Australian Gas Networks

Final Plan Attachment 9.1

Low Pressure Mains and Services Depreciation

A Report by Incenta Economic Consulting

December 2016

Low Pressure Mains and Services Depreciation

Report for Australian Gas Networks

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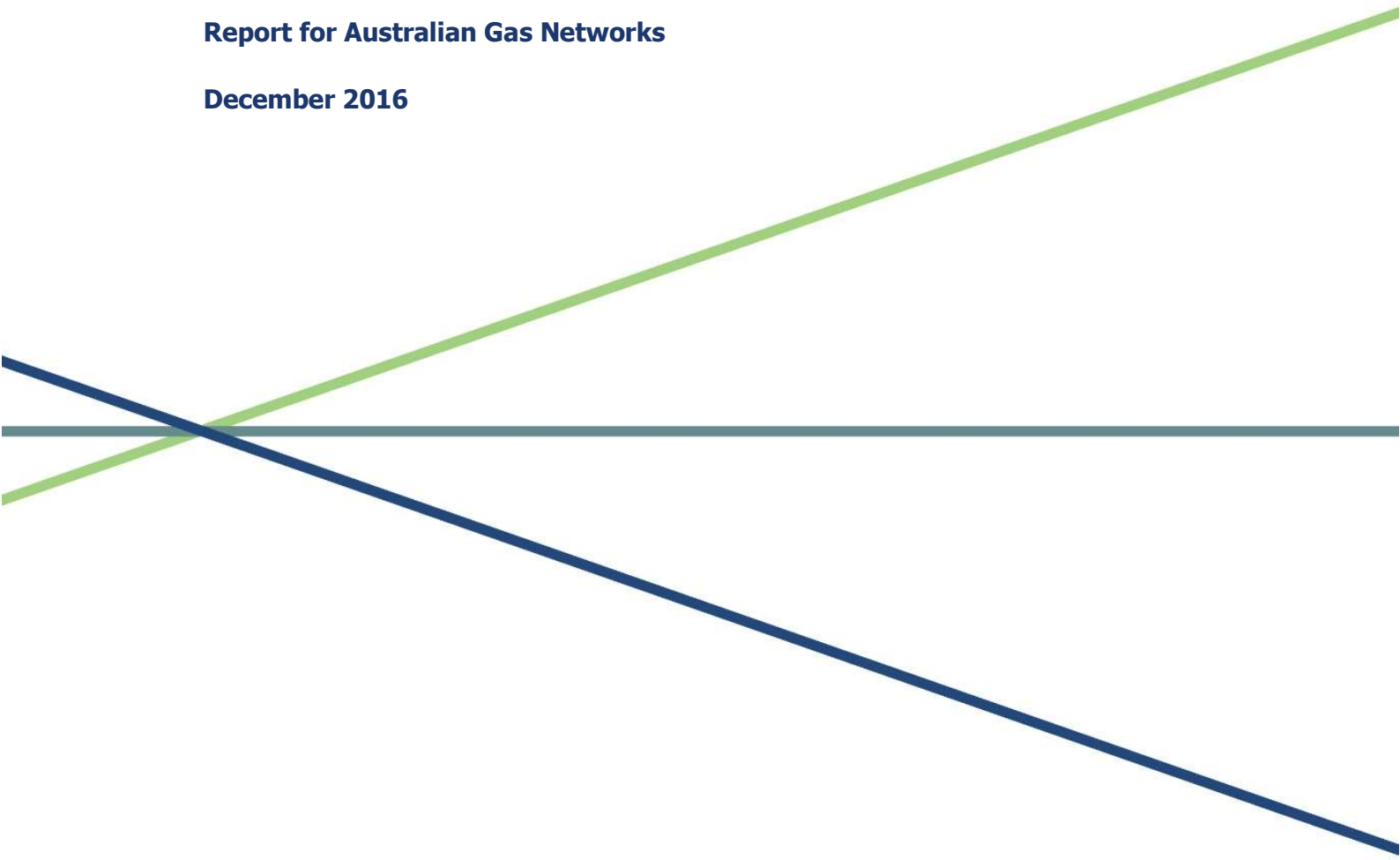

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1. Introduction and summary of recommendations

1.1 Scope

1. Incenta Economic Consulting ("Incenta", "we" or "us") has been engaged by Australian Gas Networks (AGN) to assist in calculating the adjustment to regulatory depreciation that is appropriate to reflect the replacement of low pressure pipelines. The relevant background to this request is that, as a consequence of AGN's low pressure mains replacement program, there will be:

   a. assets that have a value in AGN's opening capital base for the next access arrangement period that have already been replaced (or that have been replaced by that date), and

   b. there will be a further set of assets that AGN proposes to replace over the next access arrangement period that would have a value in AGN's capital base at the end of the next access arrangement period.

2. AGN is proposing to depreciate the unrecovered value of the assets subject to replacement over the next access arrangement period. We have been asked to comment on the relative merits of its proposal and to assist in quantifying the residual asset value as at 1 January 2018.

1.2 Summary of advice

1.2.1 Merits of the proposal

3. AGN's proposal to adjust depreciation to allow for the recovery of the unrecovered value associated with the assets that are (and have been) subject to replacement is consistent with the AER's approach to this matter in previous reviews. In particular, we observe that the AER has permitted:[1]

   a. AusNet Services (Victorian electricity distribution) to adjust depreciation to reflect the replacement of assets in bushfire prone areas[2]

   b. Ergon (Queensland electricity distributor) to adjust depreciation to permit the recovery of assets damaged in a cyclone[3]

   c. United Energy (Victorian electricity distribution) to adjust depreciation to reflect the replacement of certain assets,[4] and

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1 While we found two instances where an adjustment to depreciation was not accepted where replacement was advanced, these were for reasons that are not applicable to the current manner (these are discussed in the body of the report).

2 AER (2016), Preliminary Decision, Ausnet Services Distribution Determination 2016 to 2020, October, pp.5-13 to 5-17. This preliminary decision was endorsed in the final decision.

3 AER (2010), Queensland distribution determinations 2010-11 to 2015-15, May, p.232.

4 AER (2010), Victorian distribution determinations — Final Decision, October, pp.468-469.

d. AusNet Services (Victorian gas distribution) to adjust depreciation to reflect the replacement of low pressure mains, which was an identical program to AGN's mains replacement program that is the subject of this report.[5]

4. In our view – and consistent with the AER's decisions as summarised above – an adjustment to depreciation is consistent with the requirements of the National Gas Rules and Law. In particular, we conclude that adjusting depreciation in this context:

a. *when considered against the National Gas Objective* – would be likely to promote efficiency by aligning price with costs, and also promote intergenerational equity by avoiding a circumstance where future generations would be required to pay for both the replaced and replacing assets

b. *when considered against the National Gas Rules* – the combination of Rules 89(b) and Rule 89(c) require assets to be depreciated over their economic lives and for depreciation to be adjusted to reflect changes in such lives, which encourages precisely the outcome AGN is proposing.

c. *in addition* – the fact that AGN's reference tariffs for the next access arrangement period even after the adjustment to depreciation are expected to fall materially compared to current levels means that the adjusted depreciation is unlikely to adversely affect the efficient growth in the market for services (and so be neutral towards Rule 89(a)).

1.2.2 Estimated adjustment to depreciation

5. The low pressure assets that will have been replaced by the end of the next access arrangement period were included in a more aggregated category of assets in the initial capital base for AGN (which was then called Stratus Networks). Accordingly, it is necessary to estimate the value in the initial capital base that was associated with these assets.

6. We have relied upon the information contained in the access arrangement information for the first access arrangement period for Stratus Networks (corresponding to the 1998-2002 period). Our estimate has been derived by:

a. commencing with the value in the initial capital base for the "mains and services" asset category

b. calculating the share of this category associated with "mains" and "services" assets on the basis of the composition of the optimised depreciated replacement cost valuation for the network upon which the initial capital base was based (this valuation provided a greater breakdown than the initial capital base)

[5] AER (2012), Access Arrangement draft decision – SPI Networks (Gas) Pty Ltd 2013–17, Part 2, September, p.136. In addition, the Essential Services Commission also permitted Multinet (the third Victorian gas distributor) to adjust depreciation in respect of the replaced low pressure mains as part of the 2008 gas access arrangements review (ESC, (2009), 2008 Gas Access Arrangements Review – Final Decision, pp.440).

c. calculating the low pressure share of the initial mains (and the share of the associated services) based upon the relative lengths of the low, medium and high pressure mains in the initial capital base, and

d. adjusting this value to reflect:

   i. accumulated depreciation between 1998 and the start of 2018

   ii. CPI indexation (the values reported below have been indexed to the midpoint of 2017), and

   iii. the small proportion of the low pressure mains that will not have been replaced by the end of the next access arrangement period.

7. The residual value of the low pressure mains and service assets that will replaced by the end of the next (2018-2022) access arrangement period is set out in the table below.

Table 1 – Assets subject to replacement

Asset	$m ($mid 2017)
Mains	50.6
Services	38.6
Total	**89.2**

8. We recommend that these amounts be depreciated as a single amount, in equal annual amounts over the next access arrangement period.

1.2.3 Conclusions

9. In summary, we find that AGN's proposal to adjust depreciation to allow for the recovery of the unrecovered value associated with the assets that are (and have been) subject to replacement:

   a. is consistent with the AER's approach to identical and similar matters in previous reviews

   b. is likely to promote the National Gas Objective, and

   c. such an adjustment is dictated by the most relevant of the guidance in the National Gas Rules in relation to regulatory depreciation, and would be neutral or positive when considered against the other relevant specific guidance on depreciation.

10. We estimate that the value in the capital base of the assets that are (or have been) subject to replacement at the start of 2018 is $89.2 million (in mid 2017 dollars). We recommend that this amount be treated as a separate asset and depreciated over the 2018-22 access arrangement period.

2. Relative merits of adjusting depreciation in light of the mains replacement program

2.1 AGN's low pressure mains replacement program

11. AGN has been replacing its low pressure mains with high pressure mains over the previous two access arrangement periods and is proposing allowances for capital expenditure that will see the program completed by the end of the 2013-17 access arrangement period. The purpose of the program is to improve the safety of the gas distribution network, and it has been accepted as a prudent and efficient program in the two previous access arrangement reviews. Similar programs of mains replacement are also being conducted by the other two Victorian gas distribution businesses as well as by AGN in relation to its South Australian network. The outcome of this project is that the mains will be replaced in advance of lives that had initially been expected (and factored into the current depreciation schedule).

12. We observe that it is common for assets to be replaced earlier or later than may have been expected at the time of the original investment. Prudent and efficient decisions about the timing and form of asset replacement require an updated risk assessment of the replacement, taking into account (amongst other things) changes in technology and demand, experience with the assets in question and updated information on their condition. Indeed, if such an analysis did not take place and assets were simply replaced after their originally contemplated life had expired, it could suggest an imprudent and inefficient approach to asset management.

13. Table 2 shows the progress of AGN's mains replacement program in relation to its Victorian gas distribution business over time. This table shows that, of the low pressure mains that were inherited at the time of privatisation, 82 per cent would have been replaced by the end of the current access arrangement period, with all except for a very small residual proposed to have been replaced by the end of the next (2018-2022) access arrangement period.

Table 2 – Progress of the mains replacement program

Access arrangement period	Mains replaced (km)	% of Total LP mains
2008-12	708	41%
2013-17	696	40%
2017-22	297	17%
LP mains not being replaced under the advanced program	19	1%
Initial low pressure mains (1/1/1998)	**1720**	**100%**
Total replacement at the end of 2022	**1701**	**99%**

14. As discussed further below, the low pressure mains and associated services that were included in AGN's initial capital base had a contemplated life of 42 years at the start of 1998, implying a remaining life of 22 years at the start of the next access arrangement period (and 17 years by the end). However, given the imminent replacement of the assets, AGN is proposing to adjust depreciation to remove the replaced assets from its capital base by the end of the next period. The following section sets out our views on

the relative merits of its proposal and section 3 provides our recommendation as to the adjustment to depreciation.

2.2 Relative merits of adjusting depreciation

2.2.1 Regulatory decisions about depreciation and the replacement of assets

15. In our view, AGN's proposal to adjust depreciation to align the recovery of the costs (and removal of those costs from the capital base) over the period that is aligned with the replacement of the assets is supported by the decisions of regulators to date. To this end, there have been a number of decisions of regulators that have accepted the proposition that when assets are replaced (or to be replaced) prior to the economic life that had been embedded in the calculation of regulatory depreciation, an adjustment to regulatory deprecation is appropriate to permit the residual costs of the replaced assets to be recovered over their new life (or, for already replaced assets, as quickly as possible).

16. In a recent decision, the AER permitted AusNet to adjust depreciation to reflect the replacement of assets in bushfire prone areas.[6] In its preliminary decision (which was endorsed in the final decision), the AER remarked as follows:

> *We accept AusNet Services' proposal to accelerate the depreciation of certain high bushfire risk assets. These assets will be transferred from existing asset classes ('Distribution system assets', remaining life 34.5 years or 'Subtransmission', remaining life 35.6 years) to new asset classes with a remaining life of one or five years. …*
>
> *…*
>
> *We consider that there is a regulatory requirement for AusNet Services to replace the high bushfire risk assets, imposed upon it by the Victorian Government. Some of these assets have already been replaced, and the rest will be replaced over the 2016– 20 regulatory control period. In either case, the effective economic life of the assets is reduced and therefore we accept AusNet Services' proposal to change its depreciation schedule for these assets to align with the reduced economic life. For already replaced assets, we accept AusNet Services' proposed remaining asset life of one year, which means that the return of capital occurs as soon as possible. For the remainder, we accept AusNet Services' proposed five year remaining asset life as it aligns with the replacement program across the 2016–20 regulatory control period. [footnotes omitted]*

17. A second decision – whose subject matter was most consistent with the current matter – occurred in relation to AusNet Services (gas distribution), which involved the replacement of low pressure mains and services and so was a virtually identical case to

[6] AER (2016), Preliminary Decision, Ausnet Services Distribution Determination 2016 to 2020, October, pp.5-13 to 5-17.

that of AGN. In that decision, the AER permitted an adjustment to depreciation, commenting in the draft decision (which was adopted in the final decision) as follows:[7]

> *The low pressure mains, along with other mains (medium pressure and high pressure mains) make up the 'Distribution pipelines' asset class. Since the earlier access arrangements, SP AusNet has put in place capex projects to gradually replace low pressure mains with high pressure mains. SP AusNet stated that moving to a high pressure gas network will allow it to improve network safety and reliability by reducing the incidence of leaks. For the 2013–17 access arrangement, SP AusNet also proposed capex to replace low pressure mains with high pressure mains.*
>
> *Consistent with the AER's draft decision on SP AusNet's proposed forecast replacement capex, the AER considers that the proposed reduction in the remaining economic life as at 1 January 1998 associated with the low pressure mains is appropriate. The AER considers that the proposed remaining economic life is consistent with the NGR, which requires that the depreciation schedule allow for adjustments reflecting changes in the expected economic life of a particular asset. ...*

18. In addition, an adjustment to depreciation have also been made for:

    a. Multinet (Victorian gas distribution) by the ESC to take account of its replacement of low pressure mains[8]

    b. Ergon (Queensland electricity distributor) to adjust depreciation to permit the recovery of assets damaged in a cyclone, and[9]

    c. United Energy (Victorian electricity distribution) to adjust depreciation to reflect the replacement of certain assets.[10]

19. As noted above, the common finding of the decisions referred to above is that the replacement of those assets would justify an adjustment to depreciation to reflect the revised economic life of the assets. In addition, there are two further points that can be drawn.

    a. First, in all of the decisions referred to above, the assets subject to the replacement had been grouped together with other assets for the purpose of calculating regulatory depreciation. As a consequence, the regulatory value of the assets in question was not observable, but needed to be estimated based upon the available, incomplete information. In all cases, therefore, the AER accepted the use of an estimate of the

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7 AER (2012), Access Arrangement draft decision – SPI Networks (Gas) Pty Ltd 2013–17, Part 2, September, p.136. Immediately after this quoted material, the AER discussed the materiality of the effect on prices from the adjustment to depreciation, although it was not clear how that factor influenced its decision making. By way of contrast, there was no discussion of price impacts in the AER's more recent decision in relation to AusNet electricity distribution.

8 ESC, (2009), 2008 Gas Access Arrangements Review – Final Decision, pp.440. This reference indicates the discussion where Multinet's proposal was summarised. The ESC's discussion only focussed on the items with which it disagreed, and this proposal was not amongst them.

9 AER (2010), Queensland distribution determinations 2010-11 to 2015-15, May, p.232.

10 AER (2010), Victorian distribution determinations — Final Decision, October, pp.468-469.

residual value of the replaced assets (although, as expected, the AER tested the estimates submitted and, in a number of cases, required a revision).

b. Secondly, in all of the decisions except one, the adjustment to depreciation was effected by separating out the replaced assets into a specific asset class and depreciating those assets over a life aligned to the timing of replacement. The exception to this was in relation to AusNet (Victorian gas distribution) where an adjustment was instead made to the remaining life of the group, although we note that in that case the outcome was as proposed by the business (and not imposed by the AER). In fact, the AER's preferred approach appears to be the former, where the assets in question are separated out into a specific asset class.

20. In our review of energy network regulatory decisions, we identified two cases where a request for adjusted depreciation in the context of asset replacement was denied; however, in each case, the reasons were specific to the relevant case. These were:

a. Envestra (for the 2008-12 access arrangement period) – the principal reasons the Essential Services Commission denied adjusted depreciation were because Envestra also proposed an overall limit to depreciation (so that the adjustment to depreciation had no real effect and created complexity) and because the request was made after the draft decision. Neither of these concerns exist in the current case. Moreover, the Commission permitted Multinet to adjust depreciation for its equivalent project, which supports the view that the Commission's reasons were unique to the specific circumstances of Envestra.

b. Multinet (for the 2013-17 access arrangement period) – the AER rejected the adjustment to depreciation because, due to Multinet not delivering the expected mains replacement during the previous period, the mains expected to be replaced over the forthcoming period had already been depreciated. Again, this concern does not exist in the current case.

2.2.2 Our view on the guidance from the National Gas Law and Rules

21. In our view, and consistent with the decisions of the AER as summarised above, the adjustment to depreciation in order to align with the technical and economic lives of replaced assets, is both authorised and encouraged by the National Gas Law and National Gas Rules.

22. First, our view is that adjusting the depreciation of assets that are subject to replacement is consistent with the National Gas Objective, which directs decisions to "promote efficient investment in, and efficient operation and use of, natural gas services for the long term interests of consumers of natural gas". Adjusting depreciation to remove the value associated with these assets from the capital base over the next access arrangement period will have the effect of quarantining the cost associated with the replaced assets to the customers that use those assets, and result in future customers paying only for the replaced assets. Timing the recovery of costs in this manner is likely to:

a. promote efficiency in the consumption of gas, which is generally held as requiring prices to be aligned with costs, and

b. promote an outcome that is equitable between generations of customers as it will avoid the situation where future generations may be required to pay for both the replaced and replacing assets.

23. In terms of the more specific guidance, the rules that are most relevant to this matter are rules 89(b) and (c), which (together with the inclusion of the opening part of the provision) provide as follows:

> *The depreciation schedule should be designed:*
>
> ...
>
> *(b) so that each asset or group of assets is depreciated over the economic life of that asset or group of assets; and*
>
> *(c) so as to allow, as far as reasonably practicable, for adjustment reflecting changes in the expected economic life of a particular asset, or a particular group of assets[.]*

24. We read these rules as providing a direct instruction to depreciate each asset (or group of assets) over their economic lives, and to update the depreciation allowance associated with that asset or group of assets over time to reflect changes in economic lives. The replacement of the low pressure pipelines means that a change to the economic lives previously factored into depreciation clearly would have occurred. We do not think the fact that the adjustment is subject to being practicable is a constraint in this case. As we discuss in section 3, while it is necessary to estimate the required adjustment to depreciation, there is sufficient information underpinning the setting of the initial capital base to permit a reasonable estimate of that adjustment. Moreover, there is no impracticability to estimating the revised economic lives of the relevant assets given that the revised (remaining) economic lives will be tied to the schedule of asset replacement.

25. In addition, we also think that the adjustment to depreciation for the assets subject to replacement will, in the specific context of AGN, be either neutral to, or promote, the rule 89(1)(a), which provides as follows:[11]

> *The depreciation schedule should be designed:*
>
> *(a) so that reference tariffs will vary, over time, in a way that promotes efficient growth in the market for reference services*

26. This is because, even with the adjustment to depreciation, AGN's reference tariffs are expected to be materially lower in the next access arrangement period compared to the current period. Given this situation, we would expect that adjusting depreciation would be unlikely to adversely affect the efficient growth in the market. Rather, it is more likely that leaving the replaced assets in the capital base – and so requiring the cost of both the

[11] A further rule is that "an asset is only depreciated once" (rule 89(1)(d)). This rule goes to the integrity of the depreciation calculation and is met by the calculations as performed in the PTRM.

replaced and replacing assets to be recovered in future periods – would be likely to adversely affect the efficient growth of the market in future periods.

3. Recommended adjustment to depreciation

3.1 Sources of information

27. The low pressure assets that AGN will have replaced by the end of the next access arrangement period have been grouped with other assets in AGN's capital base. An estimate, therefore, is required of the depreciated value of the replaced assets as at the start of the 2018-22 access arrangement period.

28. The information that we have relied upon to derive this estimate has been taken from the original access arrangement information (AAI) for Stratus Networks (for the 1998-2002 period) and is as follows:[12]

    a. The starting point is AAI Table 4, which sets out the initial capital base for Stratus Networks as at 1 January 1998 and has this broken down into five asset categories. The low pressure mains and services are included in the category labelled "mains and services". This table also sets out the "optimised depreciated replacement cost" (ODRC) values for the three asset categories whose value was initially determined using this method as at 1 January 1998.[13] The initial capital base was set below the ODRC values for two of these categories to meet certain price objectives. AAI Table 3 sets the remaining life for the "mains and services" asset category at 42 years from 1 January 1998.

    b. AAI Table 2 provides a more detailed breakdown of the ODRC values for the assets as at 1 July 1997. This table breaks down the "mains and services" category into eight separate components, including those labelled as "mains" and "services".

    c. AAI Table 30 shows the relative length of the high pressure, medium pressure and low pressure mains pipelines as at 1 January 1998.

29. The content drawn from AAI Tables 2 and 4 – including our mapping of the relevant asset classes between the ODRC and initial capital base – is shown below. AAI Table 2 provides two ODRC estimates, one simply referred to as "ODRC" and the final column as "allocated ODRC". The Office of the Regulator-General in its decision on the initial capital base noted that the difference between these arose from the transfer of assets between the Victorian businesses after the initial ODRC valuations had been completed and considered the "allocated ODRC" value to be the final ODRC estimate.[14]

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12 Victorian Third Party Access Code for Natural Gas Pipeline Systems: Access Arrangement Information for Distribution Pipeline by Stratus Networks Pty Ltd and Stratus Networks (Assets) Pty Ltd, Final as at 30 November 1998 (obtained from: http://www.aemc.gov.au/Energy-Rules/National-gas-rules/Gas-scheme-register/VIC-Envestra-(Vic)-Gas-Network?folderId=25987).

13 The assets in the "land and buildings" category were valued at the lesser of market value and depreciated replacement cost, and the assets in the "equipment, vehicles and other" category were valued at their accounting book values (Office of the Regulator-General (1998), Access Arrangements – Multinet, Wester and Stratus: Final Decision, October, p.53).

14 Office of the Regulator-General (1998), Access Arrangements – Multinet, Wester and Stratus: Final Decision, October, p.53.

Table 3 – Information on the composition of the Initial Capital Base

	1 January 1998 Table 4			1 July 1997 Table 2
	Initial Capital Base $million	*ODRC $million*		*ODRC $million*
Mains and services	499.2	516.4	Mains (incl. system security)	262.6
			Services	200.4
			Transmission Pressure	32.4
			Field Regulators	7.6
			City Gates	5.4
			Other Regulators	3.5
			SCADA	2.5
			Total	**514.4**
Meters - Domestic	45.7	51.7	Meters - Domestic	**52.0**
Meters - Other	19.6	19.6	Meters - Commercial	11.8
			Meters - System	7.6
			Total	**19.4**
Total - system assets	**564.5**	**587.7**	Total - system assets	**585.8**
Land and buildings	10.2			
Equipment and vehicles and other	5.3			
Total - non-ODRC assets	**15.5**			
Total - all assets	**580.0**			

Source: Stratus Networks Access Arrangement Information for the 1998-2003 period, tables 2 and 4.

30. The information on the relative length of mains across the high pressure, medium pressure and low pressure mains as at 1 January 1998 was as follows:

Table 4 – Relative length of different categories of mains at 1 January 1998

Mains category	km
Low pressure	1,720
Medium pressure	127
High pressure	5,467
Total	**7,314**

Source: Stratus Networks Access Arrangement Information for the 1998-2003 period, table 30.

3.2 Method for deriving the written down value for the replaced low pressure assets

31. We have derived our recommended written down value for the assets that would have been subject to replacement by the end of the 2018-22 access arrangement period by applying the following steps.

    a. First, we have commenced with the value for "mains and services" as reflected in the initial capital base, which was **$499.2 million**.

    b. Secondly, we have assumed that the share of "mains" and "services" in the "mains and services" initial capital base is the same as the share of each of these assets in the

1 July 1997 ODRC for the assets that are included in the larger "mains and services" category. This implies an initial capital base value for the "mains" portion of the "mains and services" category of **$254.8 million** and **$194.5 million** for the "services" portion.

c. Thirdly, we have assumed that the mains initial capital base separated between low pressure, medium pressure and high pressure in the same proportion as the relative lengths of mains in these categories. We have further assumed that the services associated with the low, high and medium pressure mains also divided into the same proportions. This implied an initial capital base value for the low pressure portion of the mains of **$59.9 million** and **$49.7 million** for services associated with the low pressure mains.

d. Fourthly, we have then adjusted these initial capital base values for the accumulated depreciation between 1 January 1998 and 1 January 2018 (20 years out of the initial remaining life of 42 years) as well as the change in CPI (we report outputs as at the midpoint of calendar year 2017).[15] The effect of these steps was to produce:

   i. written down value as at 1 January 2018 in beginning of 1998 dollar terms of **$31.4 million** and **$24.0 million** for low pressure mains and services, respectively, and

   ii. written down value as at 1 January 2018 in mid 2017 dollar terms of **$51.2 million** and **$39.1 million** for mains and services, respectively.

e. Fifthly, as discussed in section 2.1, of the low pressure mains that were in existence at the start of 1998, 19 km will not be replaced by the end of the next access arrangement period. Accordingly, we have scaled down the values derived above to exclude the associated assets. This results in our final estimates of the written down capital base values of the replaced assets at the start of 2018 (and expressed in mid 2017 dollar terms) of **$50.6 million** and **$38.6 million** for mains assets and services assets, respectively.

32. The steps to this calculation are set out further in Table 5 below.

[15] We have applied a CPI lagged by 9 months for this purpose (for example, the CPI for September 2016 has been used as the proxy for the CPI as at June 2017), consistent with the approach that has been applied to roll-forward AGN's capital base to date (see, for example, the approved roll forward model for the 2013-17 access arrangement period). The relevant CPI observations are 67.1 (which was the CPI for March 1997 and is used as the proxy for the CPI at the start of 1998) and 109.4 (which was the CPI for September 2016 and is used as the proxy for the CPI at the midpoint of 2017): Australian Bureau of Statistics (2016) 6401.0 - Consumer Price Index, Australia, Sep 2016, October (downloads for Table 1, accessed 1 December 2016).

Table 5 – Derivation of the capital base value of replaced assets at the start of 2018

Step	Line	Asset being valued	$million	Calculation	Comment
1	[1]	Mains and Services category of initial capital base	**499.2**	n/a	Prescribed in initial capital base
2	[2]	Mains portion of initial capital base	254.8	= [1] x 262.6 / 514.4	Relative contributions to ODRC
	[3]	Services portion of initial capital base	194.5	= [1] x 200.4/514.4	Relative contributions to ODRC
3	[4]	Low pressure mains portion of initial capital base	59.9	= [2] x 1720 / 7314	Relative length of LP
	[5]	Low pressure services portion of initial capital base	45.7	= [3] x 1720 / 7314	Relative length of LP
4	[6]	Low pressure mains depreciated to 1/1/2018 ($start 1998)	31.4	= [4] x (1 - 20 / 42)	Proportion of initial life passed
	[7]	Low pressure services depreciated to 1/1/2018 ($start 1998)	24.0	= [5] x (1 - 20 / 42)	Proportion of initial life passed
	[8]	Low pressure mains depreciated to 1/1/2018 ($mid 2017)	51.2	= [6] x 109.4 / 67.1	Relative CPIs
	[9]	Low pressure services depreciated to 1/1/2018 ($mid 2017)	39.1	= [7] x 109.4 / 67.1	Relative CPIs
5	[10]	Replaced low pressure mains (at 1/1/2018, $mid 2017)	**50.6**	= [8] x (1 - 19 / 1720)	Proportion of LP replaced
	[11]	Replaced low pressure services (at 1/1/2018, $mid 2017)	**38.6**	= [9] x (1 - 19 / 1720)	Proportion of LP replaced

33. We acknowledge that the calculations above were based upon a number of assumptions; however, our view is that those assumptions are reasonable and we have not identified any alternative approach or assumptions that would be superior given the information that exists. We note specifically that:

    a. The assumption that components of the mains and services asset category in the initial capital base were present in the same ratio as the 1997 ODRC value require the assumption that capital expenditure and depreciation were the same across the components, and that all components were "written down" to the same degree to achieve the price objective. We think these assumptions are reasonable, and note that the aggregate write down to the "mains and services" category was only 3 per cent in any event, suggesting that any substantial error in allocating the write down will be small.

    b. The assumption that the low pressure mains in the initial capital base (and associated services) was the same proportion to the total mains as the relative lengths is broadly consistent with the proposal the AER accepted for SP AusNet for the 2013-17 access arrangement period. Indeed, the decision accepted that 34 per cent of the mains were low pressure, which was slightly higher than the 30 per cent that low pressure represented by length.

34. In terms of the period of time over which the amount should be recovered, the calculations performed for this report are based upon the assets that have already been replaced or that will be replaced over the next access arrangement period, which AGN proposes to be a term of five years. The simplest approach – and the approach that we recommend – is simply to depreciate the amount that we have calculated over the five year access arrangement period. While it may appear to be more accurate to divide the assets into different classes that correspond to the precise replacement schedule (and which will include a substantial portion of assets that have already been replaced), this appearance is misplaced. In particular, the fact that a smoothed reference tariff will be calculated for the access arrangement period means that how depreciation is allocated within the period is unlikely to have a material effect on reference tariffs.

4. Conclusion

35. In summary, we find that AGN's proposal to adjust depreciation to allow for the recovery of the unrecovered value associated with the assets that are (and have been) subject to replacement:

    a. is consistent with the AER's approach to identical and similar matters in previous reviews

    b. is likely to promote the National Gas Objective, and

    c. such an adjustment is dictated by the most relevant of the guidance in the National Gas Rules in relation to regulatory depreciation, and would be neutral or positive when considered against the other relevant specific guidance on depreciation.

36. We estimate that the value in the capital base of the assets that are (or have been) subject to replacement at the start of 2018 is $89.2 million (in mid 2017 dollars). We recommend that this amount be treated as a separate asset and depreciated over the 2018-22 access arrangement period.