Final Plan Attachment 8.4

Unit Rates Forecast

December 2016

Contents

1. Introduction

1.1. Overview

This report and associated Supporting Information files explains the derivation of the unit rate forecasts that underpin the capital expenditure (capex) forecasts over the next (2018 to 2022) Access Arrangement (AA) period.

The capex driver categories[1] derived using a 'unit rate multiplied by volume' forecasting approach are the following:

- Growth Capex:
  - *Mains* – new estates, existing homes and industrial and commercial (I&C) customers;
  - *Services* – new homes, multi-user sites, existing homes and I&C customers; and
  - *Meters* – new domestic and I&C customers meter connections.
- Meter Replacement: periodic meter change (PMC) (domestic and I&C meters).
- Mains Replacement: block replacement (general and Central Business District (CBD)), trunk (replacement and decommissioned) and piecemeal mains renewal.

This document explains how Australian Gas Networks (AGN) has derived the unit rates for each of the above capex driver categories. In support of this document, AGN has also separately provided Supporting Information files, detailed in Table 1.1 below.

Table 1.1: Supporting Information Files

Supporting Information	Title	Description	Confidentiality Claim[2]
Supporting Information 1	Regulatory Unit Rate Analysis	Calculates derivation of all unit rates detailed in this document	Yes
Supporting Information 2	Gas Fitting Services Vic/Albury	Copies of the contract that AGN has entered into with Select Solutions to carry out various works including Meter Fix and Meter replacement	Yes
Supporting Information 3	Melbourne CBD Map	Provides geographic split of CBD mains replacement stages	No

1.2. Consistency of Forecasts with AER's Approved Approach

The unit rate forecasts that have been calculated for our Victorian and Albury networks over the next AA period are summarised in Table 1.2 below.

In developing these unit rate forecasts, AGN has adopted the same approach that was accepted by the Australian Energy Regulator (AER) in our recent South Australian AA review (regarding the five year period beginning 1 July 2016), which involves the following:

[1] For the purposes of our Victorian & Albury AA, our capex driver categories are Mains Replacement, Growth Assets, Information Technology, Meter Replacement, Augmentation, Telemetry and Other Assets.

[2] For further information regarding our Confidentiality Claims, please refer to Attachment 1.8.

1 *Tender/contract information* – Where the relevant information is available, unit rates have been based on recent market tested tender submissions or awarded contracts (and adjusted for any variations to the scope of work where relevant to the forecast period)[3].

2 *Historic actuals* – Where tender or contract information is not available (i.e. the market has not recently been tested), or in situations where the categories of expenditure involve low volumes of work, are subject to a high degree of variability and/or it is difficult to derive meaningful assumptions on the mix of work to be carried out, the unit rates have been based on a weighted average historic unit rate (i.e. the revealed cost) measured over a three-year period. The period used for this average is calendar year 2014, 2015 and 9 months to September 2016 to reflect the most recent information. If, however, a sufficient time series is not available it may be necessary to use a shorter measurement period.

3 *Bottom-up estimate* – Where neither tender submissions, awarded contracts nor historic actual costs are available, unit rates have been developed using a bottom-up forecasting approach based on informed management estimates.

AGN has adopted this approach in order to derive unit rates for our Victorian and Albury AA, and as such our forecasting approach can be considered consistent with the AER's approved approach regarding our South Australian AA. The forecasts developed using this approach can also be considered consistent with rule 74 of the National Gas Rules (NGR), because they have been arrived at on a reasonable basis and represent the best forecast or estimate possible in the circumstances.

The remainder of this report provides further detail on how the unit rates for the Growth Capex, Meter Replacement and Mains Replacement capex driver categories have been derived.

[3] Note: A summary of AGN's current relevant contracts is included at Appendix A (at the end of this document) showing those contracts which have been recently market tested and contracts which have been in place for a period of time and for which it is appropriate to rely on actual historical rates.

Table 1.2: Summary of Forecast Unit Rates ($2016)

Category		Unit Rate	Forecasting Approach for Victoria/Albury	Consistent with AER Approved Approach?
Growth Capex				
New Mains	New Estate	[redacted]	Historic actuals (3-year weighted average (2014-2016)[4])	Consistent
	Existing Home	[redacted]	Historic actuals (3-year weighted average (2014-2016)[5])	Consistent
	I&C	[redacted]	Historic actuals (3-year weighted average (2014-2016)[5])	Consistent
New Service	New Home	[redacted]	Historic actuals (3-year weighted average (2014-2016)[4])	Consistent
	Multi-User	[redacted]	Historic actuals (3-year weighted average (2014-2016)[5])	Consistent
	Existing Home	[redacted]	Historic actuals (3-year weighted average (2014-2016)[5])	Consistent
	I&C	[redacted]	Historic actuals (3-year weighted average (2014-2016)[5])	Consistent
New Meter	Domestic	[redacted]	Actual rates for the 9 months to September 2016 to reflect impact of new contracts entered into in 2016.[6]	Consistent
	I&C	[redacted]	Historic actuals (3-year weighted average (2014-2016)[5])	Consistent
Meter Replacement				
Meters < 25m³ (Domestic)		[redacted]	Actual rates for the 9 months to September 2016 to reflect impact of new contracts entered into in 2016.	Consistent
Meters > 25m³ (Commercial)		[redacted]	Historic actuals (3-year weighted average (2014-2016)[5])	Consistent
Mains Replacement				
General Block - High Density Inner city Suburb (HDICS)		[redacted]	Historic actuals where no recent tenders are available.	Consistent
General Block – Low Density Suburb (LDS)		[redacted]	Historic actuals where no recent tenders are available.	Consistent
CBD Block (CI & UPS)		[redacted]	Indicative tender/contract information for sample of CBD sections to be undertaken.	Consistent
CBD Trunk (CI & UPS)		[redacted]	Indicative tender/contract information for sample of CBD sections to be undertaken.	Consistent
General Trunk (CI & UPS)		[redacted]	Bottom-up estimate[7]	Consistent
Decommissioned Trunk Replacement		[redacted]	Bottom-up estimate[7]	Consistent
Piecemeal Mains Replacement		[redacted]	Completed jobs[8]	Consistent
Piecemeal Services Replacement		[redacted]	Historic actuals (3-year weighted average (2013-2015)[5])	Consistent

4 The three-year weighted average (2014, 2015 and 9 months to September 2016) has been used in these cases because the categories of expenditure involve high volume generic work.

5 The three-year weighted average (2014, 2015 and 9 months to September 2016) has been used in these cases because of the difficulties associated with forecasting this type of expenditure given the categories of expenditure involve low volumes of work; are subject to a high degree of variability and/or it is difficult to derive meaningful assumptions on the mix of work to be carried out.

6 The forecast meter unit rates for domestic meters are based on 9 months actual data to September 2016 which best reflect a new contract entered into for thee supply of new meters in June 2016 and a new Gas Fitting contract for the installation of meters entered into in February 2016.

7 A bottom-up estimate has been used in this case because there is no historic cost information (or historic costs are not indicative of the costs that will be incurred going forward) and the work has not yet been subject to a competitive tender.

8 Due to a lack of this type of work being undertaken over the past 4 years the rate has been based on two jobs completed in 2013 & 2014 for a total of 480 metres.

2. Growth Capex

2.1. New Mains

2.1.1. Summary

The unit rates that AGN incurs when laying mains differ depending on whether the mains are used to supply:

- new residential estates (new estates);
- existing brownfield residential areas (existing home); or
- I&C customers (I&C).

2.1.1.1. Relevant Contracts

In March 2014, AGN entered into Mains and Services laying contracts with a panel of approximately 30 contractors across a number of regions. These contracts cover all of the contract labour related costs associated with laying these different types of mains. [redacted] Copies of the Mains and Services laying contracts are available on request.

2.1.1.2. Forecast Unit Rates

The table below sets out the forecast unit rates for each type of main for the next AA period, which have been calculated using the three-year weighted average contractor and material unit rates incurred over the period 2014-2016.[10] The costs incurred over this period can be considered efficient and a reasonable basis upon which to base the forecast costs for the next AA period because they reflect competitively tendered main laying rates and material costs.

Table 2.1: Mains Forecast Unit Rates ($2016)

[redacted]

Consistent with rule 74 of the NGR, AGN is of the view that the forecasts in this table have been arrived at on a reasonable basis, reflect the best estimate of the work that will be undertaken over the next AA period and represent the best forecast possible in the circumstances. It is worth

9 [redacted]

10 This method was approved by the AER for existing homes and I&C customers in the South Australian AA. In the case of new estates, AGN used recent contract unit rates in South Australia, which the AER also approved. Unlike South Australia, AGN has not recently entered into a contract for mains and services in new estates. The forecasts are therefore based on the historic three-year weighted average.

AER, *Draft Decision: Australian Gas Networks, Access Arrangement 2016-2021, Attachment 6*, November 2015, pages 6-22-6.23.

noting, however, that the following factors are expected to place upward pressure on historic unit rates over the next AA period:

- Costs of carrying out work will increase over time as additional administrative and safety standards (in particular specialist traffic control) are giving rise to higher contractor costs as we move into higher density suburbs. For example in recent years in suburbs with a high tree density, Tree Protection Zones (TPZ) have been designated by councils requiring us to use non-destructive excavation (for example, hydro or manual excavation as opposed to mechanical). Also councils are becoming more stringent in terms of traffic control and reinstatement standards which have become more and more council-specific over recent years.
- We are anticipating proportionately more work in higher density inner-city suburbs (HDICS) and the CBD, compared to what we have been delivering over the current AA period. Work in these areas is more complex due to increased congestion, working restrictions, the requirement to reinstate completely sealed areas each day/night, upgrading existing meter locations (often complex meter assemblies or meter rooms) to modern standards, business interruption issues and increased coordination with a large number of stakeholders.
- Increasing requirements such as traffic management and reinstatement specifications (including full lane width profiling for roads under five years) are also contributing to higher costs, although the impact of this cost pressure on current unit rates has been masked somewhat by volatility in the mix of work completed.
- [redacted]
- The cost of laying mains in new estates is also expected to rise as a result of the introduction of standard trenching specifications for common service trenches by local councils, which will give rise to wider common service trenches (e.g. to accommodate more telecommunication services) and higher civil construction costs.

Notwithstanding these cost pressures, AGN has decided to base the forecast unit rates regarding all new mains on the three-year weighted average historic unit rates. The forecasts can therefore be viewed as conservative.

Further detail on the new mains unit rates associated with new estates, existing homes and I&C connections is provided below.

2.1.2. New Estate Mains

Forecasting Approach: 3-year weighted average (2014-2016)	**Consistent with AER Approved Approach**

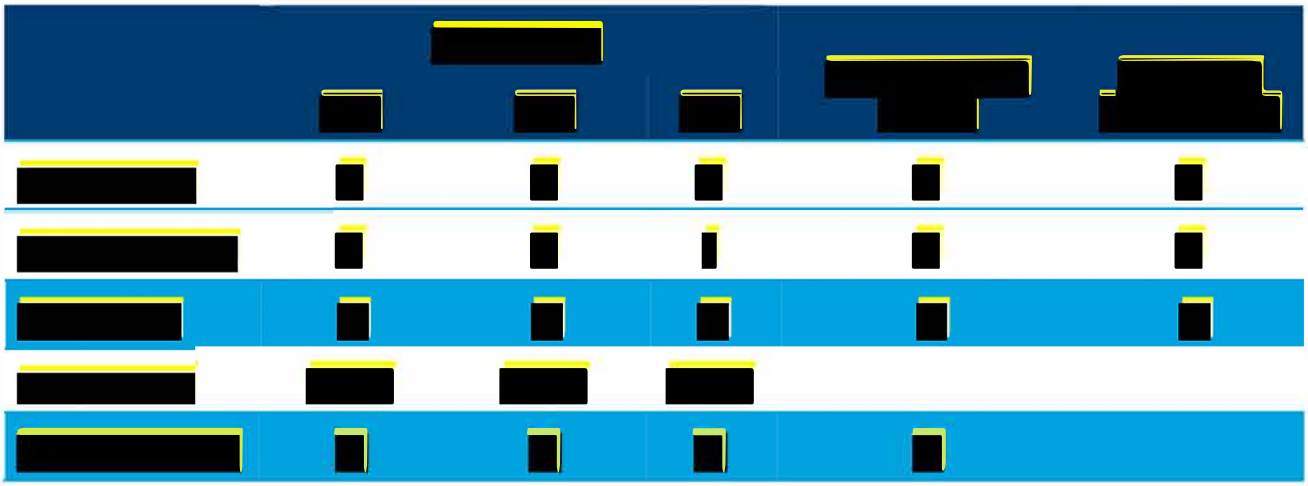
2.1.2.1. Nature of Work and Costs

This work involves the installation of gas supply and reticulation mains in new residential greenfield estate developments. The volume of activity is driven by house and land development market conditions with an average of approximately 130-150 kilometres per annum of new estate mains installed each year. Because the work is quite generic, the unit rate is usually relatively stable.

2.1.2.2. Historic and Forecast Unit Rates

The table below sets out the actual unit rates that have been incurred in laying mains in new housing estates over the last three years and the forecast that has been assumed for the next AA period.

Table 2.2: New Estate Mains Forecast Unit Rates ($2016)



Note: Totals may not add due to rounding.

2.1.2.3. Comparison of Historic Rates with AER Approved Rates

The figure below compares the actual unit rates that have been incurred in the current (2013-2017) AA period with the benchmark unit rates approved by the AER. As this figure highlights, the actual unit rates have on average been in line with the approved benchmark.

The lower contractor rates observed in 2015 and 2016 reflect completion of large diameter trunk supply mains (primarily 125mm and 180mm) in large scale new developments (predominantly Merrifield & Clyde) in 2014 and 2015 with work moving into the reticulation phase using small diameter (63mm) and less costly pipe and installation costs.

[redacted]

2.1.2.4. Are Current Costs Efficient?

The costs to-date reflect competitively tendered main laying unit rates and actual material costs procured through competitive material tendering and can therefore be viewed as efficient. [redacted]

2.1.2.5. Forecast Unit Rates

In the next AA period, the unit rate for new estate mains is forecast to be [redacted], which is [redacted] the approved benchmark in the current AA period. The forecast in this case has been based on the three-year weighted average unit rate for both contractor and material/other costs, measured over the period 2014-2016. Historic rates have been used in this case because the volume and type of work that is expected to be carried out in the next AA period is similar in nature to what has recently been delivered. The historic rates therefore provide an appropriate basis for estimating the costs that are expected to be incurred over the forecast period.

2.1.3. Existing Homes Mains

Forecasting Approach: 3-year weighted average (2014-2016)	**Consistent with AER Approved Approach**

2.1.3.1. Nature of Work and Costs

This work involves the laying of mains in existing (brownfield) areas. The work is low volume (average of 9 kilometres per annum over 2014 to 2016 period) and subject to a high degree of inter-year variability because the scope and costs of work can differ depending on the location (e.g. within roadway or verge) and diameter of the mains.

2.1.3.2. Historic and Forecast Unit Rates

The table below sets out the actual unit rates that have been incurred in laying mains for existing homes over the last three years and the forecast that has been assumed for the next AA period.

Table 2.3: Existing Homes New Mains Forecast Unit Rates ($2016)

[redacted]

Note: Totals may not add due to rounding.

2.1.3.3. Comparison of Historic Rates with AER Approved Rates

The figure below compares the actual unit rates that have been incurred in the current (2013-2017) AA period with the benchmark unit rates approved by the AER.

[redacted]

As this figure highlights, the unit rates incurred in the current AA period have exhibited a high degree of variability (i.e. because the scope of work can differ in each year) and on average have been [redacted]

The [redacted] contractor rates observed in 2014 were largely due to an increase in the volume of new developments in Melbourne inner suburban areas ([redacted]), [redacted]

The [redacted] in unit rates that occurred in 2015 and 2016 can largely be attributed to a greater than usual proportion of work carried out [redacted]

[redacted]

2.1.3.4. Are Current Costs Efficient?

The costs to-date reflect competitively tendered main laying unit rates and actual material costs procured by competitive tender. They can therefore be viewed as efficient. [redacted]

2.1.3.5. Forecast Unit Rates

In the next AA period, the unit rate for existing home mains is forecast to be [redacted], which is [redacted] than the benchmark the AER approved in the current AA period. [redacted]

The forecast in this case has been based on the three-year weighted average unit rate for both contractor and material/other costs, measured over the period 2014-2016. This approach is consistent with the approach AGN has used for other expenditure categories that involve low volumes of work, are subject to a high degree of variability and/or where it is difficult to derive meaningful assumptions on the work mix. It is also consistent with the approach that was used in our recent South Australian AA, which was approved by the AER.[11]

2.1.4. I&C Mains

Forecasting Approach: 3-year weighted average (2014-2016)	**Consistent with AER Approved Approach**

2.1.4.1. Nature of Work and Costs

This work involves the laying of new mains to the boundaries of I&C premises consuming less than 10 TJ per annum.[12] The work is low volume and subject to a high degree of inter-year variability because the scope of work can vary from small diameter extensions in low density urban areas to high volume large distribution network extensions within the Melbourne CBD.

2.1.4.2. Historic and Forecast Unit Rates

The table below sets out the actual unit rates that have been incurred in laying mains for I&C customers over the last three years and the forecast that has been assumed for the next AA period.

[11] AER, *"Draft Decision: Australian Gas Networks, Access Arrangement 2016-2021, Attachment 6"*, November 2015, pg. 6-22-6.23.

[12] Note that no unit rates are used in respect of forecasting capex for Demand consumers (>10 TJ) because the frequency of connection of such consumers is low and the work is not of a generic nature.

Table 2.4: I&C New Mains Forecast Unit Rates ($2016)

[redacted]

Note: Totals may not add due to rounding.

2.1.4.3. Comparison of Historic Rates with AER Approved Rates

The figure below compares the actual unit rates that have been incurred in the current (2013 to 2017) AA period with the benchmark unit rates approved by the AER.

[redacted]

As this figure highlights, [redacted] but have exhibited a significant degree of inter-year variability.

The inter-year variability is largely due to the increase in Melbourne CBD commercial developments established with large diameter steel trunk supply mains that occurred in 2014. This dropped off somewhat in 2015, but has increased in 2016 due to additional development projects undertaken in the Melbourne CBD and inner suburbs.

2.1.4.4. Are Current Costs Efficient?

The costs to-date reflect competitively tendered main laying unit rates and actual material costs procured by competitive tender. They can therefore be viewed as efficient. [redacted]

2.1.4.5. Forecast Unit Rates

In the next AA period, the unit rate for I&C mains is forecast to be [redacted], which is [redacted] than the unit rate approved by the AER in the current AA period. The forecast has been based on the three-year weighted average unit rate for contractor and material/other costs, measured over the period 2014-2016.

This approach is consistent with the approach AGN has used for other expenditure categories that involve low volumes of work, are subject to a high degree of variability and/or where it is difficult to derive meaningful assumptions on the work mix over the next AA period. It is also consistent with the approach that was used in the recent South Australian AA, which was approved by the AER.[13]

2.2. New Services

2.2.1. Summary

The unit rates that AGN incurs when installing services differ depending on whether the services are used to supply:

- new estates;
- multi-users;
- existing homes; or
- I&C.

The costs of installing a service differ across these connection types because of the ability to install services in new estates before footpaths, roads and other infrastructure are laid as well as reduced traffic management costs. Conversely, work undertaken in existing areas requires additional work due to existing road and footpath conditions and the need to undertake reinstatement work. With respect to high density multiservice dwellings and I&C jobs, as discussed below, they are non-generic in nature and the cost of these jobs can vary depending on the complexity of the work involved.

For a summary of the status of all relevant contracts, please refer to section 2.1.1.1 and Appendix A.

2.2.1.1. Forecast Unit Rates

The table below sets out the forecast unit rates for each type of service for the next AA period, which have been calculated using the three year weighted average contractor and material unit rates incurred over calendar years 2014-2016.[14] The costs incurred over this period can be

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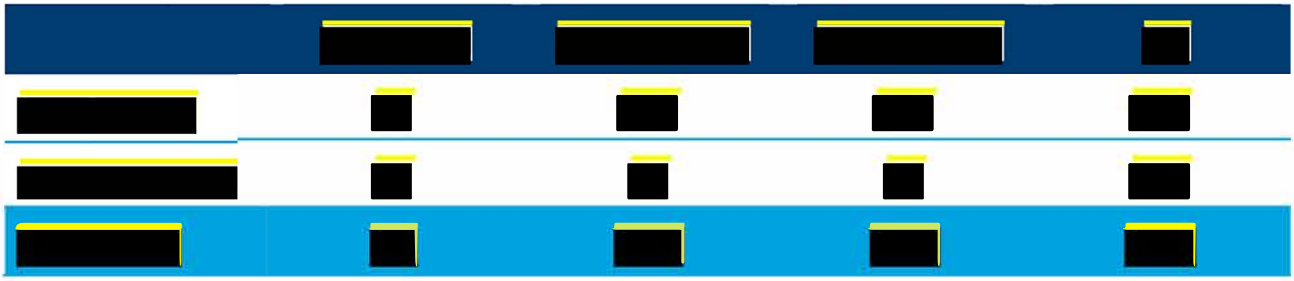
13 AER, *Draft Decision: Australian Gas Networks, Access Arrangement 2016-2021, Attachment 6*, November 2015, pages 6-22-6-23.

14 This method was approved by the AER for existing homes and I&C customers in the South Australian AA. In the case of new estates, AGN used recent contract unit rates in South Australia, which the AER also approved. Unlike South Australia, AGN has not recently entered into a contract for mains and services in new estates. The forecasts are therefore based on the historic three-year weighted average.

considered efficient and a reasonable basis upon which to forecast costs over the next AA period because they reflect competitively tendered and procured service installation rates and materials.

Table 2.5: New Services Forecast Unit Rates ($2016)



Consistent with rule 74 of the NGR, AGN is of the view that the forecasts in this table have been arrived at on a reasonable basis, reflect the best estimate of the work that will be undertaken over the next AA period and represent the best forecast possible in the circumstances.

Further detail on the unit rates associated with new homes, multi-user sites, existing homes and service work is provided below.

2.2.2. New Home Services

Forecasting Approach: 3-year weighted average (2014-2016)	**Consistent with AER Approved Approach**

2.2.2.1. Nature of Work and Costs

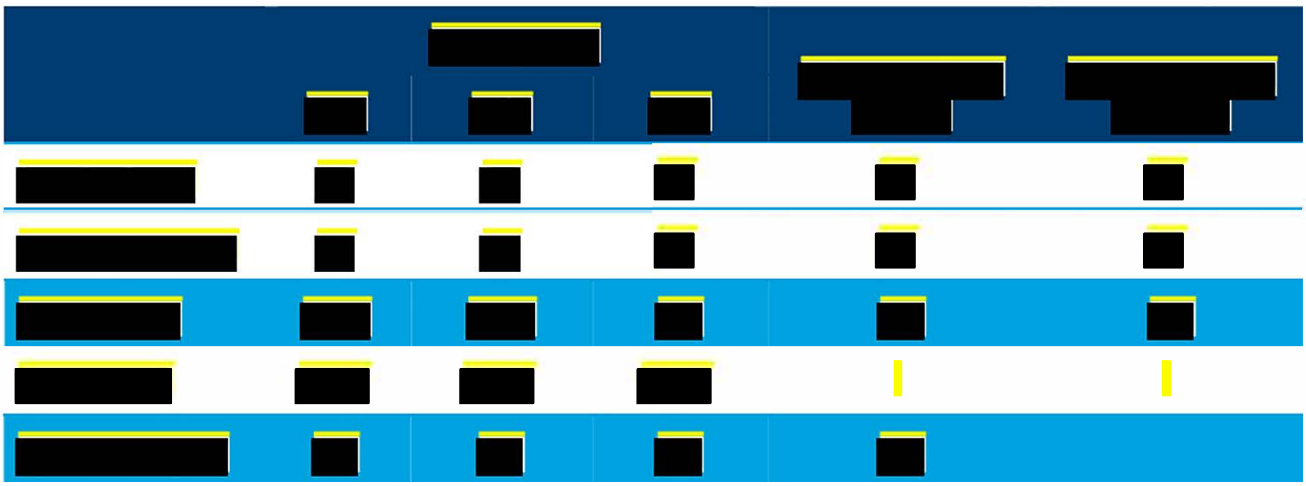
This work involves the laying of services to new homes, either in greenfield or brownfield conditions. Approximately 10,000-13,000 new services are installed each year in new residential dwellings under construction, with the location of new home services varying from urban infill and regeneration projects requiring reinstatement and traffic management services to dwellings built in new greenfield estates where costs associated with reinstatement and traffic management may be lower. The unit rates for this type of work tend to be relatively stable, but can be influenced on a year to year basis by:

- the proportion of work carried out in greenfield versus brownfield developments, with higher traffic management and reinstatement costs in brownfield developments;
- the volume of road crossings driven by the mix of same side versus opposite side connections; and
- the location of service positions on a customer's property.

2.2.2.2. Historic and Forecast Unit Rates

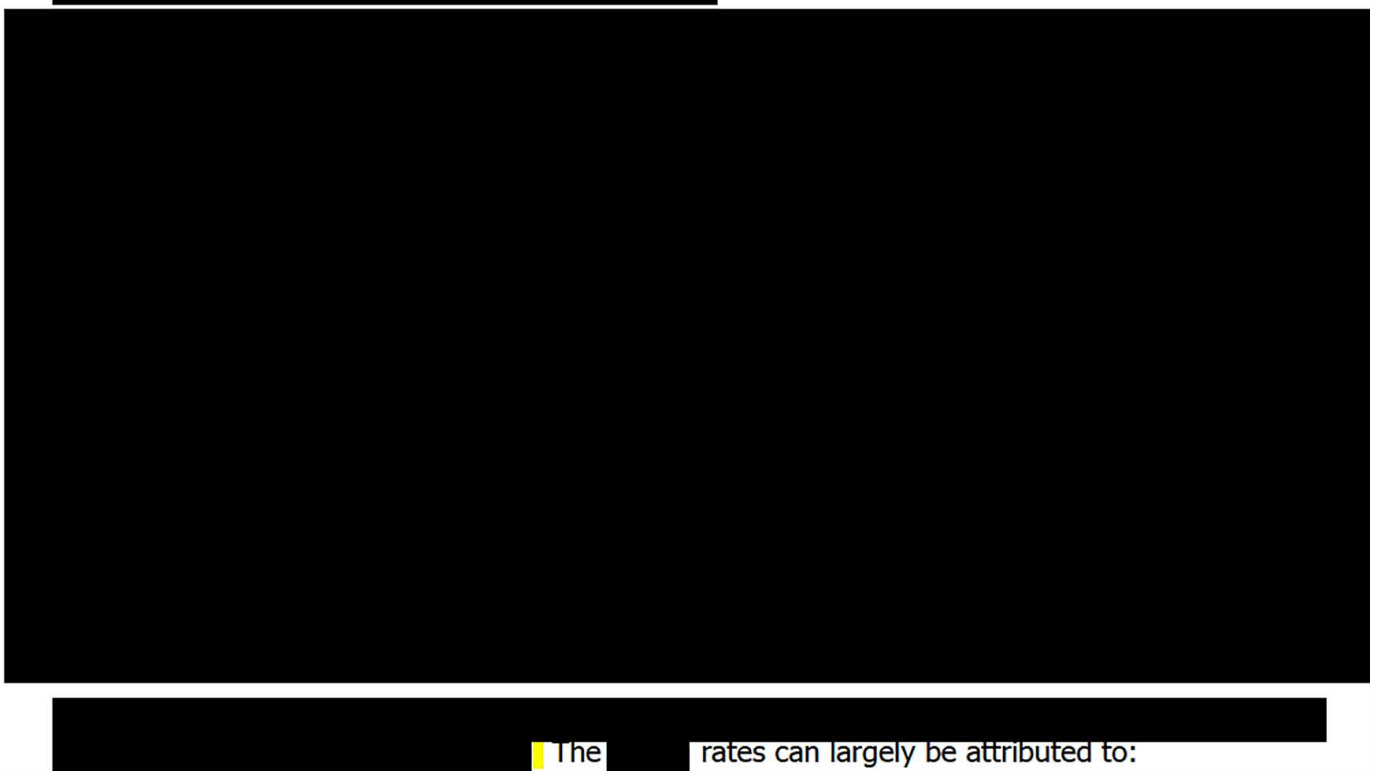
The table below sets out the actual unit rates that have been incurred in laying services to new homes over the last three years and the forecast that has been assumed for the next AA period.

Table 2.6: New Home Services Forecast Unit Rates ($2016)



2.2.2.3. Comparison of Historic Rates with AER Approved Rates

The figure below compares the actual unit rates that have been incurred in the current AA period with the benchmark unit rates approved by the AER.



The rates can largely be attributed to:

- The work being undertaken in the Northern Growth Corridor (e.g. in Mernda, Doreen, Epping and South Morang), which involves work in rocky (basalt) ground conditions and gives rise to higher labour costs. Rates are expected to remain around the three year average as work in the Northern Growth Corridor continues to grow in locations such as Kalkallo, Donnybrook and Woodstock, which are also located in rocky areas near quarries.
- The introduction of a new internal APA installation standard, which requires meter bars and brackets to be installed to remove potential stress on fittings. Meter bars have been assessed nationally as a preferred method of providing physical stability and protection for free standing

meter installations. Meter bars also enable a fixed point of reference for inlet and outlet connections and remove a source of possible leakage associated with the current use of "O" connectors. This standard has resulted in higher material costs per new service but is considered good practice and contributes to the overall safety and reliability of our network.

It is worth noting that in our AA Proposal for the current AA period, AGN argued that this movement into the Northern Growth Corridor would put upward pressure on rates not reflected in historic actuals due to the conditions described above. However, the AER rejected this view and set rates based on lower historical averages[15].

2.2.2.4. Are Current Costs Efficient?

The costs to-date reflect competitively tendered contractor rates and actual material costs procured by competitive tender and can therefore be viewed as efficient. [redacted]

2.2.2.5. Forecast Unit Rates

In the next AA period, the unit rate for new home services is forecast to be [redacted], which is [redacted] than the benchmark approved by the AER in the current AA period, due to ongoing work in the more expensive Northern Growth corridor due to ground conditions. The forecast in this case has been based on the three-year weighted average unit rate for both contractor and material/other costs, measured over the period calendar years 2014 to 2016.

Historic rates have been used in this case because the volume and type of work that is expected to be carried out in the AA period is similar in nature to what has recently been delivered. The historic rates therefore provide an appropriate basis for estimating the costs that are expected to be incurred over the forecast period.

2.2.3. Existing Home Services

Forecasting Approach: 3-year weighted average (2014-2016)	**Consistent with AER Approved Approach**

2.2.3.1. Nature of Work and Costs

This work involves the laying of services to existing homes (brownfield conditions). The work is low volume and subject to some variation depending on the mix of same side and opposite side connections, the location of gas meters on customer properties (e.g. front boundary, garden, wall box) and the complexity of remaining properties available for connection.

2.2.3.2. Historic and Forecast Unit Rates

The table below sets out the actual unit rates that have been incurred in laying services in existing homes over the last three years and the forecast that has been assumed for the next AA period.

15 AER, *Draft Decision: Envestra Ltd, Access Arrangement 2013-2017, Part 4 Confidential appendices*, September 2012 , page 33.

Table 2.8: Existing Home New Services Forecast Unit Rates ($2016)

2.2.3.3. Comparison of Historic Rates with AER Approved Rates

The figure below compares the actual unit rates that have been incurred in the current AA period with the benchmark unit rates approved by the AER.

[redacted]

Two factors that have contributed to the [redacted] unit rates are:

- The introduction of a new internal installation standard (as outlined in section 2.2.2.3), in line with good industry practice, resulting in increased materials costs.
- More aggressive growth in expensive inner city suburbs, compared to expectations.

2.2.3.4. Are Current Costs Efficient?

The costs to-date reflect competitively tendered contractor rates and material costs and can therefore be viewed as efficient. [redacted]

2.2.3.5. Forecast Unit Rates

In the next AA period, the unit rate for existing homes services is forecast to be [redacted] than the allowance approved by the AER in the current AA period. The forecast in this case has been based on the three-year weighted average unit rate for contractor and material/other costs measured over the period calendar years 2014 to 2016.

This approach is consistent with the approach AGN has used for other expenditure categories that involve low volumes of work, are subject to a high degree of variability and/or where it is difficult to derive meaningful assumptions on the work mix. It is also consistent with the approach that was used in the recent South Australian AA, which was approved by the AER. [16]

2.2.4. Multi-User Services

Forecasting Approach: 3-year weighted average (2014-2016)	**Consistent with AER Approved Approach**

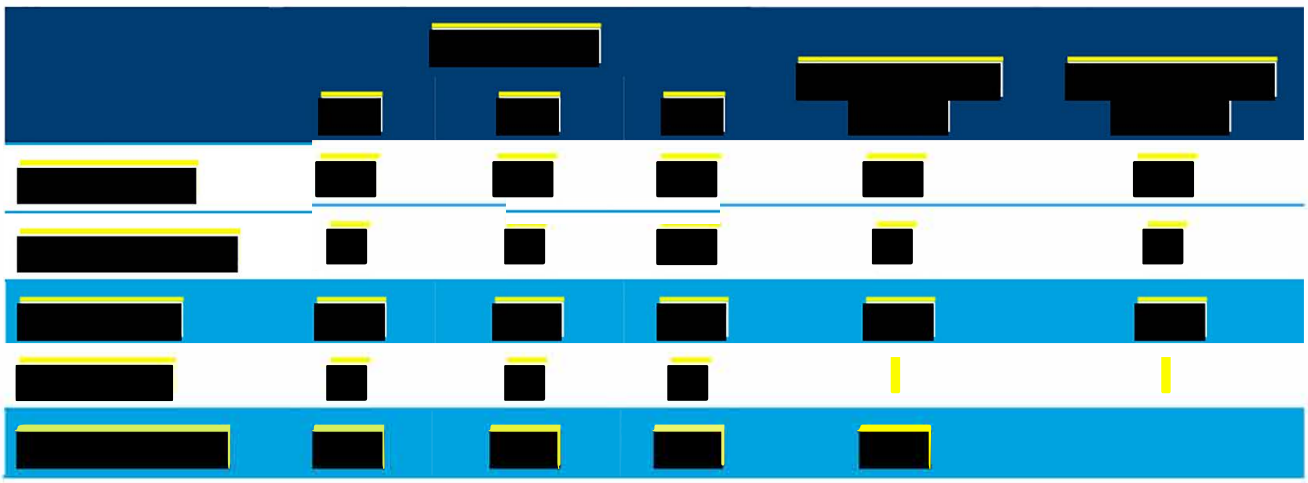
2.2.4.1. Nature of Work and Costs

This work encompasses the laying of services to premises that have more than one customer, such as units and apartment buildings, and usually arise due to site redevelopment. This work is low volume and subject to a high degree of inter-year variability because the scope of work can vary from small unit sites containing three or four dwellings to large multiple dwelling developments. As one would expect, the scale of a multi user site directly affects both contractor and material costs.

2.2.4.2. Historic and Forecast Unit Rates

The table below sets out the actual unit rates that have been incurred in laying multi-user services over the last three years and the forecast that has been assumed for the next AA period.

Table 2.7: Multi-User New Services Forecast Unit Rates ($2016)



2.2.4.3. Comparison of Historic Rates with AER Approved Rates

The figure below compares the actual unit rates that have been incurred in the current AA period with the unit rates the AER approved over the same period.

[16] AER, *Draft Decision: Australian Gas Networks, Access Arrangement 2016-2021, Attachment 6*, November 2015, pages 6-22-6.23.

[redacted]

[redacted] but have exhibited a significant degree of inter-year variability, which as noted above reflects the low volume and varied scale of these projects. The other interesting point to note about new multi-user service unit rates is that material costs are rising by more than inflation, although this effect is being masked somewhat in the unit rate by the type of work being carried out.

2.2.4.4. Are Current Costs Efficient?

The costs to-date reflect competitively tendered contractor rates and material costs and can therefore be viewed as efficient. [redacted]

2.2.4.5. Forecast Unit Rates

In the next AA period, the unit rate for multi-user services is forecast to be [redacted] than the benchmark adopted in the current AA period. The forecast in this case has been based on the three-year weighted average unit rate for contractor and material/other costs, measured over the period 2014-2016. This approach is consistent with the approach AGN has used for other expenditure categories that involve low volumes of work, are subject to a high degree of variability and/or where it is difficult to derive meaningful assumptions on the work mix. It is also consistent with the approach that was used in the recent South Australian AA, which was approved by the AER.[17]

2.2.5. I&C Services (New Services < 10TJ)

Forecasting Approach: 3-year weighted average (2014-2016)	**Consistent with AER Approved Approach**

2.2.5.1. Nature of Work and Costs

This work involves the laying of services for I&C premises. It is low volume work and subject to a high degree of variation because the scope of work can vary from small diameter basic

[17] AER, *Draft Decision: Australian Gas Networks, Access Arrangement 2016-2021, Attachment 6,* November 2015, pages 6-22-6.23.

commercial connections to complex industrial connections and the location can also differ (i.e. suburban streets, VicRoads or Melbourne CBD).

2.2.5.2. Historic and Forecast Unit Rates

The table below sets out the actual unit rates that have been incurred in laying services at I&C premises over the last three years and the forecast that has been assumed for the next AA period.

Table 2.9: I&C New Services Forecast Unit Rates ($2016)

[redacted]

2.2.5.3. Comparison of Historic Rates with AER Approved Rates

The figure below compares the actual unit rates that have been incurred in the current AA period with the benchmark unit rates approved by the AER.

[redacted]

The volatility exhibited by the components of the actual unit rates reflects the effect of the matters outlined in section 2.2.5.1.

2.2.5.4. Are Current Costs Efficient?

The costs to-date reflect competitively tendered contractor rates and actual material costs procured by competitive material tendering and can therefore be viewed as efficient.

2.2.5.5. Forecast Unit Rates

In the next AA period, the unit rate for I&C services is forecast to be [redacted] than the benchmark adopted in the last AA review. The forecast in this case has been based on the three-year weighted average unit rate for contractor and material/other costs, measured over the period 2014 to 2016. This approach is consistent with the approach AGN has used for other expenditure categories that involve low volumes of work, are subject to a high degree of variability and/or where it is difficult to derive meaningful assumptions on the work mix. It is also consistent with the approach that was used in the recent South Australian AA, which was approved by the AER.[18]

2.3. New Meters

2.3.1. Summary

The unit rates that AGN incurs when installing a new meter differs depending on the type of meter installed (i.e. whether it is a domestic or an I&C meter). The new meter unit rates include both the cost of the meter and costs associated with the installation of the meter.

2.3.1.1. Relevant Contracts

In 2016, AGN entered into new contracts for both:

- *the acquisition of new domestic meters* – this new national contract was entered into with meter suppliers, [redacted] and
- *gas fitting services for domestic meter installation services* – [redacted]

Copies of these new contracts can be found in Supporting Information 3.

2.3.1.2. Forecast Unit Rates

The table below sets out the forecast unit rates for each type of new meter installation for the next AA period, which have been calculated as follows:[19]

- *For domestic meters* – actual rates for the 9 months to September 2016 have been used as they are considered to best reflect the recently awarded contract rates for the supply of domestic meters and for the separately awarded Gas Fitting contract covering installation of meters at new domestic connections; and
- *For I&C meters* – the three-year weighted average contractor and material unit rates incurred over the period 2014-2016 have been used as contract information isn't available so historic actuals are considered to be the best forecasting approach available.

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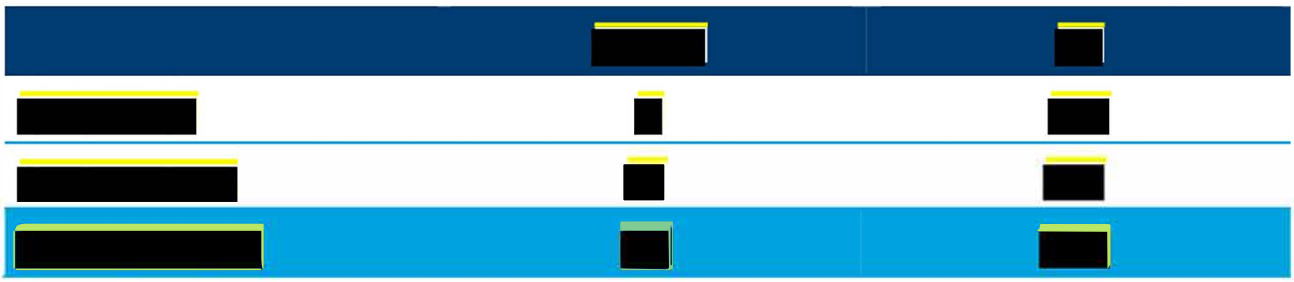
18 AER, *Draft Decision: Australian Gas Networks, Access Arrangement 2016-2021, Attachment 6,* November 2015, pages 6-22-6.23.

19 These methods were approved by the AER in the South Australian AA.
AER, *Draft Decision: Australian Gas Networks, Access Arrangement 2016-2021, Attachment 6,* November 2015, pages 6-22-6.23.

Table 2.10: New Meter Installation Forecast Unit Rates ($2016)



Consistent with rule 74 of the NGR, AGN is of the view that the forecasts in this table have been arrived at on a reasonable basis, reflect the best estimate of the work that will be undertaken over the next AA period and represent the best forecast possible in the circumstances (i.e. where available, we have relied upon contract unit rates in the first instance).

Further detail on the unit rates associated with installing new meters is provided below.

2.3.2. New Domestic Meters

Forecasting Approach: Actual unit rates to September 2016	**Consistent with AER Approved Approach**

2.3.2.1. Nature of Work and Costs

Installing domestic gas meters for new connections involves:

- procuring new meters, including quality control;
- planning and scheduling of meter installations;
- organising resources (combination of direct and contractor) to carry out the meter installation; and
- installing the new meter and carrying out a safety check and appliance commissioning.

This work is relatively high volume and associated unit rates are relatively stable.

2.3.2.2. Historic and Forecast Unit Rates

The table below sets out the actual unit rates that have been incurred in installing domestic gas meters for new connections over the last three years and the forecast that has been assumed for the next AA period based on our most recent actual rates for the 9 months to September 2016 which reflect recently contracted rates for the purchase of new meters.

Table 2.11: New Domestic Meters Forecast Unit Rates ($2016)

[redacted]

2.3.2.3. Comparison of Historic Rates with AER Approved Rates

The figure below compares the actual unit rates that have been incurred in the current AA period with the benchmark unit rates approved by the AER.

[redacted]

2.3.2.4. Are Current Costs Efficient?

The costs to-date reflect competitively tendered contractor rates and material costs and can therefore be viewed as efficient. [redacted]

2.3.2.5. Forecast Unit Rates

In the next AA period, the unit rate for domestic meter connections is forecast to be [redacted] than the benchmark established in the last AA review. [redacted]

[redacted]. The forecast in this case has been based on the current rates for the 9 months to September 2016.

The most recent available information has been used on the basis that these rates best reflect the impact of the new competitively tendered contracts recently entered into for the contactor component of the rate, (Gas Fitting Services) and for the supply of new meters both executed in 2016. As such the 2016 rate represents the most recently market tested cost of performing this work.

The use of recently negotiated rates is consistent with the approach that was used in the recent South Australian AA, which was approved by the AER.[20]

2.3.3. New I&C Meters

Forecasting Approach: 3-year weighted average (2014-2016)	**Consistent with AER Approved Approach**

2.3.3.1. Nature of Work and Costs

Installing gas meters for new I&C meters (<10TJ p.a.), involves:

- procuring new meters, including quality control;
- planning and scheduling of meter installations;
- organising resources (combination of direct and contractor) to carry out the meter installation; and
- installing the new meter and carrying out any relevant safety checks.

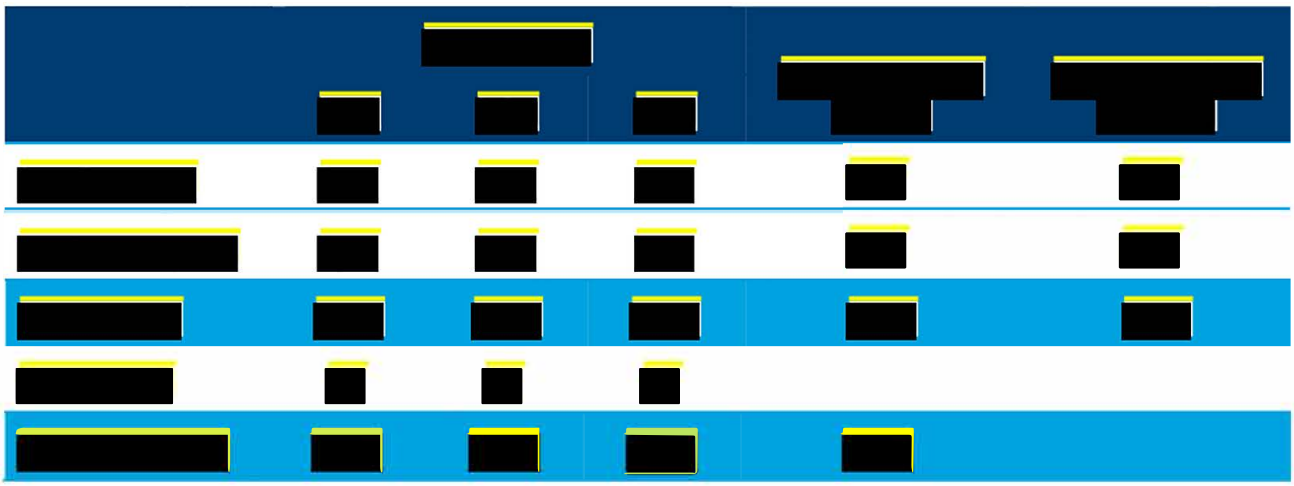
The work is low volume and subject to a significant degree of volatility because the scope of work can differ from year to year depending on the number and size of I&C meters that need to be connected. The nature and complexity of work poses a challenge, particularly with the limited access and high installation cost around the Melbourne CBD.

2.3.3.2. Historic and Forecast Unit Rates

The table below sets out the actual unit rates that have been incurred in connecting I&C meters over the last three years and the forecast that has been assumed for the next AA period.

[20] AER, *Draft Decision: Australian Gas Networks, Access Arrangement 2016-2021, Attachment 6,* November 2015, pages 6-22-6.23.

Table 2.12: New I&C Meters Forecast Unit Rates ($2016)



2.3.3.3. Comparison of Historic Rates with AER Approved Rates

The figure below compares the actual unit rates that have been incurred in the current AA period with the benchmark unit rates approved by the AER.

As with I&C services, it is difficult to compare unit rates for I&C meters over time and to compare these unit rates with a benchmark because they can vary substantially from year to year depending on the number and size of I&C meters that need to be installed as well as the location (i.e. meter room, ventilation requirements, sleeved services) the load, the number of meters installed and the type of end user.

2.3.3.4. Are Current Costs Efficient?

Large I&C meter connections are predominantly carried out by a mixture of internal staff and contractors depending on the scale of the job. While the work is not subject to a competitive tender, it can still be viewed as efficient given:

- the incentives AGN's asset management service provider, APA Group (APA), has to minimise connections costs under its outsourcing contract with AGN; and
- materials are procured through a competitive procurement process.

2.3.3.5. Forecast Unit Rates

In the next AA period, the unit rate for I&C meter connections is forecast to be [redacted] The forecast in this case has been based on the three-year weighted average unit rate for contractor and material/other costs, measured over the period 2014-2016.

This approach is consistent with the approach AGN has used for other expenditure categories that involve low volumes of work, are subject to a high degree of variability and/or where it is difficult to derive meaningful assumptions on the work mix and is also consistent with the method approved by the AER in the South Australian Draft Decision[21].

[21] AER, *"Draft Decision: Australian Gas Networks, Access Arrangement 2016-2021, Attachment 6"*, November 2015, pg. 6-22-6.23.

3. Meter Replacement

3.1. Summary

The unit rates that AGN incurs when replacing meters differs depending on the type of meter that is being replaced (industrial and commercial or domestic application) and the use of new or refurbished meters.

3.1.1. Relevant Contracts

In 2016, AGN entered into new contracts for both:

- *the acquisition of new domestic meters* – this new national contract was entered into with meter suppliers, [redacted]
- *gas fitting services for domestic meter changes* – this new contract was entered into with [redacted]

Copies of these new contracts can be found in Supporting Information 3.

In relation to I&C meter changes, this work is predominantly carried out by a mixture of APA internal staff and contractors depending on the scale of the job, with I&C meters acquired through a competitive tender process as required.

3.1.2. Forecast Unit Rates

The table below sets out the forecast unit rates for each type of meter replacement for the next AA period, which have been calculated using:[22]

- *For meters < 25m³ (i.e. domestic meters)* – actual rates for the 9 months to September 2016 have been used as they are considered to best reflect the recently awarded contract rates for the supply of domestic meters and for the separately awarded Gas Fitting contract covering installation of meters at new domestic connections; and
- *For meters > 25m³ (i.e. commercial meters)* – the three-year weighted average contractor and material unit rates incurred over the period 2014-2016 have been used as contract information isn't available so historic actuals are considered to be the best forecasting approach available.

Table 3.1: Meter Replacement Forecast Unit Rates ($2016)

[redacted]

Consistent with rule 74 of the NGR, AGN is of the view that the forecasts in this table have been arrived at on a reasonable basis, reflect the best estimate of the work that will be undertaken over

[22] These methods were approved by the AER in the South Australian AA.
AER, *Draft Decision: Australian Gas Networks, Access Arrangement 2016-2021, Attachment 6,* November 2015, pages 6-22-6.23.

the next AA period and represent the best forecast possible in the circumstances (i.e. where available, we have relied upon contract unit rates in the first instance).

Further detail on the unit rates associated with meter replacement activities is provided below.

3.2. Meter Replacement - Meters < 25m^3 (Domestic)

Forecasting Approach: Contract unit rates to September 2016	**Consistent with AER Approved Approach**

3.2.1. Nature of Work and Costs

Replacing domestic gas meters involves:

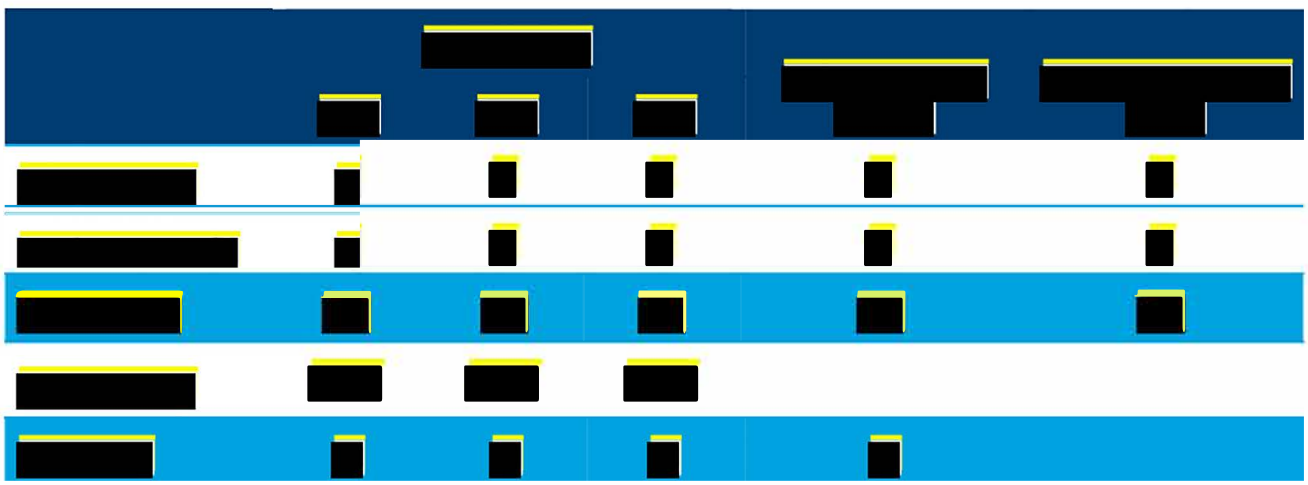
- procuring any new or refurbished meters required, including quality control;
- planning and scheduling of meters to be changed over;
- organising resources (combination of direct and contractor) to carry out the meter change, which includes testing of outlet service and relighting appliances, and if required, re-attending premises after hours if the customer requires assistance; and
- the following activities as prescribed in clause 7.2.3 of the Victorian Gas Distribution System Code (V11):
  - testing meters brought in from the field;
  - life extension; and
  - refurbishing meters as required.

The replacement of domestic meters over the next AA period is required to ensure the meter is calibrated and fit for purpose in accurately measuring gas usage within +/– 2%, as required by Australian Standard AS4944 and the Victorian Gas Distribution Code.

3.2.2. Historic and Forecast Unit Rates

The table below sets out the actual unit rates that have been incurred in replacing domestic gas meters over the last three years and the forecast that has been assumed for the next AA period.

Table 3.2: Meters < 25m^3 (Domestic) Meter Replacement Forecast Unit Rates ($2016)



3.2.3. Comparison of Historic Rates with AER Approved Rates

The figure below compares the actual unit rates that have been incurred in the current AA period with the benchmark unit rates approved by the AER.

Part of the reason for this was the AER's preference for a bottom up approach for calculating the domestic PMC rate in the previous decision. and which as can be seen from the graph above, is more reflective of actual costs experienced.

3.2.4. Are Current Costs Efficient?

The costs to-date reflect competitively tendered contractor rates and material costs and can therefore be viewed as efficient.

3.2.5. Forecast Unit Rates

In the next AA period, the unit rate for changing domestic meters is forecast to be than the benchmark approved by the AER in the current AA period. As discussed above this is, in part, due to the low benchmark which was not reflective of actual costs being experienced at that time. The forecast in this case has been based on the current rates for the 9 months to September 2016.

The most recent available information has been used on the basis that these rates best reflect the impact of the new competitively tendered contracts recently entered into for the contactor component of the rate, (Gas Fitting Services) and for the supply of new meters both executed in 2016. As such the 2016 rate represent the most recently market tested cost of performing the work.

The use of recently negotiated rates is consistent with the approach that was used in the recent South Australian AA, which was approved by the AER.[23]

3.3. Meter Replacement - Meters > 25m³ (Commercial)

Forecasting Approach: 3-year weighted average (2014-2016)	**Consistent with AER Approved Approach**

3.3.1. Nature of Work and Costs

Replacing commercial gas meters, involves:

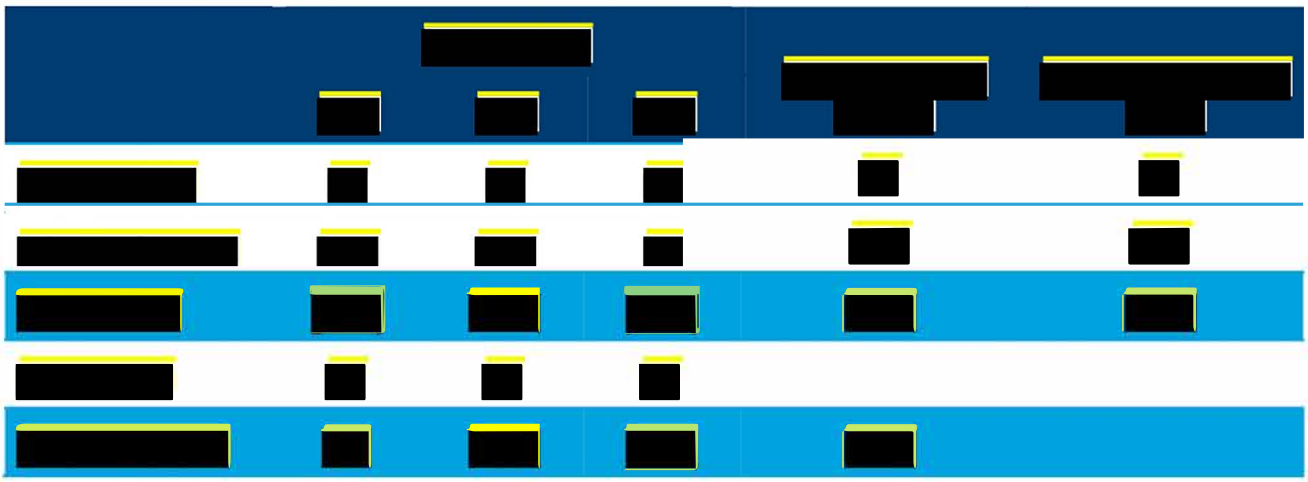
- procuring any new or refurbished meters required, including quality control;
- fabrication of site-specific fittings and pipework;
- planning and scheduling of meters to be changed over;
- organising resources to carry out the meter change in conjunction with customer requirements/restrictions; and
- the following activities as prescribed in clause 7.2.3 of the Victorian Gas Distribution System Code (V11):
  - testing meters brought in from the field;
  - life extension; and
  - refurbishing meters, as required.

This work is low volume and subject to a significant degree of volatility because the scope of work can differ depending on the number of larger non-domestic meters that need to be replaced.

3.3.2. Historic and Forecast Unit Rates

The table below sets out the actual unit rates that have been incurred in changing non-domestic gas meters over the last three years and the forecast that has been assumed for the next AA period.

Table 3.3: Meters > 25m³ (Commercial) Meter Replacement Forecast Unit Rates ($2016)



[23] AER, *Draft Decision: Australian Gas Networks, Access Arrangement 2016-2021, Attachment 6,* November 2015, page 6-22-6.23.

3.3.3. Comparison of Historic Rates with AER Approved Rates

The figure below compares the actual unit rates that have been incurred in the current AA period with the benchmark unit rates approved by the AER.

[redacted]

[redacted] than the unit rate approved by the AER in the last AA review and has been subject to a degree of inter-year variability. This variability reflects the differences in the number and size of the I&C meters that need to be changed each year (i.e. in some years there may be a greater number of larger models that need to be replaced than in previous years). This will affect the replacement/refurbishment cost, with costs able to vary by up to 1300% when comparing replacement of a small I&C meter to a large industrial turbine meter, for example.

3.3.4. Are Current Costs Efficient?

Large I&C meter changes are predominantly carried out by a mixture of internal staff and contractors depending on the scale of the job. While the work is not subject to a competitive tender, it can still be viewed as efficient given:

- the incentives AGN's asset management service provider, APA, has to minimise costs under its outsourcing contract with AGN; and
- materials are procured through a competitive procurement process.

3.3.5. Forecast Unit Rates

In the next AA period, the unit rate for changing commercial gas meters is forecast to be [redacted] than the benchmark adopted in the last AA review.

It is worth noting that AGN submitted a rate of [redacted] relating to the current AA period based on average historical costs to deliver this activity. However, the AER set the benchmark based on an initial bottom-up forecast which (as the actual rates have since shown),

[redacted]

The forecast in this case has been based on the three-year weighted average unit rate for contractor and material/other costs. This approach is consistent with the approach AGN has used for other expenditure categories that involve low volumes of work, are subject to a high degree of variability and/or where it is difficult to derive meaningful assumptions on the work mix. It is also consistent with the approach that was used in the recent South Australian AA, which was approved by the AER. [25]

[24] AER, *Final Decision: Envestra Ltd, Access Arrangement 2013-2007, Part 4 Confidential Appendix,* March 2013, page 99.
[25] AER, *Draft Decision: Australian Gas Networks, Access Arrangement 2016-2021, Attachment 6,* November 2015, page 6-22-6.23.

4. Mains Replacement

4.1. Summary

The unit rate that AGN incurs when carrying out mains replacement varies depending on the relevant category of mains. These categories are detailed in the Distribution Mains and Services Integrity Plan (DMSIP, provided as Attachment 8.2 to our Final Plan) and a reconciliation to these categories is provided in the table below.[26]

Table 4.1: Mains Replacement Unit Rate and Volume Categories

Unit Rate Category	Relevant Volume Categories
General Trunk Replacement	• General Trunk Replacement (CI & UPS)
General Block Replacement *(Low Density Suburbs (LDS))*	• General Block Replacement LDS (CI & UPS, PVC)
General Block Replacement *(High Density Inner City Suburbs (HDICS))*	• General Block Replacement HDICS (CI & UPS, PVC)
CBD Block Replacement	• CBD Block Replacement (CI & UPS)
CBD Trunk Replacement	• CBD Trunk Replacement (CI & UPS)
Piecemeal Replacement	• Piecemeal Replacement • HDPE (Sampling Program) • HDPE (> 35 Year Replacement)
Decommissioned Trunk Replacement	• Decommissioned Trunk Replacement (CI & UPS)

4.1.1. Relevant Contracts

All mains replacement activities are carried out using a prequalified contractor panel, which was established in 2011 with a three-year term and two one-year extension options. Some smaller piecemeal work can be undertaken by internal crews on occasion. The current agreement expires in December 2016, with negotiations currently underway for a new national agreement.

The panel enables AGN to tender all areas identified for replacement (including the CBD) to pre-qualified contractors only. Contracts are usually awarded several months prior to the start of each financial year to assist successful contractors meet construction timeframes.

An overview of the Mains Replacement contracting regime is provided as part of a description of key contracts at Appendix B). A summary of the most recent mains replacement tenders received can be found in Supporting Information 1.

[26] Note: There are no mains replacement activities forecast to be undertaken in Albury over the next AA period.

4.1.2. Forecast Unit Rates

The table below sets out the forecast unit rates for each category of mains replacement work for the next AA period and provides a brief summary on the approach taken to forecasting each unit rate.

Table 4.2: Mains Replacement Forecast Unit Rates ($2016)

Unit Rate Category	Unit Rate	Comment
General Trunk Replacement	[redacted]	This unit rate has been calculated using a bottom-up approach. In AGN's view, the bottom-up approach is appropriate to use when the scope of the work to be carried out over the forecast period is materially different to what was carried out historically or where there is no recent historic costs which can be referenced, which is the case for General Trunk Replacement.
General Block Replacement *(Low Density Suburbs (LDS))*	[redacted]	Unlike the South Australian network, Victoria exhibits clear differences in replacement difficulty across outer and inner suburbs. It is therefore necessary to develop suburb by suburb pricing for the purposes of forecasting (we also note that the AER approved a suburb by suburb forecast of unit rates in relation to the current Victorian AA period)[27]. The forecast is further categorised as either High Density Inner City Suburb (HDICS) or Low Density Suburb (LDS).
General Block Replacement *(High Density Inner City Suburbs (HDICS))*	[redacted]	The General Block Replacement unit rate has been based on recent tender information where this is available, and on historical rates where recent market testing has not occurred. In some cases no work has previously been undertaken in the suburb being proposed and in such cases the rate has been based on rates for work undertaken in similar suburbs and varied for any known changes in scope if applicable.
CBD Block Replacement	[redacted]	This unit rate has been based on indicative tenders received to undertake four stages of CBD Block Replacement within the Melbourne CBD.
CBD Trunk Replacement	[redacted]	This unit rate is also based on indicative tenders.
Decommissioned Trunk Replacement	[redacted]	Consistent with the General Trunk Replacement unit rate, this unit rate has been calculated using a bottom-up approach.
Piecemeal Replacement	[redacted]	The forecast unit rate is based on historical costs associated with two individual jobs undertaken in 2013 and 2014 due to the very low level of work undertaken in recent years.

Consistent with rule 74 of the NGR, AGN is of the view that the forecasts in this table have been arrived at on a reasonable basis, reflect the best estimate of the work that will be undertaken over the next AA period and represent the best forecast possible in the circumstances.

[27] AER, *Draft Decision: Envestra Ltd, Access Arrangement 2013-2017, Part 4 Confidential appendices*, September 2012 , page 19.

Further detail on the unit rates associated with these various categories of mains replacement related work is provided below.

4.2. General Block Replacement – LDS/HDICS

Forecasting Approach: Historic actuals except for where recent tenders are available.	Consistent with AER Approved Approach

4.2.1. Nature of Work and Costs

This work involves large detailed constructions, which involve replacing existing cast iron (CI), polyvinyl chloride (PVC) and unprotected steel (UPS) mains and other associated pipework in the network (including individual customer services, service risers and associated meter set rebuilds).

There are two General Block Replacement sub-rates, being:

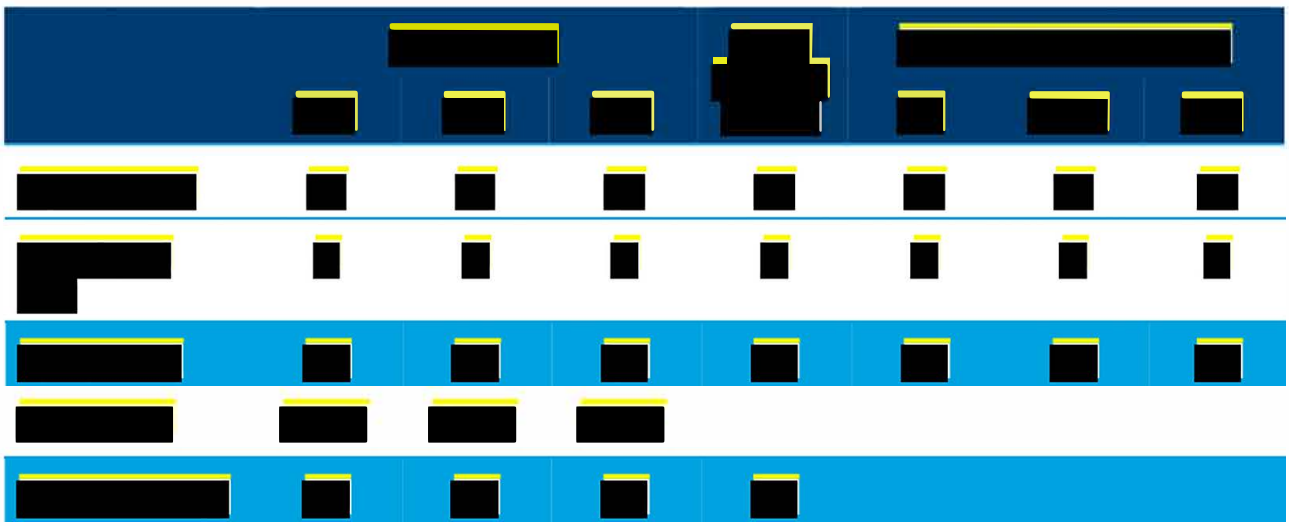
- General Block Replacement - Low Density Suburbs (LDS); and
- General Block Replacement - High Density Inner City Suburbs (HDICS).

212 kilometres of General Block Replacement across LDS and HDICS is forecast to be undertaken over the next AA period (please refer to Attachment 8.2 of our Final Plan for more detail).

4.2.2. Historic and Forecast Unit Rates

The table below sets out the actual unit rates that have been incurred in General Block Replacement over the last three years and the forecast that has been assumed for the next AA period.

Table 4.3: General Block Replacement[28] Forecast Unit Rates ($2016)



4.2.3. Comparison of Historic Rates with AER Approved Rates

The figure below compares the actual unit rates that have been incurred in the current AA period with the benchmark unit rates approved by the AER.

[28] Note: Excludes piecemeal replacement.

[redacted]

[redacted]

[redacted]

[redacted]

4.2.4. Are Current Costs Efficient?

The costs to-date reflect competitively tendered mains replacement unit rates and material costs and can therefore be viewed as efficient.

4.2.4.1. Contract Status

All areas identified for replacement are tendered to a panel of pre-qualified contractors annually through the Mains Replacement Block contract. Contracts have usually been awarded several months prior to the start of the financial year to assist successful contractors in meeting the construction timeframes.

It is worth noting in this context that the use of smaller contractors who have been able to remain competitive due to low overhead costs, will diminish over time as they have been unable to conform and adapt to increasingly higher standards of safety and environmental management, and increasing and more rigorous compliance requirements, particularly from city councils. These requirements are more likely to be met by larger contractors that have the ability to spread the overheads associated with these obligations across projects. This reduction in competition combined with increasing compliance standards and lower volumes of work on offer is likely to put upward pressure on prices over time.

[redacted]

4.2.5. Forecast Unit Rates

The approach outlined in this section has been consistently applied across LDS and HDICS.

In the next AA period, the unit rate for General Block Replacements is forecast to be [redacted] (see Table 4.3), using a suburb by suburb costing approach, which is [redacted] than the benchmark established in the current AA period to December 2016. The increase largely reflects the movement of the mains replacement program to the inner city suburbs of Melbourne. Some of the factors that directly contribute to higher costs in the inner city suburbs of Melbourne are set out below:

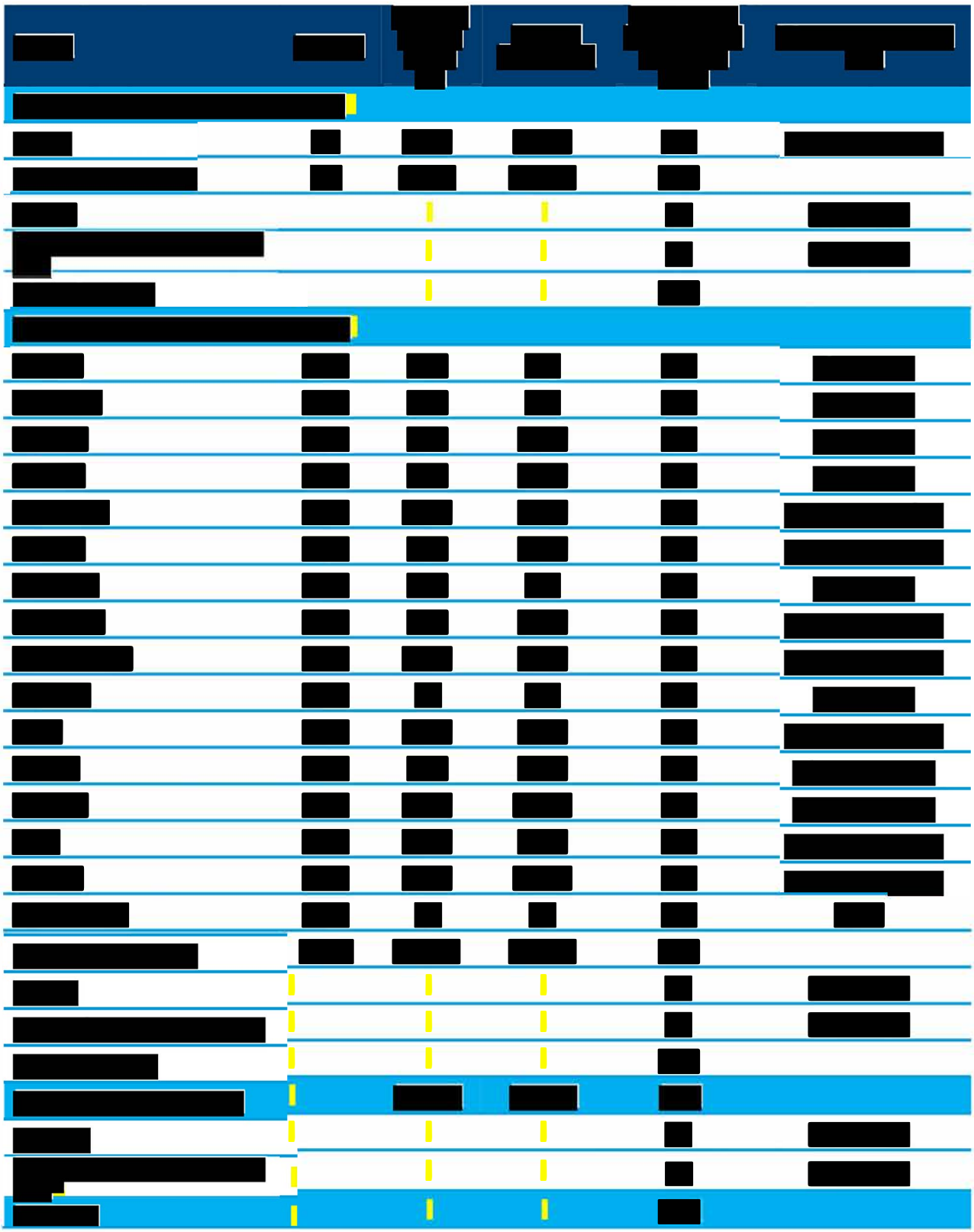
- Several areas of work to be undertaken have a higher number of multi-user sites and properties with meter rooms, some of which have been found to have installations that do not meet current standards and require upgrading. These multi-user sites will continue to add cost to the works due to required upgrades to current standards.
- Several high density areas of work to be undertaken have a higher number of gas mains in narrow bluestone laneways that have specific heritage management requirements. This will increase construction and reinstatement costs.
- Shallow gas mains (i.e. not meeting minimum installation standards), are identified more frequently in these suburbs, resulting in increased costs due to the need to relay the new gas main to specification.
- Material costs are increasing due to recent changes in internal installation standards, resulting in additional fittings (e.g. meter bars and bracket to remove potential stress on fittings). Meter bars have been assessed nationally as a preferred method of providing physical stability and protection for free standing meter installations. Meter bars also enable a fixed point of reference for inlet and outlet connections and remove a source of possible leakage associated with the current use of “O” connectors.
- In denser areas with limited space allocated to building services, third party installations may give rise to safety issues that require upgrade or relocation to ensure compliance to modern standards.
- Contract labour costs are expected to rise annually by more than CPI as further administrative and safety standards, and in particular a greater use of specialist traffic control, are implemented and applied. This is expected to flow through to tendered rates.
- An increased level of scrutiny by local councils and higher awareness of gas consumers, particularly in relation to concrete reinstatement quality and timeliness, will place upward pressure on rates. For example, councils regularly review and approve all reinstatements on extremely high conformance standards.
- Increasing traffic management requirements and reinstatement specifications are contributing to higher contractor costs, although the impact is masked by the volatility exhibited by the unit rate.
- Increased stakeholder management costs due to the higher prevalence of businesses in higher density suburbs.
- Work in areas with denser traffic and a higher proportion of businesses affected by the works require work to be scheduled during the night or on weekends. This increases labour costs due to the application of penalty rates.

4.2.5.1. Derivation of Forecast

The $[redacted] forecast has been calculated as follows:

- The unit rate for contractor costs is based on either:
  - recent tenders, where these have been received for that particular stage of a suburb or if this is not available;
  - the actual historic unit rates incurred for a stage where work has been performed in the current access period, or if this is not available;
  - or if no recent tender or recent historical rates are available for a stage, then average of the tender rates or historical rates for that particular suburb.
  - If no work has been undertaken in a particular suburb, then the rate has been based on rates for work undertaken in similar suburbs and varied for any known changes in scope if applicable (note, this relates to outer CBD, North Melbourne and eastern CBD areas).
- The unit rate for materials costs is based on average unit rates for 2014, 2015 and 9 months to September 2016.
- Additionally, a [redacted] uplift has been applied to capture internal project management costs based on average actual costs for Mains Replacement over the same period discussed above.

Table 4.4: General Block Replacement - HDICS/LDS, Forecast Unit Rates ($2016)



[29] Actual average material costs for completed projects in 2014. 2015 and 9 months to September 2016. This includes pipe, fittings, regulators, mains and service valves, service risers, required to carry out the work.

[30] This includes APA costs associated with internal project management, supervision, safety audits and other associated costs, equating to an average [redacted] of the full project cost.

4.2.5.2. Reasonableness of the Forecast Unit Rate

We consider the forecast unit rates for General Block Replacement (LDS and HDICS) are reasonable for the reasons outlined below.

Calculating the Median of Tender Outcomes

AGN is yet to assess the tenders received for the 2017 and 2018 program of work. As discussed in detail in Appendix B, when awarding a tender a number of criteria are assessed including:

- historical performance;
- safety record;
- experience working in the Victorian market (in the case of new entrants); and
- the contractors' capacity to undertake all the parcels of work they have tendered for (i.e. deliverability constraints).

For this reason a parcel of work is not always awarded to the lowest tender.

In order to develop a reasonable estimate of our forecast unit rate for General Block Replacement, we have calculated the median value of all tenders for each stage. AGN is of the view that this is the most reasonable approach to deriving a forecast unit rate where tenders have been received but not yet formally assessed. This calculation is set out in detail in Supporting Information 1.

That said, given the overall volume of General Block Replacement work that we are forecasting to undertake in the next AA period (and the significance of this category within our overall capex forecast), we have also considered alternative approaches to calculating the forecast unit rate which are summarised in the table below.

Table 4.5: Sensitivity Testing of General Block Replacement Unit Rate ($2016)

	Option	Resulting Unit Rate Forecast
1	Mean (i.e. average) of all tenders received	[redacted]
2	Mean (i.e. average) of all tenders, excluding the highest and lowest tenders	[redacted]
3	Median of all tenders received	[redacted]
4	Median of all tenders, excluding the highest and lowest tenders	[redacted]

Given the above sensitivity testing (and the relative insignificance of any differences between the approaches), we consider that applying Option 3 is the most reasonable forecasting approach, given the information we currently have. We also note that by selecting Option 3, we have chosen the least cost option.

Incorporation of Costs for Outer CBD Areas

CBD East & North are the outer fringe areas of Melbourne CBD and it is estimated that the work involved with delivering mains replacement activities in these areas is more complex than the HDICS but less complex than the CBD proper. For that reason, mains replacement activities forecast to be undertaken in these areas (please refer to Attachment 8.2 for more information)

have been included in the General Block Replacement category and excluded from the CBD estimate in Section 4.3 below.

As such, unit rates for delivering work in CBD North and CBD East included in the rate calculation above have been based on the actual historic costs incurred in similar suburbs (in terms of complexity), such as [redacted]. Additionally, adjustments have been made to these historic actual costs, to allow for work that will need to be done after hours or during restricted times. In order to estimate the impact of these limitations, the overtime rates contained in the most recent APA Network Agreement have been referenced. These workings have been included in Supporting Information 1.

4.3. CBD Block Replacement

Forecasting Approach: Based on indicative tenders for sample of CBD sections to be undertaken	**Consistent with AER Approved Approach**

4.3.1. Nature of Work and Costs

Work in the CBD is complicated by high levels of congestion, working restrictions, the requirement to reinstate completely sealed areas each day/night, upgrading existing meter locations (often complex meter assemblies or meter rooms) to modern standards, business interruption issues and increased coordination with a large number of stakeholders.

The only mains replacement work undertaken to date in the CBD has been low volume mains extensions done at the request of third parties. The average cost of this type of work has been in the order of [redacted] Approximately 25 kilometres of CBD Block Replacement is expected to be undertaken over the next AA period. A map of the proposed replacement program is included at Supporting Information 3 detailing the 16 sections of the CBD planned to be replaced.

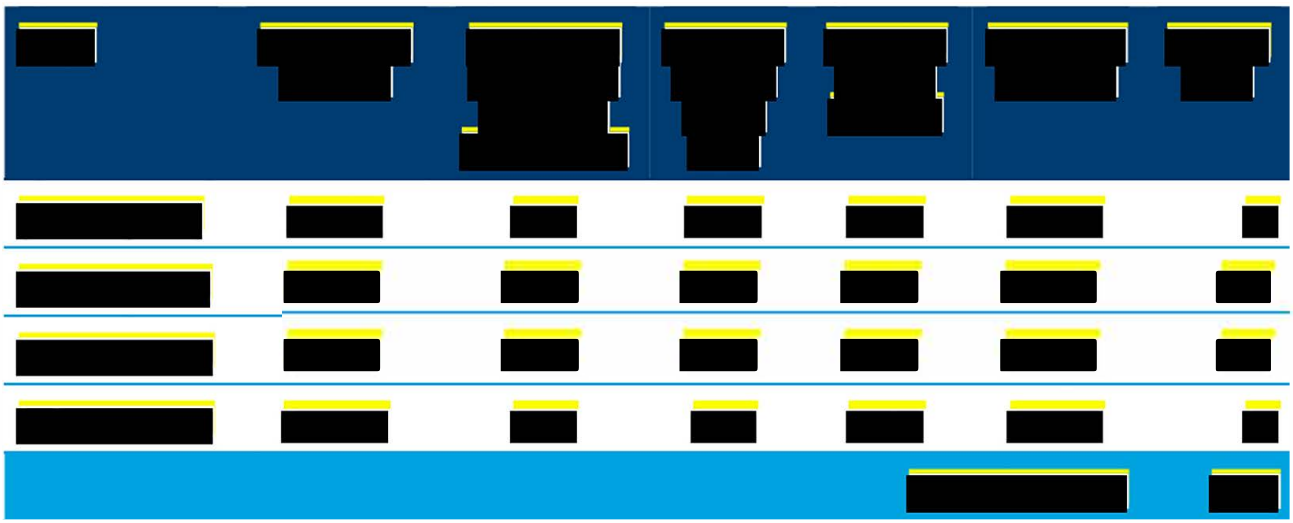
The replacement of mains within the CBD requires the development of a detailed strategic plan that considers a range of options such as High Pressure (HP) renewal, transfer of services to existing HP mains, mains laying and mains extensions.

4.3.2. Contract Status

All 16 CBD areas identified for replacement will be tendered to a panel of pre-qualified contractors under the Mains Replacement Block contract. This tender process is not scheduled to commence until late in 2017. In the meantime, indicative tender prices with exclusions have been received for four CBD areas for planning purposes and the average unit cost has been used to forecast the contractor unit rate.

The four areas that were selected for initial indicative pricing are representative of the whole of the CBD and the resultant unit rate is applicable to all 16 areas, although given the indicative nature of the tenders it is likely that the actual tenders will be higher. The indicative prices are set out in the table below and more information is attached at Supporting Information 1.

Table 4.6: Contractor Rates, Tendered Rates ($2016)



4.3.3. Forecast Unit Rates

In the next AA period, the unit rate for CBD Block Replacement is forecast to be [redacted]. This forecast has been developed using a bottom-up approach because the nature of the work to be carried out in the next AA period is substantially different to what has occurred to date. The bottom-up approach uses the indicative contractor rates set out in Table 4.5.

The replacement works in the next AA period will involve working closer to and within the highly congested areas of the CBD involving larger diameter existing mains, an increase in congestion of traffic and pedestrians, more expensive reinstatement (due to fully paved footpaths), increased working restrictions (due to limited space both above and underground), increased commercial/business considerations (interruptions, coordination/liaison).

The table below and associated notes sets out how the forecast unit rate of [redacted] per metre was estimated.

Table 4.7: Unit Rate for CBD Block Replacement ($2016)

Note: Totals may not add due to rounding.

4.4. CBD Trunk Replacement

Forecasting Approach: Based on indicative tenders	**Consistent with AER Approved Approach**

4.4.1. Nature of Work and Costs

Similar to general trunk replacement discussed below, this program involves the replacement of large diameter CI and UPS feeder trunk mains within the Melbourne CBD network. The forecast work is to be undertaken in Spencer Street in the CBD and as with the CBD Mains Replacement, this program is complicated by:

- high levels of congestion;
- working restrictions (due to limited space both above and underground);
- expensive reinstatement of completely sealed areas (due to fully paved footpaths and 600mm road profile); and
- business interruption issues and increased coordination with a large number of stakeholders.

We have not previously undertaken these replacement activities in the CBD and as such, the unit rate for this work has been estimated using a bottom-up approach based on receiving indicative pricing from contractors. In the next AA period, approximately 2 kilometres of trunk supply main is expected to be replaced in Spencer Street.

[31] The average unit rate for contracted labour is assumed to be $1,044 per metre, which is based on the indicative pricing received from contractors for four selected areas. The four areas that were selected for initial indicative pricing are representative of the whole of the CBD and the resultant unit rate is applicable to all 16 areas.

[32] It has been assumed that there will be un-scoped variations with a cost of 5% of the tendered contractor rates that will cover additional reinstatement due to specific council requests, additional traffic management due to specific traffic considerations on sensitive areas or during special events, and meter room modifications required to bring customer installation to high pressure standards.

[33] The materials' unit rate will be $25 per metre more expensive than for general block replacement to allow for possible sleeving of fitting lines for high rise buildings.

[34] The APA project management, internal supervision, safety audits and other support activities' costs will amount to 5% of the full project cost.

4.4.2. Forecast Unit Rates

In the next AA period, the unit rate for CBD Trunk Replacement is estimated to be [redacted] and reflects the issues discussed above in terms of congestion and working restrictions.

Table 4.8: Unit Rate for CBD Trunk Replacement ($2016)

[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

The forecast unit rate has been based on an indicative quote from Comdain to undertake the work via open cut method. Included in the estimated cost is [redacted] allowance for unscoped variations from the contractor and [redacted] allowance for other costs consistent with estimates used for CBD Block Replacement costs discussed above.

4.5. General Trunk Replacement

Forecasting Approach: Bottom-up estimate	**Consistent with AER Approved Approach**

4.5.1. Nature of Work and Costs

Replacing trunk pipelines requires detailed construction works, which involve the replacement of large diameter cast iron and unprotected steel feeder trunk mains transporting gas between areas of the network. Replacement generally involves inserting large diameter PE pipe into old pipework (often with an associated increase in pressure) but can often also require open cut works. This work can be subject to inter-year variability depending on the location, diameter, material and replacement method of the trunk main.

The only such replacement performed in the current AA period was 1.3 kilometres at Gower Street, Preston and this was carried out by an APA internal labour crew. In the next AA period approximately 10 kilometres of General Trunk Replacement is expected to be delivered.

4.5.2. Forecast Unit Rates

In the next AA period, the unit rate for general trunk replacement is estimated to be [redacted]. An estimated unit rate has been adopted as this work has not previously been conducted in our Victorian and Albury networks, so we do not have actual costs from which to derive a forecast unit rate. Most of the trunk replacements are supply mains and work has been planned based on small sections.

Table 4.9: General Trunk Replacement Unit Rates ($2016)

Items	$/metre	Cost Basis
Excavation cost	[redacted]	Trunk supply main requires larger excavation, shoring based on the depth of cover and more traffic management based on the location of main (footpath or roadway). Based on current rates
Cut & Wrap	[redacted]	Depending on the size of existing main either IRIS gear or TDW equipment are required for bagging off and cut-off. Also custom made caps are required. Based on current rates
Window Cut-Out (every 50m)	[redacted]	Required to ensure the inserted main is still travelling without any obstruction and not holding any memory. Based on current rates
Insertion	[redacted]	Unit rate based on crew and equipment required for large diameter PE insertion. Based on current rates
Backfill & Reinstatement	[redacted]	Based on the quarry products and reinstatement (concrete footpath or asphalt roadways) requirement as per the local Council or VicRoads. Based on current rates
Total $/metre	[redacted]	

The forecast unit rate, has been calculated having regard to the following factors:

- contract labour costs are expected to rise as contractors meet increasingly more procedural, administrative and safety standards over time;
- supply main excavation holes are generally bigger and deeper than manholes for regular small diameter mains, requiring shoring and increasing the cost of excavation;
- cutting and capping is more expensive in large dimeter mains as it requires to be carried out by specially trained personnel with special tools and equipment;
- insertion is only carried out up to a maximum of 50 metres in length; and
- a trend of increased scrutiny by local councils and road authorities, particularly on reinstatements, and the extent of their required reinstatement, is likely to place upwards pressure on unit rates.

4.6. Decommissioned Trunk Replacement

Forecasting Approach: Bottom-up estimate | **Consistent with AER Approved Approach**

4.6.1. Nature of Work and Costs

Where a replacement main is not deemed necessary due to existing or new HP infrastructure, the old trunk main may be abandoned. If this occurs, then the pipeline must be excavated and sealed every 50 metres. The prioritisation for replacement or abandonment of trunk mains is undertaken having regard to:

1 leak frequency/history;

2 safety and operational risks associated with the condition of the main;

3 the timing of downstream network replacement program; and

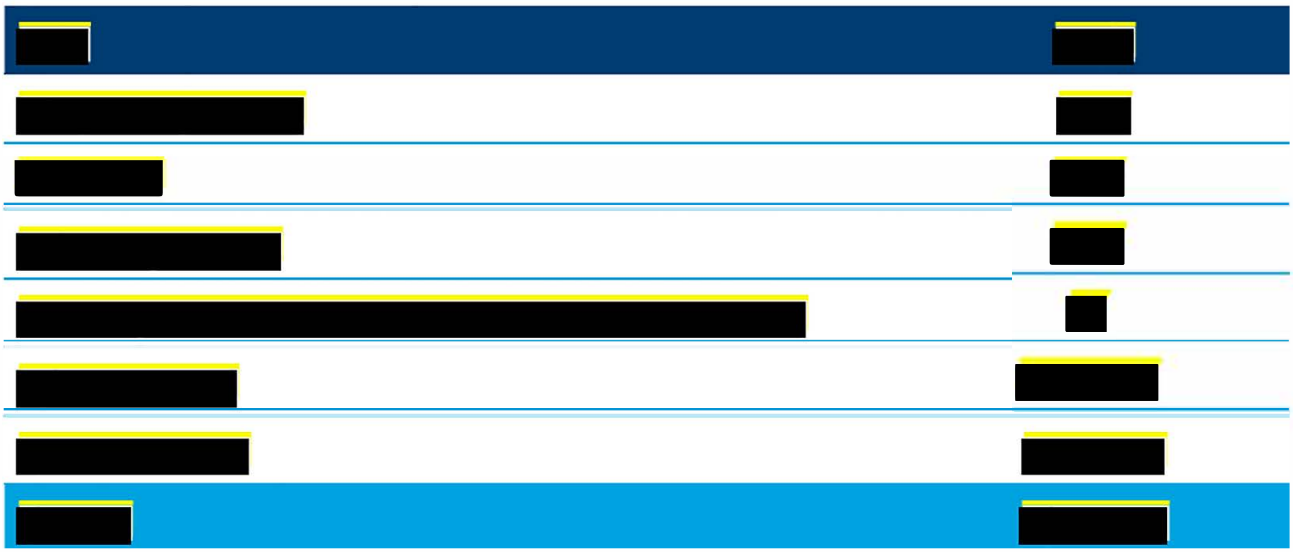
4 availability and capacity of HP network infrastructure to support the replacement.

As discussed in Section 5.2.4 of the DMSIP (provided as Attachment 8.2), a number of Medium Pressure Cast Iron and Unprotected Steel trunk mains will be either fully replaced, partially replaced or decommissioned. Of the existing supply main, it is forecast that 32 kilometres will be decommissioned. The timing of these works is, to a great extent, dependent on the completion of the CI and UPS block replacement program and the detailed designs which will be completed over the next 18 months. The unit rate for trunk main replacement and decommissioning has been based on the excavation and sealing of pipe ends every 50 metres (to prevent road subsidence) when the trunk main is abandoned.

4.6.2. Forecast Unit Rates

As the abandonment of mains is not a regular activity, the forecast for performing this type of work has been estimated using a bottom-up approach based on the experience AGN has had in carrying out such works for similar projects. The forecasts are set out in the table below.

Table 4.10: Decommissioned Trunk Unit Rates ($2016)



4.7. Piecemeal Mains Replacement

Forecasting Approach: Historic actuals	Consistent with AER Approved Approach

4.7.1. Nature of Work and Costs

Some mains replacements are performed on a 'reactive' or piecemeal basis as a means of overcoming urgent leakage problems or localised cases of water ingress.

Subject to the condition of the existing mains, it is sometimes found that conventional repairs are either not possible or not economically feasible due to multiple leaks in a localised area. In these

cases, piecemeal mains renewal is undertaken with replacement in the order of 100 metres or less in length using direct burial, rather than insertion.

Very little piecemeal replacement has been completed over the last three years, with no work undertaken in 2015. An allowance has been made in the forecast for a minimal amount of this type of work (2km over the 5 years).

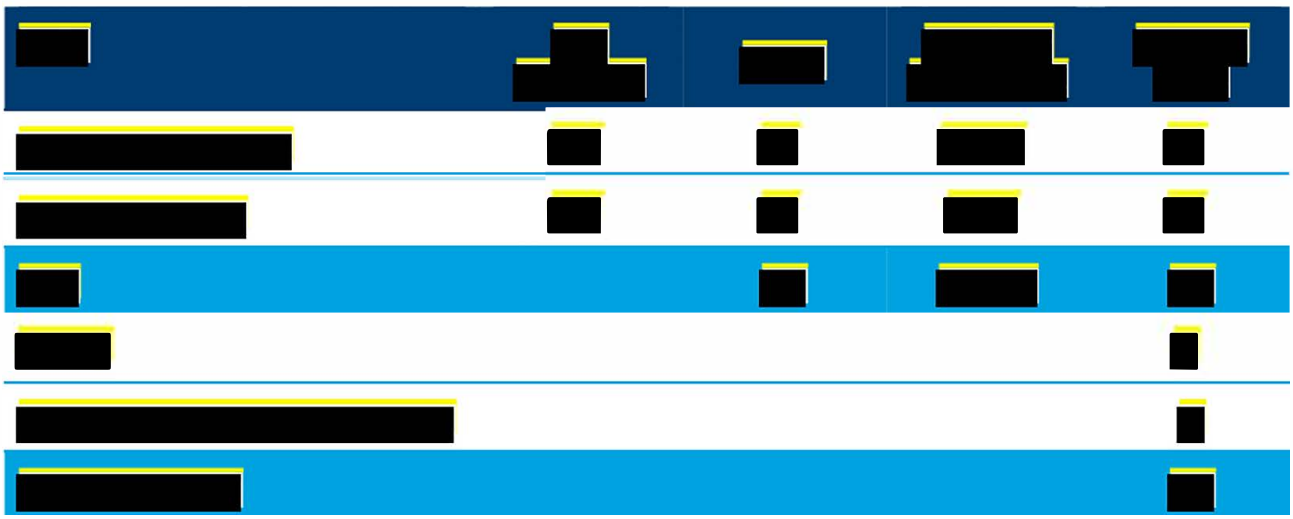
Given the HDPE program proposes short length samples and replacement, the work involved is considered similar to piecemeal. Given the lack of any historical reference for the proposed HDPE, the piecemeal rate has therefore also been applied to the proposed HDPE program as a reasonable estimate of what it would cost to do this work.

4.7.2. Historic and Forecast Unit Rates

The table below sets out the actual unit rates for jobs that have been delivered since 2013 and form the basis for the forecast that has been assumed for the next AA period.

As discussed no work has been undertaken in 2015.

Table 4.11: Piecemeal Mains Renewal Forecast Unit Rates ($2016)



4.7.2.1. Are Current Costs Efficient?

The costs to-date reflect competitively tendered labour rates and material costs and can therefore be viewed as efficient.

4.7.2.2. Contract Status

Areas identified for replacement are tendered to a panel of pre-qualified contractors under the Mains Replacement contract. Awarding of contracts is usually based on the urgency of renewal and contractor availability meeting the construction timeframes.

4.7.2.3. Forecast Unit Rates

In the next AA period, the unit rate for piecemeal replacement is forecast to be [redacted]. The forecast in this case has been based on historic rates.

Historic rates have been used in this case because the volume and type of work that is expected to be carried out in the AA period is similar in nature to what has recently occurred. The historic rates therefore provide an appropriate basis for estimating the costs that are expected to be incurred over the forecast period.

Due to a lack of historical work of this nature, AGN has had to rely on the rates associated with a number of jobs completed since 2013. This approach is consistent with the approach AGN has used for other expenditure categories that involve low volumes of work, are subject to a high degree of variability and/or where it is difficult to derive meaningful assumptions on the work mix.

4.8. Piecemeal Services Replacement

Forecasting Approach: 3-year weighted average	Consistent with AER Approved Approach

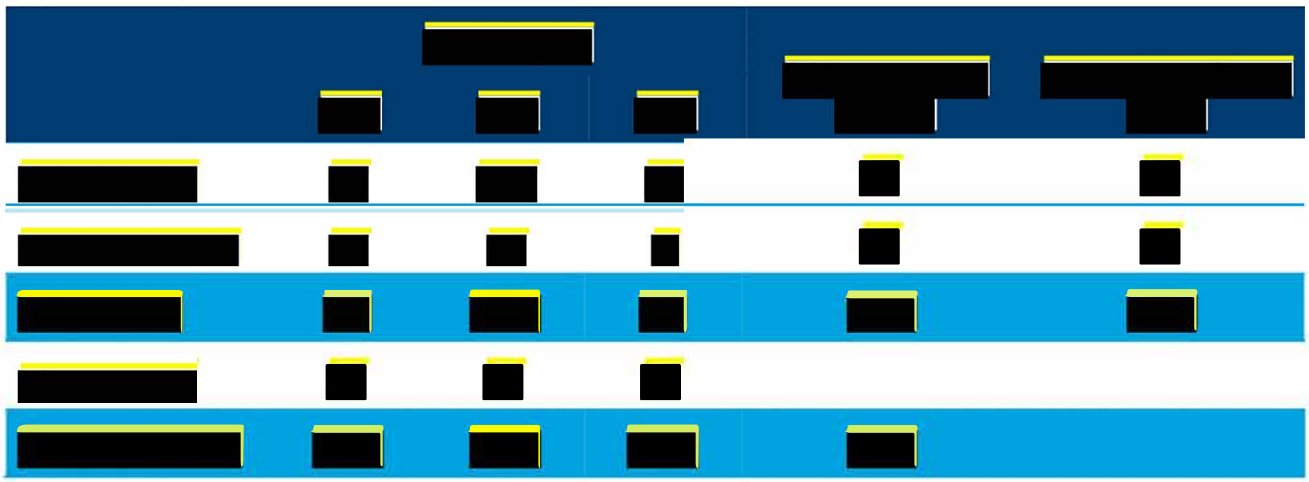
4.8.1. Nature of Work and Costs

There are cases where services need to be renewed on a stand-alone basis. The need for such service renewals arise when leaks or damage occur on the service and inspection reveals that the service is heavily corroded or in such poor condition that repairs are not viable.

4.8.2. Historic and Forecast Unit Rates

The table below sets out the actual unit rates that have been incurred over the last three years and the forecast that has been assumed for the next AA period.

Table 4.12: Piecemeal Services Replacement Forecast Unit Rate ($2016)



4.8.3. Comparison of Historic Rates with AER Approved Rates

The figure below compares the actual unit rates that have been incurred in the current AA period with the unit rates the AER approved over the same period.

[redacted]

[redacted] The inter-year variability reflects the fact that this work is largely reactive, with work undertaken when a failure occurs making a scheduled program with set volumes of work difficult to plan and undertake.

4.8.4. Are Current Costs Efficient?

The costs to-date reflect competitively tendered rates and material costs and can therefore be viewed as efficient. [redacted]

4.8.4.1. Forecast Unit Rates

In the next AA period, the unit rate for services is forecast to be [redacted] lower than the benchmark in the current AA period. The forecast in this case has been based on the three-year weighted average unit rate for contractor and material/other costs, measured over the period 2014-2016. This approach is consistent with the approach AGN has used for other expenditure categories that involve low volumes of work, are subject to a high degree of variability and/or where it is difficult to derive meaningful assumptions on the work mix.

Appendix A – Key Contract Status

The table below provides a brief overview of the current status of contracts and tenders.

Table A.1: Current Contracts and Tenders

Appendix B – Key Contracts

The key contracts that APA has entered into for the provision of services in Victoria and Albury are listed in the following table.

Table B.1: Contractors and Service Providers

Nature of Work	Number of Firms[35]
Mains replacement[36]	9
General mains	32
New services	14
Meter replacement	1
Meter reading	1
New service testing	14
Plumbing and gas fitting	1
Concrete and bitumen reinstatement	11
Traffic management	1

The key contracts list is a dynamic one, and APA is constantly looking for innovative ways to improve the supply of goods and or services to the Networks.

Where possible, to maximise efficiency, improve supplier relationship management and to lock in favourable prices, contracts may be let for periods of up to three years. This can be particularly relevant to field work, where for example a longer contract period (security of work) may enable a mainlaying contractor to invest in more plant and hire/train more personnel as opposed to perhaps hiring plant and relying on casual employment. The outcome in this instance results in a "win-win" for the business and the contractor.

The unique skills required in gas network installation, coupled with competition for contractors in other industries, means that APA must be continually vigilant to ensure the retention of an adequately skilled contract workforce. Hence, and as required by the procurement policy, a variety of factors are considered by in the procurement process. Safety is a key consideration and there must be confidence in the competency of installation contractors to undertake work safely and to appropriate quality standards.

Mains Replacement

AGN has established a national program to manage the systematic replacement of distribution mains across AGN networks. AGN has contracted out mains replacement over many years. The majority of replacement works is delivered through tenders using a prequalified panel of contractors, with tenders usually based on a fixed priced for undertaking a fixed quantity of

[35] Note: some firms may operate in more than one field of work.
[36] Note: national procurement agreement.

replacement. Smaller piecemeal or reactive renewal is generally delivered through quotes that are based on a schedule of rates accepted as part of the tender process.

The use of a prequalified panel is common procurement practice in industry, as it maximises tender efficiency by ensuring that contractors that submit tenders are already qualified in terms of standards of safety, insurance and technical capability. Legal terms and conditions also do not need to be negotiated each time work is undertaken.

In March 2011 a National Mains Replacement Manager was appointed to manage the ramp up in resources and tendering/contractual requirements to achieve mains replacement targets. The provision of works continued to be via an annual tender process. As at mid-2015, there is a panel of 14 contractors undertaking mains replacement work across South Australia, Victoria and Queensland on fixed price contracts for parcels of mains replacement work. In Victoria each parcel of work can range from 5 kilometres to 20 kilometres, depending on the location of work and project characteristics.

At the commencement of the national tender program there were 3 or 4 contractors that were recognised as having the capacity to undertake mains replacement work in Victoria. This presented a risk to AGN as large volumes of work were held with a few contractors. To mitigate this risk, and at the same time increase the overall level of competition for work, interstate based panel contractors were encouraged to consider tendering for Victorian work. Further market research was also conducted and this identified additional contractors that were not previously prequalified onto the panel. This has resulted in 9 contractors on the national contractor panel participating, from time to time, in tenders for work in Victoria.

Historically, mains replacement contracts were being awarded approximately 6-months ahead of the anticipated work commencement dates, with significant emphasis placed on annual budget approval processes. Longer term certainty of funding has resulted in more advanced planning and scheduling of work. This culminated in a significant achievement in 2013 whereby two annual work programs were tendered to the panel at the same time, enabling contractors to have two full years visibility of the mains replacement program's targeted lengths. This assisted contractors to price for concurrent areas, as well as providing additional benefits in terms of the resource planning of crews, plant and equipment.

In terms of volume for the 2014-15 mains replacement program, 10 packages of work were issued to 9 individual contractors, with total project lengths of approximately 107 kilometres. In terms of volume for 2015-16, 16 packages of work were issued to the same panel contractors, with a total project length of approximately 132 kilometres.

In 2016 an Expression of Interest (EOI) was conducted for Mains Replacement within the Melbourne CBD. The EOI was issued to a select group of 7 contractors within the existing Mains Replacement Panel contract that were identified as having the appropriate skills and experience to undertake mains replacement work of a more complex nature. From this process the tendered rates will be utilised to form a basis for the Victorian Access Arrangement submission.

Where trunk mains are required, these are also tendered out on a fixed price basis to the contractor panel, but other contractors that specialise in large mains installations may also be invited to tender for such works.

While price is a significant consideration in awarding contracts, consideration must also be given to other factors, notably contractor resources. A contractor may bid, for example, for every work parcel in a tender, but only have one crew (with the capacity to undertake one parcel of work). Therefore it is possible that this contractor may have bid the lowest price for 10 parcels of work with the aim of securing one parcel of work. Similarly, the next lowest tenderer for a certain parcel may also not have the capacity to undertake that parcel of work, and so on. By matching workload, prices and contractor capacity, the business aims to achieve the lowest practical price.

Furthermore, in order to encourage a competitive contract workforce (prolonged loss of work by contractors can lead to a diminishing contractor panel and lower competition), it may be prudent and in the long term interests of consumers to allocate work from time to time to a contractor that may not be the lowest price tenderer if doing so is expected to promote competition and result in lower costs over the longer term.

Similarly, contractor historical performance is a key consideration in awarding contracts. If a contractor has a poor safety record, or their work results in numerous customer complaints, this will impact on their ability to win parcels of work (and remain on the contractor panel), regardless of their pricing.

For the above reasons, contracts are not always awarded to the lowest tenderer.

New Mains and Services

AGN has existing contracts in place with thirty three contractors for the installation of new works across Victoria, covering new mains installations and customer service connections in new estates and existing sub-divisions. These contracts cover both domestic and (I&C) customer connections.

The service area covers Metropolitan Melbourne (including Melbourne CBD), as well as the regional centres and surrounding areas of Somerville, Traralgon, Shepparton, Albury and Bairnsdale. [redacted]