are two drivers of the increased unit rates:

- With more FLE testing being undertaken (smaller family size), AGN say that there a fewer meters available for refurbishment. Historic data shows that the proportion of new meters versus refurbished meters has increased from in the previous period to approximately in the current period. AGN indicate that this proportion is expected to continue during the next period.
- In addition, AGN has changed field requirements in its latest contracts, which commenced around April / May 2019, requiring additional ancillary works such as replacing or sealing the meter box and changing regulators. While Zincara agrees that undertaking these activities at the time of meter change is relatively more cost effective than during a separate site visit, the result is that these costs are now included within the meter change program rather than opex or other capex category.

Zincara considers that the above changes do impact unit rate cost resulting in higher domestic meter replacement unit rates. In response to our further question²⁵, AGN has provided breakdown costs of the ancillary works associated with meter box sealing and regulator changes, including the cost of the regulators. They have also included the proportion of meter change work orders that have resulted in ancillary charges. Based on the information provided and the fact that the current actuals in 2019/20 reflect a full year of work undertaken under the current meter fitting contract, Zincara considers that AGN's is reasonable and the best available in the circumstances.

6.5.4 I&C meters – unit rates

With lower volumes and higher degree of variability relating to meter sizes, AGN propose to use the three-year weighted average of to forecast the unit rate of I&C meter replacement program. The "current actual" unit rate is **1000**. The current period AER allowance is around **1000**. During the current period, the actual yearly average unit rate has varied above and below the AER allowance. For comparison, if the current actual unit rate is applied then the proposed capex of **1000** would reduce by **1000**, which would not be considered material.

Based on our assessment we consider AGN's proposed unit rate for I&C meter replacement program to be reasonable and recommend it acceptance.

6.6 CONCLUSION

AGN has forecast its meter replacement program capex for the next period to be \$18.15 million. There are two major categories, domestic meters and I&C meters.

Domestic meter replacement program. The program has two variables, the first being volume of meters to be replaced and secondly the unit rate:

Volumes. The program includes:

²⁵ IR003

- Low volume meter families, not cost effective to sample test for FLE;
- End-of-life meters that have typically been refurbished a number of times;
- Initial in-service compliance testing, undertaken within 3 to 5 years;
- FLE family sample testing to determine further field life;
- Failed FLE test families, with the forecast based on key assumptions.

The forecast total domestic meter replacement program is 90,474 meters.

Unit rates. AGN has used "current year actuals" as the basis for its proposed unit rate forecast of **actuals**, giving a total capex of **actuals**. AGN note two key drivers for the increased unit rate:

- Increased proportion of new meters compared with refurbished meters (increased from to be approximately be achieving field life extensions (testing smaller family size). Note approximately be of replacement meters are refurbished meters, which are approximately be cheaper over their anticipated asset life;
- Additional field requirements undertaken at the time of the meter replacement, relating to replacing or sealing the meter box and changing regulators as necessary, both of which are not directly related to the meter change process but are reasonable to perform rather than as a separate site visit. It is noted that these would normally be related to other opex or capex activities, but are now included with the meter replacement capex. These additional activities are included in the latest contracts.

AGN's approach is typical of good gas industry practice and its forecast of meter replacement volumes and unit rates are considered reasonable. Zincara therefore recommends acceptance of AGN's domestic meter replacement program.

I&C meter replacement program.

Volume. The program includes:

- Low volume meter families, not cost effective to sample test for FLE;
- End-of-life meters that have typically been refurbished a number of times;
- Initial in-service compliance testing, undertaken within 3 to 5 years;
- FLE family sample testing to determine further field life;

The forecast total I&C meter replacement program is 2,995 meters.

Unit rates. With the relatively low volume of meters and high variability due to the variety of meter sizes, AGN proposes the three-year weighted average as the basis for the forecast unit rate of **and a**, giving a total capex of **and a**. The proposed unit rate is in line with the AER allowance during the current period.

AGN's approach is typical of good gas industry practice and its forecast of meter replacement volumes and unit rates are considered reasonable. Zincara therefore recommends acceptance of AGN's I&C meter replacement program.

7. AUGMENTATION

7.1 INTRODUCTION

The proposed Augmentation program is summarised in the following:

| Business case | Project name | Capex |
|---------------|--|-----------------|
| SA115 | Northern Metro HP main and Gawler Gate Station | \$7.13 million |
| SA116 | Southern Metro HP augmentation | \$3.07 million |
| Total: | | \$10.21 million |

 Table 7-1: AGN proposed Augmentation program (\$2019/20)
 \$2019/20

(Source: Capex forecast model)

7.2 GAWLER GATE STATION

The northern suburbs of metropolitan Adelaide, in and around Gawler, continue to be one of the major residential growth areas in South Australia. Three large residential and commercial developments near Gawler (Springwood, Roseworthy and Concordia) are expected to connect to the networks within the next five years. The load impacts will have greatest impact in and around Willaston (around 3,200 customers) on the northern extremity of the Gawler region.

The Springwood and Roseworthy developments are the most advanced with gas supply expected during the next AA period, with Concordia to connect soon afterwards.

Without augmentation AGN expect extremity pressures to fall below the minimum acceptable pressure of 90 kPa in 2023. Even allowing for some deferral if growth does not meet the forecast, it is very likely that the augmentation will be required within the next AA period.

AGN has assessed a number of options, with the proposed option to install a new gate station off the SEA Gas transmission pipeline to the east of Gawler and lay 1.3 kilometres of steel DN250 high pressure trunk main to connect with the existing Gawler trunk main by 2023, at a cost of \$7.13 million.

In addition to the growth being experienced and forecast in the Gawler region, this proposal will enable the large new developments to connect without adversely impacting current customers, while supporting growth for more than 20 years. It also provides the additional security of supply as a second source of supply into the Gawler region (around 9,600 customers).

This option provides the best NPV outcome of the options considered.

The cost estimate is based on current vendor and contractor rates, with the cost of the gate station being provided by SEA Gas.

Following assessment of the business case Zincara considers that the project is consistent with good industry practice and prudent in order to maintain supply pressure above minimum levels. The cost estimate being based on similar projects and gate station costing provided by SEA Gas appears reasonable.

7.3 SEAFORD ALDINGA HIGH PRESSURE AUGMENTATION

The southern suburbs of metropolitan Adelaide, from Noarlunga down to Sellicks Beach, are a major residential growth area. Over the past five years, the number of customer connections in the region has grown by an average of 498 new residential connections per year, and AGN expect this growth to continue over the next AA period. The HP network in the southern suburbs (comprising most of the City of Onkaparinga local government area) supplies more than 15,000 customers.

Historical growth in residential connections has decreased the amount of spare capacity in the Seaford Aldinga network and as a result it is reaching the point where augmentation is required in order to maintain customer supply pressures above minimum acceptable levels. The southern extremity of the network, in and around Aldinga, is particularly susceptible to pressure drop.

AGN estimate that the pressure levels in the Seaford Aldinga HP network will fall below the minimum acceptable pressure of 90 kPa before 2023 if the network is not augmented. Even allowing for some deferral if growth does not meet the forecast, it is very likely that the augmentation will be required within the next AA period.

There is evidence to suggest future growth in connections may be higher than the historical rate, with AGN indicating growth around 659 new gas connections per year.

This business case considers options to augment the Seaford to Aldinga network during 2021/22 with the proposed option to 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 then extending approximately 2.8 km south to Aldinga. This option would augment the Aldinga network to mitigate the pressure drop risk, and would sustain forecast growth for five-to-six years. A further 2.2 km of 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, AGN propose that this can be deferred to 2028, if the proposed initial 2.8 km of trunk main is installed in 2021/22.

The advantage of this option is that it reduces the amount of capital expenditure required for the forthcoming AA, and sets an efficient platform for further augmentation when the forecast growth occurs in Sellicks Beach. Once the 2.2 km Sellicks Beach extension has been delivered, there should be sufficient capacity to support further growth for at least 12-15 years. Based on current projections, no further HP augmentation is currently forecast for the Seaford Aldinga HP network until beyond 2040.

Note an additional \$2.4 million would be required in 2027/28 to accommodate growth in Sellicks Beach. This is captured in the 25-year NPV analysis.

Duplicating the 2.8 km DN280 trunk by 2022/23 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 occurs in Sellicks Beach and the regions around Aldinga.

Option 1 provides sufficient capacity to support the forecast organic growth over the remainder of the next AA period, enabling AGN to defer additional augmentation until 2027/28. No additional augmentation is forecast after 2027/28.

Following assessment of the business case Zincara considers that the project is prudent and consistent with good industry practice in order to maintain supply pressure above minimum levels. The proposed solution also provides flexibility to meet future growth and defer additional augmentation until at least the subsequent AA period. The cost estimate being based on current vendor and contractor rates in 2019 and historical costing

7.4 CONCLUSION

AGN propose two augmentation projects during the next AA period:

- Gawler Gate Station (business case: SA115)
- Seaford Aldinga high pressure augmentation (business case: SA116)

Note: unlike the current AA period, AGN's Attachment 8.7 Capex Forecast Model does not appear to forecast any minor augmentation projects during the next period.

The two augmentation projects are proposed to ensure network pressures are maintained above 90 kPa while enabling ongoing forecast growth in their respective regions.

The Gawler gate station project includes the installation of a new gate station off the SEA Gas transmission pipeline along with 1.3 kilometres of trunk main to connect with the Gawler network. The cost is estimated at \$7.13 million.

The business cases provide details of the need for the respective projects to cover growth, including step out developments, to ensure adequate gas supply is maintained. Allowing for some deferral if forecast loads don't match proposed timeframes, it is likely that the projects would be required during the next AA period (July 2021 – June 2026).

Zincara's assessment concludes that these projects are consistent with good industry practice, are prudent to maintain supply pressure and cost estimates are based on similar projects. On this basis we recommend that these projects be approved.

8. **GROWTH**

8.1 INTRODUCTION

The proposed connections (growth assets) program is summarised in the following:

| Asset category | Volume | Unit Rates | Сарех | Rates Methodology |
|-----------------------------|------------|--------------|--------------|-----------------------|
| Meters: | (meters) | (\$/meter) | (\$ million) | |
| Domestic | 35,327 | | | Current actual |
| I&C < 10TJ | 1,130 | | | 3-yr weighted average |
| Meters total: | 36,457 | | \$11.98 | |
| | | | | |
| Services: | (services) | (\$/service) | (\$ million) | |
| New home | 24,253 | | | Current actual |
| Existing home | 4,572 | | | Current actual |
| Multi-user | 1,626 | | | Current actual |
| I&C < 10TJ | 1,130 | | | 3-yr weighted average |
| Services total: | 31,580 | | \$65.77 | |
| | | | | |
| Mains: | (metres) | (\$/metre) | (\$ million) | |
| Estate | 119,451 | | | Current actual |
| Existing home | 45,165 | | | Current actual |
| I&C < 10TJ | 6,325 | | | 3-yr weighted average |
| Mains total: | 170,941 | | \$20.92 | |
| | | | | |
| Growth new areas: | | | (\$ million) | |
| Concordia reticulation | | | \$3.06 | Bottom-up |
| Kingsford industrial estate | | | \$2.66 | Bottom-up |
| Mount Barker reticulation | | | \$24.97 | |
| Growth new areas: | | | \$30.69 | |
| Total growth capex: | | | \$129.36 | |

 Table 8-1: AGN proposed connections program (\$2019/20, million)

(Source: Capex forecast model)

In the above table (Capex forecast model):

- Concordia reticulation project and Kingsford regional industrial estate project include the trunk mains only, with the reticulation mains, services and meters included in the respective growth categories.
- Mount Barker is different in that it was not included in the Core Energy demand forecast and is included separately in the growth capex forecast. The project capex includes trunk reticulation as well as associated residential and commercial connections.
- Dwelling commencements includes an estimated short term impact of Covid-19. However, further update should be provided prior to AER's final decision.

8.2 VOLUME FORECAST

The volume forecast is based on Core Energy's forecast, except for Mount Barker. Core Energy's forecast is based on the Housing Industry Association (HIA) forecast of new dwelling commencements, which shows a decline in new dwelling commencements, particularly multiunit dwellings in 2018/19 followed by a small recovery in 2019/20. An update, provided in May 2020, includes the impacts of COVID-19, showing a short term decline in detached and multi-unit dwellings. The longer term economic impacts will be subject to further forecast updates when new information becomes available.

The forecast growth in residential connections is slightly lower than the 10-year historic average.

The Mount Barker growth data was not included in the Core Energy forecast, as it is a new extension with no historical demand data. These connections have been added to AGN's forecast reflecting the AER's final decision on the Mount Barker extension for the residential, commercial and industrial categories. The Mount Barker forecast for next period is 2,504 new connections comprising:

- Residential connections: 2,436
- Commercial connections: 68

The volume forecast is summarised in the above table. Forecast new connections is 39,061 which includes the Core Energy forecast (including Concordia and Kingsford industrial estate), Mount Barker and adjustment for impact of Covid-19.

8.3 UNIT RATES

8.3.1 Methodology

With respect to unit rate, AGN say they have adopted the same forecasting approach accepted by the AER for Victoria (AA period commencing 2018):

- **Current actuals** are used where the category involves high volumes of work, is subject to regular and ongoing changes to industry practices, the work is subject to increasing requirements and administrative standards by third parties, or other upward cost pressures.
- Three year weighted average of historical averages (by volume) are used where there are lower volumes and also scope and complexity of work is subject to a high degree of variability. Based on 2017/18 and 2018/19 financial years and the first nine months of 2019/20.
- **Bottom-up** estimate is used where current or historical actuals are not available.

On this basis AGN say that the methods "provide a reasonable basis for the forecast unit rates and represent the best forecast or estimate possible in the circumstances".

8.3.2 Contracts

AGN's major connections related contracts include:

- Mains and services. The previous contract commenced in January 2015 and expired in December 2019. New contracts commenced in January 2020.
- Meter acquisitions. Contract commenced in June 2016 with the four year term expiring June 2020. A one-year extension has been applied with the existing suppliers.
- Domestic meter fitting. Contract commencing May 2019 has a three-year term expiring May 2022 with two by one-year extension options. Another contract commencing April 2019 has a five-year term expiring April 2024.

8.3.3 Mains

New estate mains. Three-year weighted average is and current actuals (AGN proposed) is which is similar to trend line into the forecast period. Note current period AER allowance was around **Control**. Capex reduction if use multi-year average rather than current actuals is approximately **Control**. AGN say that higher rates are due to large greenfield developments, requiring larger diameter mains, with similar large developments expected to continue/commence during the next period, including Concordia.

In response to our request for further information relating to the impact of larger diameter mains²⁶, AGN has provided data and analysis to support its forecast for the next period and in particular the impact of growth at the network extremities such as Adelaide northern areas, Gawler region, Seaford Aldinga and McLaren Vale. Zincara has reviewed the information and considers that it provides a reasonable analysis of historic and forecast main laying. As such it supports AGN's forecast unit rates as best estimate in the circumstances and Zincara recommends acceptance of AGN's forecast unit rate for new estate mains.

Existing home mains. Three-year weighted average is and current actuals (AGN proposed) is **Existing**, which is below the trend line into the forecast period. Note current period AER allowance was around **Exist**. Capex reduction if use multi-year average rather than current actuals is approximately **Existence**. AGN say that next period is forecast to reflect the more recent experience of the current period where there has been an increase in developments in established urban areas close to the CBD, resulting in higher traffic management, reinstatement and similar delivery complexities. Current period shows year on year increase in unit rates with 2018/19 and YTD2019/20 flat. Zincara considers the forecast as reasonable and recommends acceptance of AGN's forecast for existing home mains.

I&C mains. Three-year weighted average (AGN proposed) is and current actuals is . Note current period AER allowance was around . As this category is relatively lower volume with a higher degree of variability AGN proposes to use the multi-year average, which is well below the trend line into the forecast period. The higher-than-expected costs incurred during the current AA period are due to the large number of commercial developments which occurred in the Adelaide CBD during 2017/18, 2018/19 and 2019/20. These large developments required installation of large diameter steel trunk mains, which cost considerably more to install than standard HDPE mains, resulting in an overall unit rate that was higher than the benchmark. The SA Department of Planning, Transport and Infrastructure (DPTI) development activity tracker shows the volume of approved and commenced developments is similar in nature and number to those recently completed. AGN therefore expect the forward-looking unit rate for new I&C mains to remain at the higher levels experienced in the current AA period and have used a weighted average of historical actual rates to forecast the cost of installing new I&C mains over the next AA period. Zincara considers the forecast as reasonable and recommends acceptance of AGN's forecast for I&C mains.

²⁶ IR005

8.3.4 Services

New homes. Three-year weighted average is **and current actuals (AGN** proposed) is **actually**, which is marginally below the trend line into the forecast period. Note current period AER allowance was around **actually**. Capex reduction if use multi-year average rather than current actuals is approximately **actually**. The current year rates reflect the impact of a new internal APA installation standard, which requires meter bars and brackets to be installed to remove potential stress on fittings. AGN says this new standard reduces the cost of new meter installations. In addition, a new internal APA meter location compliance procedure was introduced in July 2019, potentially increasing the length of new services. These changed procedures will increase unit rates with current year showing ongoing trend of year on year increases.

In response to our request for further information relating to the cost impact of the meter bar and bracket as well as the changed meter compliance procedures²⁷, AGN has provided details of their costs. Zincara has reviewed the additional information and considers that it is reasonable. As such Zincara recommends acceptance of AGN's unit rate for services to new homes.

Existing homes. Three-year weighted average is and current actuals (AGN proposed) is **Existing homes.** Which is below the trend line into the forecast period. Note current period AER allowance was around **Existence**. Capex reduction if use multi-year average rather than current actuals is approximately **Existence**. The higher than benchmark unit rate for installing new services to existing homes is impacted by a new installation standard which requires additional works to remove potential stress on fittings and mitigate safety risk. These sites are also requiring more complex connections (such as larger sites, sloping blocks). We have also seen higher costs related to changing requirements by councils, for health and safety, for traffic management and working around other infrastructure assets. Current year represents a step-up compared to previous years.

In response to our request for further information relating to the cost impact of the meter bar and bracket as well as the changed meter compliance procedures²⁸, AGN has provided details of their costs. Zincara has reviewed the additional information and considers that it is reasonable. As such Zincara recommends acceptance of AGN's unit rate for services to existing homes.

Multi User. Three-year weighted average is and current actuals (AGN proposed) is **and current**, which is below the trend line into the forecast period. The general unit rate has been very similar to the AER allowance, while noting a data capture issue with 2016/17 unit rates. The Capex reduction if use multi-year average rather than current actuals is approximately **acceptance**, which is relatively immaterial. Zincara recommends acceptance of AGN's unit rate for services to multi user sites.

I&C (<10TJ). Three-year weighted average (AGN proposed) is **and current** actuals is **and current**, which is below the trend line into the forecast period. Note current period AER allowance was around **actuals**. The recent years reflect an increase in CBD commercial developments, which is expected to continue in the forecast period. Zincara recommends acceptance of AGN's unit rate for services to I&C sites.

²⁷ IR005

²⁸ IR005

8.3.5 Meters

Domestic. Three-year weighted average is **and current actuals (AGN proposed)** is **and current actuals (AGN proposed)** is **a second and current actuals (AGN proposed)**. There has been a general downward trend in this category during the current period. Note that the current period AER allowance was around **a second actual actuals**. AGN noted in its new services categories, that installing a meter bar and bracket has reduced the cost of new meter installations²⁹. The difference between the multi-year average and current year unit rate is considered immaterial. Zincara recommends acceptance of AGN's unit rate for domestic meters.

I&C (<10TJ). Three-year weighted average (AGN proposed) is **and current** actuals is **and current**. The trend has been relatively steady during the current period. Note current period AER allowance was around **accurrent**. Zincara recommends acceptance of AGN's unit rate for I&C meters.

8.3.6 General

It is noted that if unit rates for all categories were forecast using the multi-year average shown in the Unit Rate Report (Attachment 8.9) there would be a capex reduction of approximately (mains: **Contractor**, services: **Contractor** and no material change for meters). However, as noted above, our assessment also considers the various labour and materials contracts timeframes, newly introduced procedural changes, external price pressures and unit rate trends.

AGN also say that while they have made every effort to derive accurate forecast unit rates, several factors are expected to place upward pressure on unit rates over the next AA period. For example, more stringent specifications on road reinstatement, non-destructive excavation, meter location compliance, and working around third party assets have all been introduced in the past two years. These specifications are likely to drive costs upwards and, given their recent introduction, are not yet fully reflected in our actual costs.

In consideration of all of the factors we consider that AGN's unit rates have been arrived at on a reasonable basis. They are informed by recent revealed costs of the work that will be undertaken over the next AA period and reflect the best estimate possible in the circumstances.

8.4 STEP OUT PROJECTS

AGN identify three step-out projects during the forecast period, with Mount Barker having been previously submitted to the AER in 2018 and approved.

²⁹ Unit Rate report: section 2.3.1.3, page 18

8.4.1 Concordia reticulation project³⁰

Greenfield growth in Concordia, a rural area north of Adelaide, is forecast to commence in 2021/22, with an estimated 10,000 connections to the network over 25 years. AGN's proposed option is to connect Concordia to the Gawler high pressure network downstream of the proposed new Gawler gate station³¹ and run a 3 kilometre HDPE DN280 trunk main. The business case covers the trunk main (\$3.058 million), with the reticulation (mains, services and meters), totalling \$2.766 million, included within the growth capex forecast.

During the next AA period, AGN estimates 1,143 domestic connections and 5 I&C connections.

As a greenfield development, AGN estimates a 95% penetration rate. Its NPV analysis indicates a positive return in 16 years, with a 25 year NPV of \$18.7 million.

It is noted that the preferred option is subject to the installation of the new Gawler gate station. We consider that progressing this project in conjunction with the development of the estate provides a prudent and cost efficient approach and therefore recommend acceptance.

8.4.2 Kingsford regional industrial estate³²

The industrial estate is located between Gawler and Roseworthy, 46 kilometres north of Adelaide. The estate is earmarked as a key area for industrial development.

AGN forecasts connection of five I&C customers during the next AA period.

AGN's preferred option is to extend the high pressure network north from Horrocks Highway to the industrial estate, with the trunk main (2 kilometres of HDPE DN280) laid in 2021/22 and a further 1.5 kilometres of HDPE DN180 laid within the estate, at a total cost of \$2.662 million. The services and meters for the I&C connections is estimated at \$0.043 million and are included within the growth capex forecast.

NPV analysis indicates a positive return in 16 years, with a 25 year NPV of \$1.8 million.

We consider that this project is prudent and the proposed option is the most efficient and therefore recommend acceptance.

8.4.3 Mount Barker

The Mount Barker project was approved by the AER in 2018 and AGN indicate that they will complete the pipeline extension during the current period. The forecast provides for 2,436 new residential connections along with 68 I&C connections, giving a total of 2,504

³⁰ Business Case SA 122

³¹ Business Case SA 115

³² Business Case SA 124

connections. This includes mains totalling 70,471 metres. Total growth capex for the next period is \$24.97 million and is in addition to the other growth categories.

At this stage we are awaiting confirmation from AGN as to whether the proposed pipeline will be constructed and completed prior to the end of the current AA period.

8.5 CONCLUSION

AGN has forecast its growth assets (connections) capex for the next period to be \$129.36 million.

Volumes. AGN forecast for new connections is 39,061 which include the Core Energy forecast (including Concordia and Kingsford industrial estate), Mount Barker and adjustment for impact of Covid-19. Approximately 40,000 connections are anticipated during the current period. The longer term economic impacts of the COVID-19 pandemic are not yet clear and it is recommended that the forecast be updated prior to the AER's final decision. We are also awaiting update information relating to Mount Barker reticulation. Subject to confirmation regarding these matters, Zincara recommends acceptance of AGN's connection forecast.

Unit Rates. AGN has used "current year actuals" as the basis for its proposed forecast for each of the categories apart from the I&C (<10 TJ) categories for which it applies the "weighted 3-year average of historical actuals".

A number of price pressure issues relating to unit rates include:

- New internal APA installation procedures have been introduced in recent year(s), including use of meter bar and brackets;
- New internal APA meter location compliance procedure introduced in July 2019;
- External pricing pressures through additional administrative and safety standards;
- Larger estate developments requiring larger diameter mains;
- Existing homes connections closer to the CBD or in more complex locations; and
- I&C < 10 TJ connections closer to CBD areas with more complex requirements.

Assessing the unit rates for each of the categories we also considered the potential capex impact if the unit rates across all categories were based on the multi-year average. This option resulted in an estimated capex reduction of approximately

Having reviewed the unit rates for each of the connection categories, along with additional information provided in response to our further queries, Zincara considers that AGN's proposed unit rates are reasonable in the circumstances and therefore recommend their acceptance.

9. OTHER DISTRIBUTION SYSTEM

9.1 INTRODUCTION

AGN distribution network includes approximately 200 km of metropolitan steel Transmission Pressure (TP) Pipelines which delivers gas to over 450,000 customers. The majority of the pipelines were constructed prior to 1987 with the two longest pipelines (M42 and M12) being over 50 years old. The capex for this category is essentially for work with the TP pipelines and is shown in the table below.

| Code | Name | 21/22 | 22/23 | 23/24 | 24/25 | 25/26 | Total |
|-------|---|-------|-------|-------|-------|-------|-------|
| SA101 | DCVG Dig Up and Repair TP | 0.24 | 0.26 | 0.26 | 0.26 | 0.24 | 1.26 |
| SA103 | Replacement of Valves | 0.62 | 1.01 | 1.51 | 0.91 | 0.91 | 4.97 |
| SA104 | TP M53 Replacement | 0.38 | 1.19 | - | - | - | 1.57 |
| SA105 | TP Modifications for ILI | 4.25 | 6.78 | 7.08 | 7.07 | 6.82 | 31.99 |
| SA107 | Additional emergency isolation valves | 0.07 | 0.44 | 0.44 | 0.44 | 0.37 | 1.77 |
| SA108 | I and C Meter Set Refurbishment | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 1.34 |
| SA112 | CP Assets Replacement | 0.33 | 0.33 | 0.33 | 0.33 | 0.33 | 1.65 |
| SA126 | CP Remote Monitoring | 0.30 | 0.18 | - | - | - | 0.48 |
| SA127 | Isolated Steel Sections from CP | 0.11 | 0.28 | 0.27 | 0.27 | 0.25 | 1.17 |
| SA129 | I&C Overpressure risk reduction | 0.47 | 0.47 | 0.51 | 0.51 | 0.51 | 2.46 |
| SA131 | Slab Sensitive TP Areas | 0.27 | - | - | - | - | 0.27 |
| Total | | 7.30 | 11.20 | 10.66 | 10.05 | 9.71 | 48.92 |

Table 9-1 Other Distribution System Capex (\$2019/20, million)

(Source: AGNSA_Attachment 8.7 Capex Forecast Model-20200701_Public)

In support of the projects, AGN provided the business cases in its document AGNSA_ Attachment 8.8 Capex Business Cases_ Confidential. Our analysis of the projects is discussed in the sections below.

9.2 SA 101 DIG UP AND REPAIR TP PIPELINE LOCATIONS WITH MULTIPLE DCVG INDICATIONS OF <15%

The capex for this activity is shown in the table below.

| Code | Name | 21/22 | 22/23 | 23/24 | 24/25 | 25/26 | Total | | | |
|-------|---------------|-------|-------|-------|-------|-------|-------|--|--|--|
| SA101 | DCVG Dig Up | 0.24 | 0.26 | 0.26 | 0.26 | 0.24 | 1.26 | | | |
| | and Repair TP | | | | | | | | | |

| Table 9-2: DCVG D | ig Up and Repair Capex | (\$2019/20, million) |
|-------------------|------------------------|----------------------|
|-------------------|------------------------|----------------------|

(Source: AGNSA Attachment 8.7 Capex Forecast Model-20200701 Public)

AGN conducts DCVG³³ surveys every five years on its TP pipelines as a requirement of AS 2885. The surveys performed over the last five years have identified a further 68 locations of multiple DCVG indications with IR reading < 15%. AGN said that pipeline locations with IR reading less than 15% are deemed low priority and are not subject to any remediation as it is expected that a small coating defect would be contained by the corrosion protection system. However, excavations of such low priority sites prior to the current AA period, showed that extent of corrosion was masked by the surrounding area. In 2014, AGN commenced excavation of locations where the IR reading was <15%.

To date, AGN has completed 79 excavations of such sites, 63 in the current AA period. The result of these excavations have revealed the coating defects as shown in the figure below.



Figure 9-1: TP pipeline DCVG IR values versus excavation results

Source: (AGNSA_Attachment 8.8 Capex Business Cases_Confidential)

Of the 79 excavations, 64 of these were conducted at locations where there had been multiple DCVG IR readings below 15% at the same location. 61 of these sites showed some level of corrosion as shown in the figure below.

³³ DCVG stands for Direct Current Voltage Gradient. A DCVG Survey is carried out to identify coating defects on TP pipelines. The result of the survey is expressed in %IR which gives an estimate of the size of the defect.





Source: (AGNSA_Attachment 8.8 Capex Business Cases_Confidential)

AGN risk rating considered the risk high and as such, proposed three options to reduce the risk:

- **Option 1** Do not conduct dig ups on TP pipelines at locations with an IR reading <15%. Conduct reactive repairs as leaks occur on TP pipelines;
- **Option 2** Dig up and repair the 68 TP pipeline locations where multiple indications of IR <15% have been recorded. This work will be conducted over five years; or
- **Option 3** Dig up and repair the 68 TP pipeline locations where multiple indications of IR <15% have been recorded. This work will be conducted over ten years.

The reasons that AGN decided on Option 2 include:

- excavating locations that have shown multiple IR indications locations has proven to detect TP pipeline corrosion defects;
- the proactive repair of coating and corrosion defects on TP pipelines will reduce the need for emergency repairs;
- it is the only option that reduces risks to an acceptable level; and
- Option 3 will mitigate only half the risk associated with coating defects and corrosion in the upcoming period;

9.2.1 Cost Estimate

The cost estimate for the work is shown in the table below.

| Name | 21/22 | 22/23 | 23/24 | 24/25 | 25/26 | Total |
|-------------------|-------|-------|-------|-------|-------|---------|
| No of excavations | | | | | | |
| Labour \$ | 232.3 | 250.2 | 250.2 | 250.2 | 232.3 | 1,215.1 |
| Material | 7.8 | 8.4 | 8.4 | 8.4 | 7.8 | 41.0 |
| Total | 240.1 | 258.6 | 258.6 | 258.6 | 240.1 | 1,256.1 |

Table 9-4: Cost Estimate (\$2019/20, 000)

Source: (AGNSA_Attachment 8.8 Capex Business Cases_Confidential)

The capex above is based on:

- Labour cost of per excavation based on a historical cost of excavations between 2016 and 2019;
- Material cost of per repair for coating material; and
- Structural wrap for approximately 10% of the repair at per wrap.

9.2.2 Conclusion

Zincara is aware that DCVG results with an IR of \leq 15% generally mean that there are generally only minor corrosion defects and the coating defects monitored. However, as shown in Figure 9-1 and Table 9-3, there are some situations when the IR readings do not reflect the level of corrosion. As such, we concur with the need to confirm that the TP pipeline does not have severe corrosion that requires recoating when the IR is at a low level. In addition, we also note that AGN had carried out 79 excavations this current AA period and as such would have the capacity to compete this work in the next AA period. We therefore consider the project to be reasonable

In relation to the cost of the work, we believe that AGN's approach of using historical cost to determine the excavation cost is a reasonable approach.

| able 3-5. Recommended capex DCVG Dig Op and Repair TP (32015/20 minion) | | | | | | | | | |
|---|---------------|-------|-------|-------|-------|-------|-------|--|--|
| Code | Name | 21/22 | 22/23 | 23/24 | 24/25 | 25/26 | Total | | |
| SA101 | DCVG Dig Up | 0.24 | 0.26 | 0.26 | 0.26 | 0.24 | 1.26 | | |
| | and Repair TP | | | | | | | | |

Table 9-5: Recommended Capex DCVG Dig Up and Repair TP (\$2019/20 million)

9.3 SA103 - REPLACEMENT OF VALVES

The capex for the work is shown in the table below.

| Code | Name | 21/22 | 22/23 | 23/24 | 24/25 | 25/26 | Total |
|-------|----------------|-------|-------|-------|-------|-------|-------|
| SA103 | Replacement of | 0.62 | 1.01 | 1.51 | 0.91 | 0.91 | 4.97 |

| Table 9-6: Re | placement o | f Valves (| Capex | (\$2019/20. | million) |
|---------------|-------------|------------|-------|---------------------|----------|
| | placement o | i vaives | cuper | (<i>YEOIJ/EO</i> , | |

Source: (AGNSA_Attachment 8.7 Capex Forecast Model-20200701_Public)

There are 1,207 steel valves in the SA networks of which 283 valves are located on TP pipelines, and 924 in the smaller distribution mains. The valves were installed in the 1970's and 1980's and are typically located in medium and high density suburban areas. These valves have been installed to isolate sections of the network for emergency rectification or planned maintenance.

AGN has identified valves that are currently either inoperable or have had leaks repaired but are in a deteriorated state. AGN proposed to replace these valves in the next AA period. As per the AGN process, it considered three options:

- Option 1 Replace valves. inoperable valves (transmission and distribution). Proactive replacement of previously leaking valves (transmission and distribution) (\$5.0 million);
- **Option 2** Replace inoperable valves only (TP and distribution). Do not replace previously leaking valves that do not represent a significant immediate safety hazard; (\$2.8 million); and
- **Option 3** Maintain status quo. Continue the scheduled maintenance program only. Do not commence a new proactive replacement program for inoperable valves. Do not replace leaking valves that do not represent a significant immediate safety hazard (no additional upfront capital cost).

The reasons that AGN decided on option 1 include:

- Consistency with AS 2885 and AS/NZS 4645;
- Only solution that address the risk associated with inoperable and leaking isolation valves over the long term. Leak repair is a short term temporary solution; and
- Most cost-effective way of managing the risk associated with the seized valves.

9.3.1 Cost estimate

AGN said that the volume of work is based on the currently identified number of TP and distribution inoperable and leaking valves. Priority has been given to the inoperable valves for the first three years.

The estimated valve replacement costs are based on actual costs of recently completed projects:

- Transmission valves including a bypass Bowden 2016/17 -
- Transmission valves without a bypass Oaklands 2017/18 -
- Distribution valves including a bypass Exter Terrace 2016/17 -

; and

• Distribution valves without a bypass – Riverdale Road 20-17/18 -

Details of the capex are shown in the table below.

| | C (ÇECI)/EC | ,, | | | | |
|--------------|-------------|---------|---------|---------|---------|---------|
| | 2021/22 | 2022/23 | 2023/24 | 2024/25 | 2025/26 | Total |
| ТР | | | | | | |
| Labour | | 885.3 | 885.3 | 590.2 | 590.2 | 2,951.1 |
| Materials | 368.5 | | 2475.7 | - | - | 614.1 |
| Total | 368.5 | 885.3 | 1,131.0 | 590.2 | 590.2 | 3,563.3 |
| | | | | | | |
| Distribution | | | | | | |
| Labour | 161.2 | 215.0 | 322.4 | 268.7 | 268.7 | 1,182.3 |
| Materials | 40.7 | 20.4 | 61.1 | 50.9 | 50.9 | 223.9 |
| Total | 255.7 | 127.8 | 383.5 | 319.6 | 319.6 | 1,406.2 |
| Grand Total | 624.2 | 1,013.2 | 1,514.5 | 909.8 | 909.8 | 4,971.5 |

Table 9-7: Cost Estimate (\$2019/20, 000)

Source: (AGNNSA_Attachment 8.8 Capex Business Cases_Confidential)

9.4 CONCLUSION

From a safety perspective, Zincara concurs with the need for the replacement of the valves that are frozen. We also believe that when AGN repair the leaking valves, AGN would have ensured that the valves are operating effectively. Given that, we do not believe that valves are going to fail in the short to medium term. AGN's valve maintenance program should be able to monitor the operation of these valves and only replace those that have frozen at some stage. We therefore consider Option 2 which is to replace **m** inoperable valves, monitor the other **m** valves and replace if necessary, as the more prudent solution.

In relation to the cost estimate, we believe that AGN's approach of using actual unit cost as a proxy for the forecast replacement cost is reasonable.

We have had useful discussions with AGN and the OTR on our recommendation. Any further advice on the matter will be considered after the AER's draft decision.

| | 2021/22 | 2022/23 | 2023/24 | 2024/25 | 2025/26 | Total |
|--------------|---------|---------|---------|---------|---------|---------|
| ТР | | | | | | |
| Labour | | 885.3 | 885.3 | - | - | 1,770.7 |
| Materials | 368.5 | | - | | | 368.5 |
| Total | 368.5 | 885.3 | 885.3 | - | - | 2,139.2 |
| | | | | | | |
| Distribution | | | | | | |
| Labour | 161.2 | 215.0 | 161.2 | - | - | 537.4 |
| Materials | 30.5 | 40.7 | 30.5 | - | - | 101.8 |
| Total | 191.8 | 255.7 | 191.8 | - | - | 639.2 |
| Grand Total | 560.2 | 1,141.0 | 1,077.1 | - | - | 2,778.3 |

Table 9-8: Details of Recommended Capex Valve Replacement (\$2019/20, 000)

Table 9-9: Recommended Replacement of Valves Capex (\$2019/20, million)

| Code | Name | 21/22 | 22/23 | 23/24 | 24/25 | 25/26 | Total |
|-------|----------------|-------|-------|-------|-------|-------|-------|
| SA103 | Replacement of | 0.56 | 1.01 | 1.08 | - | - | 2.78 |
| | Valves | | | | | | |

9.5 SA104 – M53 OFFTAKE REPLACEMENT

The capex for this activity is shown in the table below.

| | able 5-10. Miss Officiale Replacement Capex (\$2015)20, minion | | | | | | | | | |
|--------|--|-------|-------|-------|-------|-------|-------|--|--|--|
| Code | Name | 21/22 | 22/23 | 23/24 | 24/25 | 25/26 | Total | | | |
| \$4104 | TP M53 | 0.38 | 1.19 | - | - | - | 1.57 | | | |
| 5A104 | Replacement | | | | | | | | | |

| Table 9-10: M53 Offtake | Replacement Capex | (\$2019/20, million) |
|-------------------------|--------------------------|----------------------|
|-------------------------|--------------------------|----------------------|

9Source: AGNSA_Attachment 8.7 Capex Forecast Model-20200701_Public)

AGN said that the M53 TP pipeline was originally a 7.9 km pipeline commissioned in 1975. Through DCVG surveys and excavations AGN identified significant pitting corrosion beneath dis-bonded heat shrink sleeves on the pipeline. In 2013, AGN replaced 3.1 km of the M53 and renamed it M131. A further 4.06 km DN200 section is being replaced during the current access arrangement (AA) period. These transmission pipelines are being replaced on a like-for-like basis to address corrosion, reduce the safety risk and ensure ongoing supply to the major residential growth area of the southern suburbs of metropolitan Adelaide.

The third and final section of M53 replacement is a smaller diameter 800 m DN100 offtake that services 600 customers in the Hackham area. To address the corrosion in the pipeline, AGN considered three options:

• **Option 1** – Replace the M53 offtake with a new polyethylene (PE) HP distribution trunk main (\$1.6 million);

- **Option 2** Like-for-like replacement of the M53 offtake with a new steel TP pipeline (\$2.5 million); and
- **Option 3** Repair the M53 offtake (\$1.6 million)

Option 1 is AGN's proposed solution. This involves installing a new TP to high pressure (HP) district regulator and polyethylene (PE) HP distribution trunk main along Main South Rd to tie into existing downstream HP network. This activity will mitigate the high health and safety, operational and compliance risks associated with corrosion of the TP pipelines. It will also reduce the operational and financial risks of emergency repairs.

Option 2 achieves the same risk reduction but at a higher cost. AGN did not consider the growth in the area requires maintaining the current capacity of the steel TP offtake.

Option 3 achieves the same risk reduction in relation to the identified corrosion on the M53, but at a higher cost. Moreover, it only addresses the known corrosion identified through DCVG surveys and excavation. It is therefore possible that corrosion may remain on areas of the pipeline that have not been excavated.

9.5.1 Cost Estimate

AGN's cost estimate for Option 1 is based on the following:

- cost based on historical expenditure, with labour rates based on work breakdown structure of activities, and material rates based on historical costs for similar materials;
- estimates derived from contractual rates of vendors to be utilised;
- resource cost based on other similar projects ongoing at present or in previous AA periods; and
- original equipment manufacturer contractual rates for spares and labour that are part of our services agreements.

The summary of the cost estimate³⁴ is shown in the table below.

| | 2021/22 | 2022/23 | 2023/24 | 2024/25 | 2025/26 | Total |
|-----------|---------|---------|---------|---------|---------|---------|
| Labour | 196.8 | 1,148.6 | - | - | - | 1,345.5 |
| Materials | 179.2 | 44.8 | - | - | - | 224.0 |
| Total | 376.0 | 1,193.4 | - | - | - | 1,569.5 |

Table 9-11: Summary of M53 Replacement Capex (\$2019/20, 000)

(Source: AGNSA_ Attachment 8.8 Capex Business Cases_ Confidential)

³⁴ Details of the costs are in Appendix C -cost estimate in AGNSA_Attachment 8.8 Capex Business Cases_Confidential pg 57

9.5.2 Conclusion

AGN has been progressively replacing the M53 TP pipeline which has significant corrosion. This project is the third and final stage of replacing the M53 TP pipeline. AGN has decided to replace this pipeline with a polyethylene trunk main instead of a like for like steel pipeline. AGN said that the future load for this pipeline does not warrant a TP pipeline replacement.

We consider that given the condition of the pipeline, it is prudent for AGN to replace the final stage of the M53 TP pipeline.

AGN had since advised³⁵ that the South Australian Department for Planning, Transport and Infrastructure (DPTI) has agreed to fund the capital for the replacement of the portion of the M53. This portion of the M53 is on the existing road bridge across Main South road, Norlunga which DPTI proposes to lower. As the capex has been submitted as part of AGN's submission, we will continue to recommend the project from a technical perspective. We refer the decision on how to treat the funding to the AER.

| | able 5-12. Recommended W55 Ontake Replacement Capex (52015/20, minor) | | | | | | | | |
|-------|---|-------|-------|-------|-------|-------|-------|--|--|
| Code | Name | 21/22 | 22/23 | 23/24 | 24/25 | 25/26 | Total | | |
| \$104 | TP M53 | 0.38 | 1.19 | - | - | - | 1.57 | | |
| SA104 | Replacement | | | | | | | | |

Table 9-12: Recommended M53 Offtake Replacement Capex (\$2019/20, million)

9.6 PIPELINE MODIFICATION FOR INLINE INSPECTION

The capex for this project is shown in the table below.

| Table J | able 5-13. Replacement of valves capex (52015/20, minor) | | | | | | | | | |
|---------|--|-------|-------|-------|-------|-------|-------|--|--|--|
| Code | Name | 21/22 | 22/23 | 23/24 | 24/25 | 25/26 | Total | | | |
| SA105 | Pipeline Mod | 4.25 | 6.78 | 7.08 | 7.07 | 6.82 | 31.99 | | | |
| | for ILI | | | | | | | | | |

Table 9-13: Replacement of Valves Capex (\$2019/20, million)

Source: (AGNSA_Attachment 8.7 Capex Forecast Model-20200701_Public)

AGN said that there are 200km of metropolitan steel TP pipelines in SA networks. These pipelines are primarily located in industrial and suburban areas which are heavily developed and/or near to population centres. The majority of the TP pipelines were constructed prior to 1987 with the longest and highest priority pipelines (M42 and M12) being over 50 years old.

Currently AGN monitors the corrosion of its pipelines through DCVG surveys. AGN said that the DCVG results can be impacted by soil which limits the effectiveness of the readings. As such, AGN are proposing to move Inline Inspection (ILI) using intelligent pigs for its ongoing corrosion inspection.

ILI however requires the TP pipelines to be of sufficient diameter and configuration and bend radius to allow for the pig to pass through. AGN said that its older pipelines have inconsistent diameters or tight bends which means that intelligent pigging is not feasible.

³⁵ AGN-IR017-Other Distributions Systems-20200916-Confidential

AGN also said that ILI is considered good industry practice and has become standard pipeline integrity management practice. In addition, Section 6.6.1 of AS 2885.3-2012 states:

"Where a pipeline (or section of a pipeline) is not capable of being inspected by an inline tool, the Licensee shall consider whether the pipeline needs to be modified to permit inspection by an inline inspection too. Any decision not to undertake modification for this purpose shall be consistent with the safety management study and PIMP, and shall be documented."

In addition, AGN also highlighted that JGN and ATCO Gas have commenced modifying their pipelines for ILI.

In Table 1.3 of Attachment 8.8, AGN provided a list of pipelines which can potentially be modified for intelligent pigs. The three highest priority pipelines are M12, M42 and M101 as they are the oldest pipelines and supply the highest number of customers (approximately 195,000). AGN proposed that at least one of these pipelines be modified for ILI.

AGN considered a range of options prior to preparing the business plan and finally decided on the following options:

- Option 1 Maintain status quo. Continue with current practice of DCVG and dig ups only, and repair/replace the pipelines upon failure. (\$0 million).
- Option 2 Conduct physical FEED study on the four highest priority 29 TP pipelines (M12, M84, M42 and M101) and undertake one high priority ILI modification project (M12) that will be indicative of the costs and challenges of future works. (\$32 million). The M84 is a short pipeline, directly connected to M12 pipeline and will be modified with the M12.
- Option 3 Conduct physical FEED study on all five 30 TP pipelines (M12, M42, M55, M84 and 101) and undertake a pilot program to modify a small, simple section of TP pipeline for ILI compatibility. (\$22 million).
- Option 4 Conduct physical FEED study and then modify the four highest priority TP pipelines (M12, M42, M84 and M101) in order to achieve the greatest risk reduction quickly. (\$71.8 million).

AGN decided on Option 2 for the following reasons:

- M12 is 20.7km long and passes through seven sensitive metropolitan areas and the pipeline is 50years old with long sections of the pipeline inaccessible to current corrosion detection practices.
- The project addresses many of the challenges and characteristics expected in other future pipeline modifications.
- The unit rates for any future projects will be more reflective on actual construction conditions and experience gain will give an insight into future efficiencies.
- AGN's NPV analysis shows that the project has similar result with Option 2 notwithstanding option 3 has a lower initial capex (\$22.2 million).

Cost Estimate

AGN said that the cost estimate has been prepared based on the following:

- the volume of proving investigative excavations, valve replacements, and elbow replacements required are based on a desktop review of the pipeline alignment drawings and verified by GPA engineering;
- the cost estimate is based on costing the activities that comprise the work breakdown structure; and
- the rates utilised in costing these activities are based on current vendor and contractor rates in 2019 and historical costing.

A summary of the cost estimate³⁶ is provided in the table below.

| | 2021/22 | 2022/23 | 2023/24 | 2024/25 | 2025/26 | Total |
|------------------|---------|---------|---------|---------|---------|----------|
| Program of Works | 1,156.3 | 1,057.1 | 1,057.1 | 687.8 | 687.8 | 4,646.1 |
| Feed Costs | | | | | | |
| M12/M84 | 641.6 | 1,295.4 | - | - | - | 1,937.1 |
| M42 | 1,384.7 | 1,817.4 | 1,817.4 | - | - | 5,019.6 |
| M101 | 1,068.0 | 1,012.4 | 1,012.4 | - | - | 3,092.9 |
| ILI Modification | | | | | | |
| M122/M84 | - | 1,594.3 | 3,188.6 | 6,377.3 | 4,783.0 | 15,943.2 |
| ILI Run | | | | | | |
| M12/84 | - | - | - | - | 1,205.7 | 1,205.7 |
| MDR | - | - | - | - | 145.0 | 145.0 |
| Total | 4,250.7 | 6,776.8 | 7,075.7 | 7,065.0 | 6,821.4 | 31,989.6 |

Table 9-14: Details of the Cost Estimate (\$2019/20, 000)

Source: (AGNSA_Attachment 8.8 capex Business Cases_Confidential)

9.6.1 Conclusion

Zincara is aware that in the last couple of decades, there has been a growing emphasis on pipeline safety with expectations from safety regulators that pipeline operators have a very good understanding of their pipeline condition. This is reflected in the Australian Standard for pipelines AS 2885. As such, a number of pipeline operators have started to modify their pipelines so that inline inspection can be carried out to gain an in-depth knowledge of the condition of the pipelines.

³⁶ Details of the costs for the various activities are provided in Appendix B (pg 96) in AGNSA_Attachment 8.8 capex Business Cases_Confidential.

AGN has presented a detailed justification for this project for modifying their high risk pipelines so that they can utilise intelligent pigs for pipeline inspection. We concur with the modification for the M12/M84 to enable inline inspection. As can be seen in Table 9-14, the project also includes the FEED study for M42 and M101. AGN said that there are similar characteristics of the M12, M42 and M101 and as such there are some efficiency for the FEED to be carried out together. The cost to carry out the FEED for the M42 and M101 is over \$8 million. Unless, AGN can demonstrate that there are significant savings for the work to be done in the next AA period, we do not consider it prudent to carry out the FEED study in the next AA period for the work to be done in the subsequent AA period. As such, we are unable to recommend the extra FEED study to be carried out.

In response to our request for further details on the cost estimate, AGN provided a detailed cost estimate prepared by external consultants Pipecraft Pty Ltd and GPA Engineering Pty Ltd. Pipecraft had prepared the estimate with a tolerance of \pm 30% with the assistance of GPA Engineering. We have reviewed the document and have not found any issues of concern. We therefore recommend accepting the cost as efficient.

There have been some useful discussions with AGN and the OTR on our recommendations. Any further information provided will be considered after AER's draft decision.

| | 2021/22 | 2022/23 | 2023/24 | 2024/25 | 2025/26 | Total |
|------------------|---------|---------|---------|---------|---------|----------|
| Program of Works | 1,156.3 | 1,057.1 | 1,057.1 | 687.8 | 687.8 | 4,646.1 |
| Feed Costs | | | | | | |
| M12/M84 | 641.6 | 1,295.4 | - | - | - | 1,937.1 |
| M42 | - | - | - | - | - | - |
| M101 | - | - | - | - | - | - |
| ILI Modification | | | | | | |
| M122/M84 | - | 1,594.3 | 3,188.6 | 6,377.3 | 4,783.0 | 15,943.2 |
| ILI Run | | | | | | |
| M12/84 | - | - | - | - | 1,205.7 | 1,205.7 |
| MDR | - | - | - | - | 145.0 | 145.0 |
| Total | 1,797.9 | 3,946.8 | 4,245.7 | 7,065.1 | 6,821.5 | 23,877.0 |

Table 9-15: Details of the Recommended Pipeline Modification Capex (\$2019/20, 000)

| Code | Name | 21/22 | 22/23 | 23/24 | 24/25 | 25/26 | Total |
|-------|--------------|-------|-------|-------|-------|-------|-------|
| SA105 | Pipeline Mod | 1.80 | 3.95 | 4.25 | 7.07 | 6.82 | 23.88 |
| | for ILI | | | | | | |

9.7 SA107 – ISOLATION VALVES

The capex for this project is shown in the table below.

Table 9-17: Additional Emergency Isolation Valves Capex (\$2019/20, million)

| Code | Name | 21/22 | 22/23 | 23/24 | 24/25 | 25/26 | Total |
|-------|------------------|-------|-------|-------|-------|-------|-------|
| | Additional | 0.07 | 0.44 | 0.44 | 0.44 | 0.37 | 1.77 |
| SA107 | emergency | | | | | | |
| | isolation valves | | | | | | |

(Source: AGNSA_Attachment 8.7 Capex Forecast Model-20200701_Public)

AGN said that there are currently 1,207 steel valves in its network, 283 in its TP system and 924 in its distribution system so that sections of the network can be isolated for maintenance and emergency purposes. Over time, due to the increasing number of customers connected to the network, the number of customers connected to a section of the pipeline has changed. AGN has conducted a review of the its metropolitan TP pipeline system on the number of customers supplied by each isolated section of the pipeline. It has identified seven locations where it is possible to reduce the number of customers that would be impacted should it be necessary to isolate the related section of the pipeline. Of these, four locations have more than 10,000 customers; one of which has 51,600 customers.

To address this issue, AGN considered three options:

- **Option 1** Maintain status quo (no additional upfront capital cost);
- **Option 2** Install new inline valves to reduce supply outage risk in Adelaide's TP system (\$3.1 million)
- **Option 3** Install new inline valves that will reduce the potential number of customers impacted by supply outage risk in Adelaide's transmission pipeline system to fewer than 10,000 at any location (\$1.8 million).

Option 3 is AGN's preferred option. Option 3 reduces the risk consequence impact of "significant" to these locations to "low".

9.7.1 Cost Estimate

AGN advised that the installation of each of the valve will require a bypass be installed in the pipeline. A similar project was carried out in Bowden (2016/17) and AGN had used the historical costs for its forecast estimate. The cost for the Bowden installation is shown in the table below.

Table 9-18: Bowden valve replacement cost (\$2019/20)

| Cost | | |
|------|--|------|
| | | |
| | | |
| | | |
| | | Cost |

Source: (AGNSA_Attachment 8.8 Capex Business Cases_Confidential)

9.7.2 Conclusion

Zincara concurs with AGN's approach to install the **second** isolation valves. Under AS/NZS 4645, the risk of supply to over 10,000 customers is considered severe and as such network operators are required to reduce the risk to low which AGN has done in this case.

In relation to the cost estimate, AGN has used a similar project cost (Bowden in 2016/17) and factored the cost to 2019/20. We consider this approach to be reasonable and as such recommended acceptance of the cost.

The recommended expenditure is shown in the table below.

| Code | Name | 21/22 | 22/23 | 23/24 | 24/25 | 25/26 | Total |
|-------|-------------------------------|-------|-------|-------|-------|-------|-------|
| | Additional | 0.07 | 0.44 | 0.44 | 0.44 | 0.37 | 1.77 |
| SA107 | emergency isolation valves | | | | | | |

Table 9-19: Recommended capex for the emergency isolation valves. (\$2019/20, million)

9.8 SA108 – REFURBISHMENT OF INDUSTRIAL AND COMMERCIAL METER SETS

The capex for this project is shown in the table below.

Table 9-20: Refurbishment of industrial and commercial meter sets (\$2019/20, million)

| Code | Name | 21/22 | 22/23 | 23/24 | 24/25 | 25/26 | Total |
|-------|------------------------------|-------|-------|-------|-------|-------|-------|
| SA108 | I and C Meter Set Refurb. | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 1.34 |

Source: (AGNSA_Attachment 8.7 Capex Forecast Model-20200701_Public)

AGN advised that it had 33,030 industrial and commercial (I&C) metering sites. There are approximately 2,000 elevated pressure meter sets with large regulators, filter, pilots and over pressure shut off (OPSO) valves fitted. AGN had identified that there are 250 I&C meter sets that need refurbishment to address corrosion and inhibit further deterioration. This is in line with its historical refurbishment volumes of around 50 per annum.

The work involves grit blasting and applying a coat of protective paint. AGN says that this is critical in ensuring the ongoing integrity of the units.

The options considered are:

Option 1 – Continue with current practice and refurbish 250 I&C meter sets (\$1.3 million);
- **Option 2** Cease the ongoing refurbishment program and move to reactive replacement only (zero upfront capex, with higher cost reactive replacement of ~\$4 million); and
- **Option 3** Replace 250 I&C meter sets proactively (\$2.4 million)

AGN decided on Option 1 as it is the most cost effective option.

9.8.1 Cost Estimate

AGN said to calculate the unit rate for the work, it had used the following key assumptions:

- Historical expenditure as this work is not new;
- Contractual rates of vendors;
- Resources based on similar projects; and
- Original equipment manufacturer's contractual rates.

9.8.2 Conclusion

Zincara concurs with the need for refurbishment of the I&C units to ensure their longevity. As such, we consider AGN's proposal is reasonable.

In relation to the cost estimate, AGN had said it had used historical costs to calculate the unit cost. We therefore sought additional information on its historical costs which AGN provided. The four years average unit cost is **a second** which is consistent with the unit cost unit (**a second**) which has been used to calculate the capex for the forecast period. We, therefore, accepting the capex as efficient.

| 10000 J LI. 1000000000000000000000000000000000000 |
|---|
|---|

| Code | Name | 21/22 | 22/23 | 23/24 | 24/25 | 25/26 | Total |
|-------|----------------------------------|-------|-------|-------|-------|-------|-------|
| SA108 | I & C Meter Set Refurbishment | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 1.34 |

9.9 SA112 CP ASSET REPLACEMENT

The capex for this project is shown in the table below.

Table 9-22: CP Asset Replacement Capex (\$2019/20, million)

| Code Name 21/22 22/23 23/24 24/25 25/26 Tot |
|---|
|---|

| SA112 | CP Assets | 0.33 | 0.33 | 0.33 | 0.33 | 0.33 | 1.65 |
|-------|-------------|------|------|------|------|------|------|
| | Replacement | | | | | | |

Source: (AGNSA_Attachment 8.7 Capex Forecast Model-20200701_Public)

AGN advised that corrosion protection (CP) units are installed on the majority of their transmission and distribution steel pipelines. The CP uses the electrical properties of the steel pipes to provide protection of the buried pipes against corrosion. The CP system creates an electrical circuit with a steel pipeline and an anodic material. The anode corrodes protecting the pipeline.

The Adelaide metropolitan gas network has two types of CP system; galvanic sacrificial anodes and the impressed current cathodic protection (ICCP). There are 2,405 sacrificial anodes and 13 ICCP units.

AGN advised that 696 sacrificial anodes and three ICCP units will have reached their end of life within the next five years. In addition, AGN had identified seven other areas of the network where it may be more cost effective to install ICCP units instead of sacrificial anodes.

new anodes;

x ICCP units; and

To address this issue, AGN had identified two options:

Option 1 – replace end of life assets with an optimised ICCP and anode combination:

- replace existing depleted anodes by installing
- replace existing depleted anodes by installing
- replace x existing end of life ICCP units with x new ICCP units.

Option 2 – replace end of life asset on a like-for-like basis:

- replace existing depleted anodes by installing new anodes; and
- replace x existing end of life ICCP units with x new ICCP units.

AGN decided to adopt Option 1 as the least cost option. The estimated cost for Option 1 is \$1.7million as compared to Option 2 of \$2.7million.

9.9.1 Cost Estimate

The assumptions for the cost estimates include:

- new anodes to be installed to replace existing anodes in one day shift (8 hours).
- Material rates for anodes and ICCP units are based on current vendor material rates.
- Labour rates are calculated based on work breakdown as there are no historical costs for reference.

A summary of the cost estimate³⁷ is shown in the table below.

| | | | 0 / 11 | | | |
|-----------|---------|---------|---------|---------|---------|---------|
| | 21/22 | 22/23 | 23/24 | 24/25 | 25/26 | Total |
| | Install | Install | Install | Install | Install | Install |
| | ICCP | ICCP | ICCP | ICCP | ICCP | ICCP |
| Scope | replace | replace | replace | replace | replace | replace |
| | | | | | | |
| | anodes | anodes | anodes | anodes | anodes | anodes |
| Labour | 228.5 | 228.5 | 228.5 | 228.5 | 228.5 | 1,142.3 |
| Materials | 102.0 | 102.0 | 102.0 | 102.0 | 102.0 | 510.0 |
| Total | 330.5 | 330.5 | 330.5 | 330.5 | 330.5 | 1.652.3 |

 Table 9-23: Project Cost Estimate by Cost Category (\$2019/20, 000)

Source: (AGNSA_Attachment 8.8 Capex Business Cases_Confidential)

9.9.2 Conclusion

Zincara agrees that an effective corrosion protection system is essential to protecting a steel pipeline against corrosion and as such, supports the need to upgrade the system when it has reached its useful life. Zincara therefore consider the project to be prudent.

In relation to the cost, we have reviewed the cost in Appendix D -Cost Estimate (pg 211) in the document AGSA_Attachment 8.8 Capex Business Cases_ Confidential and considers the cost and their assumptions to be reasonable. Zincara therefore recommends accepting the capex for this project.

| Code | Name | 21/22 | 22/23 | 23/24 | 24/25 | 25/26 | Total |
|-------|--------------------------|-------|-------|-------|-------|-------|-------|
| SA112 | CP Assets Replacement | 0.33 | 0.33 | 0.33 | 0.33 | 0.33 | 1.65 |

Table 9-24: Recommended CP Asset Replacement Capex (\$2019/20, million)

9.10 SA126 – CP REMOTE MONITORING

The capex for this project is shown in the table below.

| Code | Name | 21/22 | 22/23 | 23/24 | 24/25 | 25/26 | Total |
|-------|-------------------------|-------|-------|-------|-------|-------|-------|
| SA126 | CP Remote Monitoring | 0.30 | 0.18 | - | - | - | 0.48 |

Source: (AGNSA_Attachment 8.7 Capex Forecast Model-20200701_Confidential)

Cathodic protection (CP) units are used to protect steel pipelines against corrosion. A CP unit consists of sacrificial anodes and impressed current cathodic protection unit which are

³⁷ Details of the cost estimate are in Appendix D (pg211) AGNSA_Attachment 8.8 Capex Business Cases_Confidential

monitored by test points installed along the transmission and distribution pipelines. AGN proposes to install monitoring units on its CP units so that data from the test points can be send to the SCADA system.

The reasons for installing these monitoring units are:

- the reducing cost of monitoring equipment in recent years enables procurement and installation of devices at a reasonable cost;
- facilitates early detection of CP defects in comparison to six monthly voltage potential surveys; and
- CP remote monitoring significantly reduces the risk of undetected accelerated corrosion and incidents between CP surveys on assets that are already 30 to 45 years old.

9.10.1 Cost Estimate

The assumptions used to calculate the cost estimates are:

- Remote CP monitoring unit can be installed in 4 hours;
- Material rates are based on current vendor material rates; and
- Labour rates are calculated on a work breakdown structure approach.

| | | | | - | | |
|-------------|---------------------------|-------|----------|-------|------|-------|
| Category | Description | Units | Quantity | No of | Unit | Total |
| | | | | sites | Cost | \$000 |
| Material | | | | | | |
| | Test point logger - AEGIS | each | 1 | | | |
| | Stainless steel box and | each | 1 | | | |
| | mount | | | | | |
| Total | | | | | | 266.2 |
| Labour | | | | | | |
| | Project Manager | hours | 80 | | | |
| | Corrosion Engineer | hours | 120 | | | |
| | CP Technician | hours | 4 | | | |
| | SCADA interface software | each | 1 | | | |
| Total | | | | | | 211.0 |
| Total Proje | ect | | | | | 477.2 |

Table 9-26: Installation Capex

(Source: AGNSA_Attachment 8.8 Capex Business Cases_Confidential)

9.10.2 Conclusion

Zincara is aware that the inspection surveys are carried out one or twice year a year. This means that if a CP unit fails, it will not be detected until the next survey visit. This could lead to gaps in the CP performance data. Having remote monitoring on the CP units should reduce

if not eliminate such performance gaps. Zincara therefore recommends acceptance of the project as prudent.

We have reviewed the material and labour cost in the table above and consider the time allocated to be reasonable and the material cost for the test points to also in the range expected. We therefore recommend accepting the cost as efficient.

In response to our question on whether there is any offset savings as a result of the installation of the remote monitoring, AGN advised³⁸ that six monthly test point surveys are still required to validate the remote data and check on the physical condition of the units. We have accepted the clarification.

| Code | Name | 21/22 | 22/23 | 23/24 | 24/25 | 25/26 | Total | | | |
|-------|-------------------------|-------|-------|-------|-------|-------|-------|--|--|--|
| SA126 | CP Remote Monitoring | 0.30 | 0.18 | - | - | - | 0.48 | | | |

Table 9-27: Recommended CP Remote Monitoring Capex (\$2019/20, million)

9.11 SA127 ISOLATED STEEL SECTIONS FROM CP

The capex for this project is shown in the table below.

| Code | Name | 21/22 | 22/23 | 23/24 | 24/25 | 25/26 | Total |
|-------|---------------------------------------|-------|-------|-------|-------|-------|-------|
| SA127 | Isolated Steel Sections from CP | 0.11 | 0.28 | 0.27 | 0.27 | 0.25 | 1.17 |

Table 9-28: Isolated Steel Sections from CP (\$2019/20, million)

Source: (AGNSA_Attachment 8.7 Capex Forecast Model-20200701_Public)

AGN said that there are 70 short isolated sections of steel pipe located in various areas of the Adelaide metropolitan and regional network that have no cathodic protection. These sections are largely at creek crossings, large storm water crossings, road intersections and bridge crossings. To address the corrosion on the isolated steel sections at these locations, AGN considered these options:

- **Option 1** Protect sections of CP isolated steel pipe with anodes and replace the remaining sections with PE pipe (\$1.2 million).
- **Option 2** Replace all CP isolated steel pipe sections with PE pipe (\$5.0 million).
- **Option 3** Maintain the status quo (no upfront capital cost).

AGN decided on option 1 as the least cost option. The section that are to be replaced with PE pipes are all less than 15m. The ongoing cost of maintaining the sections which have been cathodically protected are considered small and as such not material.

³⁸ AGN-IR017-Other Distribution Systems -20200916-Confidential

AGN said that it had carried out a cost analysis on the cost of replacing the section with PE or cathodically protecting the steel pipe. It concluded that for a section of pipe which is less 15metres, the cost of installing CP equipment is the same as the cost of replacing the steel pipe with PE. Hence, replacing the pipe gives a more cost effective solution in the long term. For a steel pipe that is exposed, CP equipment will be installed from a safety perspective.

9.11.1 Cost Estimate

AGN said that the assumptions for the cost estimate include:

The design of the system and procurement of material will be carried out by a corrosion engineer;

- External contractors be engaged by through a competitive tender process;
- Material rates for anodes and pipes are based on current vendor material rate; and
- Labour rates are calculated on a work breakdown structure.

A summary of the project cost estimate³⁹ is shown in the table below.

| Name | 21/22 | 22/23 | 23/24 | 24/25 | 25/26 | Total |
|-----------|------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| | Design & Initiation | Anodes PE section | Anodes PE section | Anodes PE section | Anodes PE section | Anodes PE section |
| Labour | 38.9 | 259.1 | 248.7 | 248.7 | 236.7 | 1,032 |
| Materials | 70.2 | 17.5 | 17.5 | 17.5 | 17.5 | 140.3 |
| Total | 109.0 | 276.6 | 266.2 | 266.2 | 254.2 | 1,172.3 |

 Table 9-29:Project Cost Estimate by Cost Category (\$2019/20, 000)

Source: (AGNSA_Attachment 8.8 Capex Business Cases_Confidential)

9.11.2 Conclusion

Zincara concurs with the need to ensure that the steel pipes are protected against rust. AGN's reason to replace any pipe that is less 15 metres with PE so that it has a homogenous network seem reasonable as well, given that there is no difference in the installation cost between installing CP equipment and installing the PE pipe. We therefore consider the project to be prudent.

We sort clarification of why there were sections of the pipeline to be protected by AGN was proposing to install anodes. AGN advised that to protect sections of the pipeline, it was installed anodes as some sections of the pipeline required more than one anode.

Our review of the costs did not show any matters of concern and as such we recommend acceptance of the cost as efficient.

³⁹ Further details of the cost estimate are in Appendix C (pg 386) in AGNSA_Attachment 8.8 Capex Business Cases_Confidential.

| Code | Name | 21/22 | 22/23 | 23/24 | 24/25 | 25/26 | Total |
|-------|---------------------------------------|-------|-------|-------|-------|-------|-------|
| SA127 | Isolated Steel Sections from CP | 0.11 | 0.28 | 0.27 | 0.27 | 0.25 | 1.17 |

Table 9-30: Recommended Isolated Steel Sections from CP (\$2019/20, million)

9.12 SA129 I&C OVERPRESSURE RISK REDUCTION

The capex for this project is shown in the table below.

| Code | Name | 21/22 | 22/23 | 23/24 | 24/25 | 25/26 | Total |
|-------|----------------|-------|-------|-------|-------|-------|-------|
| | I&C | 0.47 | 0.47 | 0.51 | 0.51 | 0.51 | 2.46 |
| SA129 | Overpressure | | | | | | |
| | risk reduction | | | | | | |

Table 9-31: SA129 I&C Overpressure risk reduction (\$2019/20, million)

Source: (AGNSA_Attachment 8.7 Capex Forecast Model-20200701_Public)

AGN said that its has 33,000 industrial and commercial (I&C) customers' metering facilities. 686 I&C customer are supplied with large meter sets that have a service bypass line. In 2016, AGN commenced a program⁴⁰ to install a regulator on the bypass line for new I&C customer meter sets. Over the four year period, 153 new customers had their new meter sets with regulated bypasses. The new meter sets reduced the risk of the customer's equipment becoming overpressurised when the bypass is used for maintenance and other related activities.

As of 1 July 2020, 533 large I&C meter sets with unregulated bypasses. AGN now proposes to install 250 regulators in the next AA period on these large I&C meters with the remainder to be done in the subsequent AA period.

As per AGN process, it had listed three options to address this issue:

- Option 1 Continue with current practice of isolating the customer's supply during maintenance;
- Option 2 Install a pressure regulator on the bypass line of large I&C meter sets (\$2.5 million); and
- **Option 3** Replace large I&C meter sets with new specification meter sets that feature pressure regulators as standard (\$5.8 million).

AGN proposed option 2 as it reduces the risk of the overpressure the customer's equipment at the lower cost when compared to Option 3.

⁴⁰ AGN-IR017-Other Distribution Systems-20200916-Confidential

9.12.1 Cost Estimate

AGN said that the cost estimate is based on the current material and labour rates for new I&C installations. Summary of the cost estimate⁴¹ is shown in the table below.

| Name | 21/22 | 22/23 | 23/24 | 24/25 | 25/26 | Total |
|----------|-------|-------|-------|-------|-------|---------|
| Volume | | | | | | |
| Material | 170.6 | 170.6 | 113.8 | 113.8 | 113.8 | 682.5 |
| Labour | 295.6 | 295.6 | 349.2 | 349.2 | 349.2 | 1,773.8 |
| Total | 466.3 | 466.3 | 507.9 | 507.9 | 507.9 | 2,456.3 |

Table 9-32: Cost Estimate (\$2019/20, 000)

Source: (AGNSA_Attachment 8.8 Capex Business Cases_Confidential)

9.12.2 Conclusion

Zincara concurs with the need to install a regulator in the bypass in the I&C meter set. We therefore consider the project as prudent. Given that there are 533 units to have regulators fitted, it is not unreasonable to install units in the next AA period.

In relation to the cost, AGN o provided further clarification of how it had built up its cost in its response to the AER seeking further details of cost breakup. It provided a spreadsheet showing examples of the cost to build and fabricate a new meter set without the cost of the regulators or meter. A comparison of the labour and material cost in the spreadsheet with that provided for the bypass in Appendix C (pg404) of the document "AGNSA_Attachment 8.8 Capex Business Cases_confidential", showed that the cost of the bypass is in the order of magnitude expected.

We therefore recommend accepting the cost as efficient.

| Code | Name | 21/22 | 22/23 | 23/24 | 24/25 | 25/26 | Total |
|-------|----------------|-------|-------|-------|-------|-------|-------|
| | | | | | | | |
| | 1&C | 0.47 | 0.47 | 0.51 | 0.51 | 0.51 | 2.46 |
| SA129 | Overpressure | | | | | | |
| | risk reduction | | | | | | |

Table 9-33: Recommended I&C Overpressure risk reduction (\$2019/20, million)

9.13 SA131 SLAB SENSITIVITY TP

The cost of the project is shown in the table below.

Table 9-34: SA131 Slab in Sensitive TP Area (\$2019/20, million)

| Code | Name | 21/22 | 22/23 | 23/24 | 24/25 | 25/26 | Total |
|------|------|-------|-------|-------|-------|-------|-------|
| | | | | | | | |

⁴¹ Further details of the cost estimate are in Appendix C (pg 404) in AGNSA_Attachment 8.8 Capex usiness Cases_Confidential.

| CA121 | Slab Sensitive | 0.27 | - | - | - | - | 0.27 |
|-------|----------------|------|---|---|---|---|------|
| 5A131 | TP Areas | | | | | | |

Source: (AGNSA_Attachment 8.7 Capex Forecast Model-20200701_Public)

AGN said that sections of its TP network traverse areas which have been classified as high consequence sensitive areas as per Section 4.9 of AS 2885. AS 2885 also requires that pipelines in these areas are designed to ensure that rupture is not a credible failure mode. AGN has identified short sections of its TP pipelines totalling metres that do not meet this requirement and as such need further treatment.

As per AGN methodology, it had looked at three options to address this issue:

Option 1 – Maintain status quo which, includes weekly pipeline patrols, DBYD services and installing and maintaining pipeline marker signs;

Option 2 – Install additional physical protection; and

Option 3 – Relocate TP pipelines under the road through sensitive use locations.

AGN also considered derating the pipeline as an option but the cost of modifying district regulators stations and metering stations and concern about reducing the capacity of the pipeline make it discount this option.

AGN decided on option 2 as the most practical and cost effective option.

9.13.1 Cost Estimate

AGN said that thee cost estimate⁴² is based on current material and labour rates.

| Name | 21/22 | 22/23 | 23/24 | 24/25 | 25/26 | Total |
|----------|-------|-------|-------|-------|-------|-------|
| Labour | 180.4 | - | - | - | - | 180.4 |
| Material | 86.3 | - | - | - | - | 86.3 |
| Total | 266.7 | - | - | - | - | 266.7 |

Table 9-35: Cost Estimate (\$2019/20, 000)

(Source: AGNSA_Attachment 8.8 Capex Business Cases_Confidential)

9.13.2 Conclusion

Zincara concurs with the need to install concrete slab over the metres of the pipeline which is deemed to be in high consequence sensitive areas.

In regard to the cost, Zincara has reviewed details of the cost in Appendix C and consider it to be reasonable.

| Table 9-36: Recommended Slab in Sensitive TP Area (\$2019/20, million) | | | | | | | | | |
|--|------|-------|-------|-------|-------|-------|-------|--|--|
| Code | Name | 21/22 | 22/23 | 23/24 | 24/25 | 25/26 | Total | | |

⁴² Further details of the cost estimate are in Appendix C (pg 421) in AGNSA_Attachment 8.8 Capex Business Cases_Confidential.

| SA131 | Slab Sensitive | 0.27 | - | - | - | - | 0.27 |
|-------|----------------|------|---|---|---|---|------|
| | TP Areas | | | | | | |

9.14 SUMMARY

The capex for the Other Distribution System category essentially covers projects for safety and obsolete equipment. Zincara generally considers most of the project to be prudent. Subject to satisfactory explanation of the queries regarding the makeup of the costs, Zincara also considers the costs to be reasonable. The two items that we disagree with are the replacement of valves (SA103) and pipeline modification for Inline Inspection (SA105).

In the replacement of valves project (SA103), AGN proposes to replace isolation valves, of which are frozen and as such inoperable and have been repaired for leaks but are expected to be inoperable at some stage. We recommend the replacement of the inoperable valves but not the other which have essentially been repaired due to leaks.

We support the pipeline modification for Inline Inspection (SA105) project. However, AGN also proposes to also carry out FEED studies for two other pipelines for work to be carried out in subsequent AA period. Unless AGN can show that there are significant cost savings for carrying out the FEED studies together, we do not recommend that part of the project.

Project SA104 has been included in Zincara's recommended capex notwithstanding AGN's advice that the capex is no longer required as the project will now be funded by Department of Planning, Transport and Infrastructure (DPTI). The DPTI proposed to lower an existing road bridge which holds the portion of the M53.

The difference between AGN's proposed capex and Zincara's recommendation are provided in the table below.

| Code | Name | AGN | Zincara | Difference |
|-------|---------------------------------------|-------|---------|------------|
| SA101 | DCVG Dig Up and Repair TP | 1.26 | 1.26 | - |
| SA103 | Replacement of Valves | 4.97 | 2.78 | 2.19 |
| SA104 | TP M53 Replacement | 1.57 | 1.57 | |
| SA105 | Pipeline Mod for ILI | 31.99 | 23.88 | 8.11 |
| SA107 | Additional emergency isolation valves | 1.77 | 1.77 | - |
| SA108 | I and C Meter Set Refurbishment | 1.34 | 1.34 | - |
| SA112 | CP Assets Replacement | 1.65 | 1.65 | - |
| SA126 | CP Remote Monitoring | 0.48 | 0.48 | - |
| SA127 | Isolated Steel Sections from CP | 1.17 | 1.17 | - |
| SA129 | 9 I&C Overpressure risk reduction | | 2.46 | - |
| SA131 | SA131 Slab Sensitive TP Areas | | 0.27 | - |
| | Total | 48.93 | 38.63 | 10.30 |

Table 9-37: AGN v Zincara's Recommendation (\$2019/20, million)

10. **REGULATORS**

The capital expenditure for this category is for the replacement or upgrade of AGN's gate and district regulator stations. The capital expenditure is shown in the table below.

| Code | Name | 21/22 | 22/23 | 23/24 | 24/25 | 25/26 | Total |
|-------|---------------------------------------|-------|-------|-------|-------|-------|-------|
| SA106 | DRS Overpressure risk reduction | 0.55 | 0.64 | 0.64 | 0.64 | 0.64 | 3.10 |
| SA109 | DRS Operability Risk Reduction | 0.16 | 0.16 | 0.55 | 0.55 | 0.55 | 1.97 |
| | Total | 0.71 | 0.79 | 1.19 | 1.19 | 1.19 | 5.07 |

Table 10-1: Regulators Capex (\$2019/20 million)

Source: (AGNSA_Attachment 8.7 Capex Forecast Model-20200701_Public)

Our analysis of the two projects are detailed below.

10.1 SA106 DRS OVERPRESSURE RISK REDUCTION

There are 91 transmission (TP) district regulator stations (DRS) in the gas distribution network. Each TP DRS has a service bypass line for maintenance purposes. Since 1998, all service bypass lines have each been fitted with a valve and a regulator. Using a regulated bypass line during maintenance prevents over-pressurizing the network and also avoids disruption customers who are downstream of the TP DRS. As of 1 July 2020, there are 36 TP DRS with unregulated bypass.

Following an incident in Boston in 2018 and one in Queensland in 2019, AGN proposed to investigate options to mitigate its risks from using unregulated bypass lines. AGN's solution is to install an isolating valve and a regulator to each unregulated bypass. AGN proposes to carry out the work on units in the next AA period and complete the remaining unregulated bypass lines in the subsequent AA period.

The capex of the project is shown in the figure below.

| | | • | | | | | | | | |
|-------|---------------------------------------|-------|-------|-------|-------|-------|-------|--|--|--|
| Code | Name | 21/22 | 22/23 | 23/24 | 24/25 | 25/26 | Total | | | |
| SA106 | DRS Overpressure risk reduction | 0.55 | 0.64 | 0.64 | 0.64 | 0.64 | 3.10 | | | |

 Table 10-2: SA106 DRS overpressure risk reduction capex (\$2019/20 million)

Source: (AGNSA_Attachment 8.7 Capex Forecast Model-20200701_Public)

In coming to its proposal, AGN had considered four options:

- Option 1 continue with the current practice and just use the existing bypass with its valve to throttle the gas during maintenance.
- Option 2 install a pressure regulator and a secondary valve on each of the bypass lines.
- Option 3 Install a secondary isolation valve only on each of the bypass line.
- Option 4 Isolate the supply from the TP DRS during maintenance. This will disrupt customers and is not a practical option.

Option 2 is the only one that ensures human error will not lead to overpressure of the network resulting in safety issues. Due to resource constraints and complexity of the work, AGN said that it had only capacity to carry out the work on TP DRS in the next AA period which leaves the other units to be done in the subsequent AA period.

10.1.1 Cost Estimate

The key assumptions for the cost estimate⁴³ are:

- Costs are based on historical expenditure as this work has been carried out previously.
- Contractual vendor rates used for estimates.
- Service agreement rates for original equipment manufacturer contractual rates for spares and labour.

10.1.2 Conclusion

Overpressuring the network as result of an error in operating a bypass line without a regulator is a risk that can lead to safety issues. It is noted that there have been such incidents in Boston and Queensland. It is therefore prudent to install regulators in the bypass lines to avoid such accidents. Given that AGN has only capacity to install 18 such valves and regulators in bypass lines in the next AA period, we consider that it is reasonable for AGN to install units in the next AA period and in the subsequent AA period.

The cost estimate is based on historical costs and service agreements that AGN has with its suppliers. We have reviewed the detailed cost estimate and have not found any issue that is of concern. We therefore consider the cost to be efficient.

10.2 SA109 -DRS OPERABILITY RISK REDUCTION

There are existing DRS that have fully enclosed concrete Gatic manhole lids. As it is difficult to access and egress the pits. AGN proposes to install butterfly style lids to alleviate this issue.

⁴³ Further details of the cost estimate are in Appendix C (pg 167) in AGNSA_Attachment 8.8 Capex Business Cases_Confidential.

The new lids will also ensure that pits conform with Regulation 34-38 of the Work Health and Safety (Confined Spaces) Code of Practice 2015.

The cost of the project is shown in the table below.

| Code | Name | 21/22 | 22/23 | 23/24 | 24/25 | 25/26 | Total |
|-------|-----------------------------------|-------|-------|-------|-------|-------|-------|
| SA109 | DRS Operability Risk Reduction | 0.16 | 0.16 | 0.55 | 0.55 | 0.55 | 1.97 |

Table 10-3: SA109 DRS Operability and Risk Reduction (\$2019/20, 000)

Source: (AGNSA_Attachment 8.7 Capex Forecast Model-20200701_Confidential)

AGN considered three options:

- Option 1 Replace the existing manhole concrete lids on DRS with butterfly style lids.
- Option 2 Replace underground DRS completely with half pits.
- Option 3 Maintain status quo.

Option 1 is the only that satisfies all the requirements in ensuring the safety of the operations technicians and also complying with the Work Health and Safety (Confined Spaces) Code of Conduct 2015.

10.2.1 Cost Estimate

The key assumptions for the cost estimate⁴⁴ are:

- Cost based on historical expenditure;
- Vendors' contractual rates;
- Work activities extending over two days; and
- The first year will be taken up by fabrication costs and progressively changeover from year two.

10.2.2 Conclusion

Given the safety issues regarding confined space and the need to ensure compliance with the Work Health and Safety (Confined Spaces) Code of Conduct 2015, we recommend accepting the project as prudent.

We have examined the cost associated with the project and consider the cost to be reasonable as it is based on historical costs and vendors' contractual rates. The cost is therefore considered to be efficient.

⁴⁴ Further details of the cost estimate are in Appendix C (pg 167) in AGNSA_Attachment 8.8 Capex Business Cases_Confidential.