DRAFT DECISION
Jemena Gas Networks (NSW) Ltd
Access Arrangement

2020 to 2025

Attachment 5
Capital expenditure

November 2019

AUSTRALIAN ENERGY REGULATOR

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Note

This attachment forms part of the AER's draft decision on the access arrangement that will apply to Jemena Gas Networks (NSW) Ltd ('JGN') for the 2020–2025 access arrangement period. It should be read with all other parts of the draft decision.

The draft decision includes the following documents:

Overview

Attachment 1 – Services covered by the access arrangement

Attachment 2 – Capital base

Attachment 3 – Rate of return

Attachment 4 – Regulatory depreciation

Attachment 5 – Capital expenditure

Attachment 6 – Operating expenditure

Attachment 7 – Corporate income tax

Attachment 8 – Efficiency carryover mechanism

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Attachment 10 – Reference tariff variation mechanism

Attachment 11 – Non-tariff components

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Attachment 13 – Capital expenditure sharing scheme

Contents

Shortened forms

Shortened form	Extended form
AEMC	Australian Energy Market Commission
AER	Australian Energy Regulator
ALARP	As low as reasonably practicable
ARENA	Australian Renewable Energy Agency
CAM	Cost allocation method
Capex	Capital expenditure
CCP/CCP19	Consumer Challenge Panel, sub-panel 19
COAG	Council of Australian Governments
DAE	Deloitte Access Economics
GIS	Geographic Information Systems
I&C	Industrial and commercial
IT	Information technology
JGN	Jemena Gas Networks (NSW) Ltd
MDL	Meter Data Logger
MOU	Memorandum of understanding
MVRS	Multi Vendor Reading System
NGL	National Gas Law
NGO	National Gas Objective
NGR	National Gas Rules
NPV	Net present value
Opex	Operating expenditure
PE	Polyethylene
RF	Radio Frequency
RFM	Roll forward model
RIN	Regulatory Information Notice
SCADA	Supervisory Control And Data Acquisition
STTM	Short Term Trading Market
TJ	Terajoules
UAG	Unaccounted for gas
Zincara	Zincara Pty Ltd

5 Capital expenditure

Capital expenditure (capex) refers to the capital costs and expenditure incurred in the provision of pipeline services.[1] This investment mostly relates to assets with long lives and these costs are recovered over several access arrangement periods.

This attachment outlines our assessment of JGN's proposed conforming capex for the 2015–20 access arrangement period, which forms part of its opening capital base.[2] It also outlines our assessment of forecast capex for the 2020–25 period, which forms part of its projected capital base.[3]

5.1 Draft decision

5.1.1 Conforming capex for 2014–15 and the 2015–20 period

We approve $854.6 million ($2019–20) of total net capex for JGN for the 2014–15 to 2017–18 regulatory years as conforming capex under the National Gas Rules (NGR). This includes placeholders for $28.9 million overspend in overheads (section 5.4.9), $15.8 million ($2019–20) overspend in property as part of other capex (section 5.4.8), and $3.1 million ($2019–20) of inflation discrepancies in total capex between the capex model and the roll forward model during the 2015–20 access arrangement period.

Table 5.1 shows JGN's actual capex against the AER's allowance for the 2010–15 and 2015–20 access arrangement periods, by category.

1 NGR, r. 69.
2 NGR, r. 77.
3 NGR, r. 78(b).

Table 5.1 JGN capex performance against the allowance by category over 2010–15 and 2015–20 access arrangement periods ($2019–20, million)

	2010–15 Period			2015–20 Period		
Category	Allowance	Actual	Difference	Allowance	Actual	Difference
Connections	429.3	361.8	-67.5	336.6	480.9	144.3
Meter Replacement	140.1	81.3	-58.8	165.3	85.1	-80.2
Facilities and Pipes	87.3	58.9	-28.5	107.1	63.8	-43.3
IT	106.4	141.7	35.3	147.6	119.5	-28.1
Augmentation	81.4	98.8	17.4	94.1	40.0	-54.1
Mains Replacement	22.6	16.4	-6.2	64.5	27.3	-37.2
Other	47.0	95.1	48.1	44.4	45.5	1.1
Overheads	36.5	130.0	67.5	134.4	163.3	28.9
GROSS TOTAL	**950.6**	**984.0**	**33.4**	**1093.8**	**1025.4**	**-68.4**
Contribution	25.1	41.0	15.9	22.4	14.7	-7.7
NET TOTAL	**925.5**	**943.0**	**17.5**	**1071.5**	**1010.7**	**-60.7**

Source: JGN, *Response to information request IR016*, Received 27 August 2019.
AER analysis. Totals may not sum due to rounding.

We reviewed JGN's submission and supporting material to assess its proposed capex for the 2020–25 period. This included information on JGN's reasoning and, where relevant, business cases, responses to information requests and other relevant information. We used this information to identify whether capex over the 2015–20 period was conforming capex and, in turn, whether that capex should be included in the opening capital base.[4] Generally, we use the same approach to assess whether both historical and forecast or estimated capex conforms with the new capex criteria. We have set out this approach in more detail in section 5.3 below.

We consider the following when determining the opening capital base for the 2020–25 period:

- 2014–15 capex – given that the 2014–15 year was a forecast at the time we made our 2010–15 final decision, we have assessed whether this is conforming capex.[5]

[4] NGR, r. 77(2)(b).
[5] Ibid.

We have included conforming capex in the opening capital base for the 2010–15 period. [6]

- 2015–16 to 2017–18 capex — since we have actual capex for these years, we have assessed whether this is conforming capex.[7] We have included conforming capex in the opening capital base for the 2020–25 period.[8]
- 2018–19 and 2019–20 capex — since we do not yet have actual capex for 2018–19 and 2019–20, we must include an estimate in the opening capital base. We have not assessed JGN's estimate of capex for 2018–19 and 2019–20. We will assess 2018–19 in our final decision for the 2020–25 access arrangement, but will assess whether JGN's actual capex for 2019–20 is conforming capex under the NGR in the subsequent (2025–30) access arrangement period and adjust for any differences between actual and estimated capex.[9]

Table 5.2 shows our approved capex for the 2015–20 period by category.

6 Ibid.
7 Ibid.
8 Ibid.
9 NGR, rr. 77(2)(b), 79.

Table 5.2 AER's approved capex by category over 2014–2020 ($2019–20, million)

Category	2014–15	2015–16	2016–17	2017–18	2018–19[(a)]	2019–20[(a)]
Connections	85.0	80.5	97.8	107.6	101.0	94.0
Meter Replacement	16.3	13.8	13.6	16.0	22.1	19.5
Facilities and Pipes	9.0	14.4	11.5	7.5	7.5	22.9
IT	40.6	41.3	20.9	24.6	17.0	15.7
Augmentation	9.5	14.0	12.3	3.2	7.2	3.4
Mains Replacement	0.9	5.1	6.1	3.0	3.2	9.8
Other	48.7	23.2	3.7	6.1	4.4	8.2
Overheads	*31.1*	*32.9*	*31.5*	*33.3*	*32.5*	*33.1*
GROSS TOTAL	**240.9**	**225.3**	**197.3**	**201.3**	**195.0**	**206.6**
Contribution	5.0	2.9	1.2	1.0	7.4	2.1
NET TOTAL	**235.9**	**222.3**	**196.1**	**200.2**	**187.5**	**204.5**

Source: JGN, *Response to information request IR016*, Received 27 August 2019.
AER analysis. Totals may not sum due to rounding.

Note: (a) We have not assessed the 2018–19 or 2019–20 amounts as approved capex under this decision. This is because these values are estimates. We will undertake an assessment of whether the 2018–19 amounts are conforming capex in our final decision and 2019–20 as part of the next access arrangement decision.

5.1.2 Forecast capex for the 2020–25 period

We approve $791.1 million ($2019–20) of JGN's proposed $899.5 million ($2019–20) total net capex for the 2020–25 access arrangement period as conforming capex under the NGR.[10] This is 12.0 per cent less than JGN's proposed capex. Most of this reduction is because we consider JGN has not provided enough justification in its forecast for a number of programs.

Table 5.3 shows our approved capex for the 2020–25 period by category.

[10] NGR, r. 79.

Table 5.3 AER's approved capex by category over the 2020–25 access arrangement period ($2019–20, million)

Category	2020–21	2021–22	2022–23	2023–24	2024–25	Total
Connections	77.1	71.6	70.2	71.0	74.1	363.9
Meter Replacement	15.3	17.0	22.2	25.6	25.5	105.7
Facilities and Pipes	22.7	19.2	5.3	5.4	10.5	63.2
IT	12.6	15.9	17.3	12.6	14.9	73.3
Augmentation	16.4	10.3	12.8	7.5	0.6	47.6
Mains Replacement	11.7	5.8	1.6	6.8	10.3	36.2
Other	8.6	7.3	5.9	4.3	4.0	30.1
Overheads	24.1	15.3	14.8	14.9	14.9	84.0
GROSS TOTAL	**188.5**	**162.4**	**150.1**	**148.1**	**154.9**	**804.0**
Contribution	5.1	2.0	2.0	1.9	2.0	12.9
NET TOTAL	**183.4**	**160.4**	**148.1**	**146.2**	**152.9**	**791.1**

Source: AER analysis. Totals may not sum due to rounding.

Table 5.4 shows JGN's proposed capex compared with our alternative capex estimate for each category. In coming to our draft decision, we assessed JGN's forecast capex compared with our alternative capex estimate taking into account the available evidence and submissions from stakeholders.

Our assessment revealed that most aspects of JGN's proposal is conforming capex and we included this expenditure in our alternative estimate. That is, the proposed expenditure is justified and would be incurred by a prudent service provider acting efficiently, in accordance with accepted good industry practice, to achieve the lowest sustainable cost of providing services.

In contrast, we found that other aspects of JGN's proposal are not conforming capex and we have not included this expenditure in our alternative estimate. There are also areas where we have included the proposed expenditure on the basis that there is insufficient time, or information, for us to derive a better alternative estimate. As such, there might be further adjustments in the capex category in our final decision.

Table 5.4 AER's draft decision and JGN's proposal for capex over the 2020–25 access arrangement period ($2019–20, million)

Category	JGN's proposal	AER's draft decision	Difference
Connections	387.5	363.9	23.7
Meter Replacement	118.0	105.7	12.3
Facilities and Pipes	72.2	63.2	9.0
IT	107.2	73.3	33.9
Augmentation	60.8	47.6	13.2
Mains Replacement	44.8	36.2	8.5
Other	34.3	30.1	4.2
Overheads	88.1	84.0	4.1
GROSS TOTAL CAPITAL EXPENDITURE	**912.8**	**804.0**	**108.8**
Contribution	13.4	12.9	0.4
NET TOTAL CAPITAL EXPENDITIRE	**899.5**	**791.1**	**108.4**

Source: AER analysis. Totals may not sum due to rounding.

As shown in Table 5.4, the main differences between JGN's proposed capex and our alternative capex estimate for the 2020–25 period concern the following capex drivers:

- IT – Our draft decision is to include $73.3 million ($2019–20, direct costs) of IT capex in our alternative capex estimate. This is 32 per cent less than JGN's forecast capex of $107.2 million. We consider that JGN did not provide adequate justification for its IT program to enable us to form the view it is conforming capex. In section 5.4.5, we set out the areas where further information is required.
- Connections – Our draft decision is to include $363.9 million ($2019–20, direct costs) of connections capex in our alternative capex estimate. This is 6 per cent less than JGN's forecast capex of $387.5 million. We consider that JGN did adjust historical data to reflect current circumstances when calculating unit rates for 2020–25 period. Our consultant has developed an alternative capex estimate by removing outliers in historic data used in the calculation of unit rates.
- Augmentation – Our draft decision is to include $47.6 million ($2019–20, direct costs) of augmentation in our alternative capex estimate. This is a reduction of 22 per cent from JGN's forecast capex of $60.8 million. JGN's proposal did not adequately demonstrate proposed expenditure of $15.2 million in relation to the Aerotropolis is conforming capex. We have allowed $2.0 million for JGN to facilitate planning and design.

- Meter replacement – Our draft decision includes $105.7 million ($2019–20, direct costs) for meter replacement capex, which is $12.3 million (or 10 per cent) less than JGN's forecast of $118.0 million, principally by extending the life of some meter families.
- Mains replacement – Our draft decision includes $36.2 million ($2019–20, direct costs) for mains replacement capex, which is $8.5 million (or 19 per cent) less than JGN's forecast of $44.8 million, by the deferral of one project.
- Speculative capital expenditure account – Our draft decision is to exclude the Western Sydney Green Gas Trial from the speculative capital expenditure account. We have excluded the use of this on two grounds: hydrogen does not meet the National Gas Law (NGL) definition of 'natural gas', and the plant used to produce hydrogen is akin to a production facility which cannot be part of the distribution system.

5.2 JGN's proposal

2015–20 access arrangement period

JGN has proposed net capex of $1071.5 million ($2019–20) for the 2015–20 access arrangement period, where capex in 2018–19 and 2019–20 are estimates.

Without the estimate of capex for 2018–19 and 2019–20, JGN has proposed $618.7 million ($2019–20) as conforming capex (or $854.6 including the 2014–15 year).

We accept $618.7 million ($2019–20) as conforming capex for the 2015–16 to 2017–18 years, and will assess whether capex incurred in 2018–19 is conforming in our final decision, and whether capex incurred in 2019–20 is conforming at the next (2025–30) access arrangement review.

For 2015–20, JGN underspent net capex by 5.7 per cent ($60.7 million). This includes the estimates for 2018–19 and 2019–20.

Table 5.5 JGN's proposed capex by category over the 2015–20 access arrangement period ($2019–20, million)

Category	2014–15	2015–16	2016–17	2017–18	2018–19[(a)]	2019–20[(a)]
Connections	85.0	80.5	97.8	107.6	101.0	94.0
Meter Replacement	16.3	13.8	13.6	16.0	22.1	19.5
Facilities and Pipes	9.0	14.4	11.5	7.5	7.5	22.9
IT	40.6	41.3	20.9	24.6	17.0	15.7
Augmentation	9.5	14.0	12.3	3.2	7.2	3.4
Mains Replacement	0.9	5.1	6.1	3.0	3.2	9.8
Other	48.7	23.2	3.7	6.1	4.4	8.2
Overheads	31.1	32.9	31.5	33.3	32.5	33.1
GROSS TOTAL	**240.9**	**225.3**	**197.3**	**201.3**	**195.0**	**206.6**
Contribution	5.0	2.9	1.2	1.0	7.4	2.1
NET TOTAL	**235.9**	**222.3**	**196.1**	**200.2**	**187.5**	**204.5**

Source: JGN, *Response to information request IR016*, Received 27 August 2019.
AER analysis. Totals may not sum due to rounding.

Note: (a) We have not assessed the 2018–19 or 2019–20 amounts as approved capex under this decision. This is because these values are estimates. We will undertake an assessment of whether the 2018–19 amounts are conforming capex in our final decision and 2019–20 as part of the next access arrangement decision.

2020–25 access arrangement period

JGN proposed forecast net capex of $899.5 million ($2019–20) for the 2020–25 access arrangement period, which is $111.3 million (or 11.0 per cent) lower than its actual net capex for the 2015–20 period.[11]

This comparison is impacted by the transfer of all corporate overheads and pigging costs from capex to opex in the 2020–25 period. If corporate overheads and pigging costs are added back in for a like-for-like comparison, the 2020–25 period is $27.9 million (or 2.8 per cent) lower than JGN's actual net capex for the 2015–20 period.

[11] JGN's capex for both 2018-19 and 2019-20 are estimates only.

Table 5.6 JGN's proposed capex by category over the 2020–25 access arrangement period ($2019–20, million)

Category	2020–21	2021–22	2022–23	2023–24	2024–25	Total
Connections	80.0	76.2	75.2	76.5	79.7	387.5
Meter Replacement	18.2	20.4	23.6	26.8	29.1	118.0
Facilities and Pipes	25.1	21.2	7.0	6.9	12.0	72.2
IT	16.3	22.8	27.0	19.9	21.3	107.2
Augmentation	16.5	19.9	13.2	10.7	0.6	60.8
Mains Replacement	11.7	6.1	6.8	9.7	10.5	44.8
Other	9.7	8.3	6.7	4.7	4.9	34.3
Overheads	24.7	16.1	15.6	15.8	15.8	88.1
GROSS TOTAL	**202.1**	**190.9**	**175.0**	**170.9**	**173.9**	**912.8**
Contribution	5.1	2.0	2.0	2.1	2.1	13.4
NET TOTAL	**196.9**	**188.9**	**173.0**	**168.9**	**171.8**	**899.5**

Source: JGN, *Response to Information Request IR016*, 27 August 2019
AER analysis. Totals may not sum due to rounding.

The major components of forecast gross total capex over the 2020–25 period are connections (43 per cent), meter replacement (13 per cent) and IT (12 per cent).

5.3 Assessment approach

We must make two decisions regarding JGN's capex.

First, we are required to assess past capex and determine whether it is conforming capex that we should add to the opening capital base.[12]

Second, we are required to assess JGN's forecast of required capex for the 2020–25 access arrangement period to determine whether it is conforming capex. Capex will be 'conforming' if it meets the NGR's new capex criteria.[13]

The following sections set out our approach and the tools and techniques we employ in forming a view on these two issues. We also need to take into account timing issues associated with the lag between actual capex data being available in the last year of the 2015–20 period and the need to forecast the opening capital base for the 2020–25 period. We explain this in the next section.

[12] NGR, r. 77(2)(b).
[13] NGR, r. 79.

5.3.1 Capex in the 2015–20 access arrangement period

We reviewed JGN's submission and supporting material to assess its proposed capex for the 2015–20 access arrangement period. This included information on JGN's reasoning and, where relevant, business cases, responses to information requests and other relevant information.

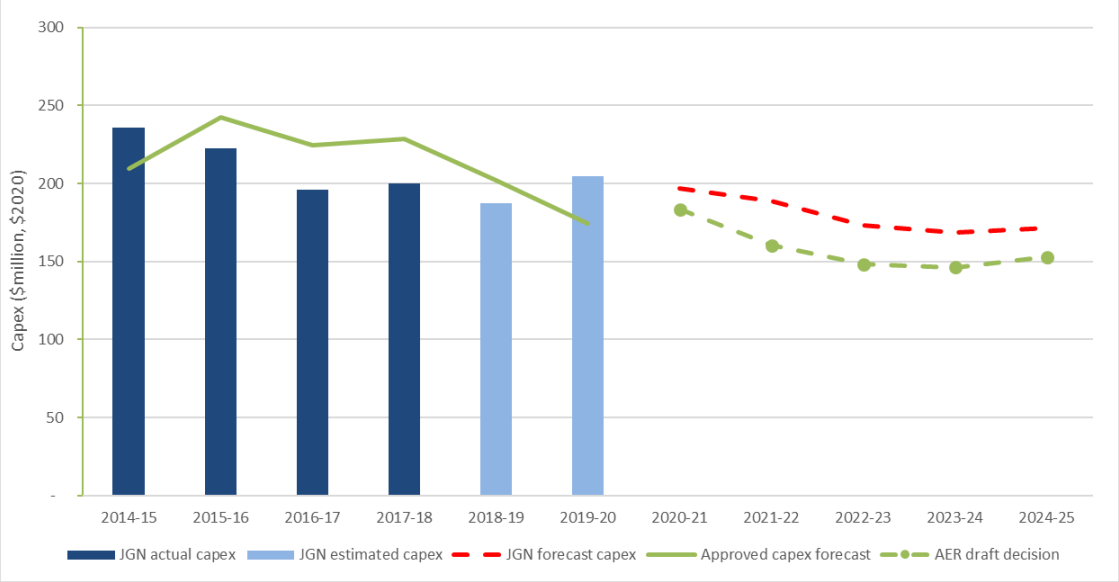
We used this information to identify whether capex over the 2015–20 period was conforming capex and, in turn, whether that capex should be included in the opening capital base.

Generally, we use the same approach to assess whether both historical and forecast or estimated capex conforms with the new capex criteria. We have set out this approach in more detail in section 5.3.2 below.

For the purpose of our draft decision, we have focused our resources on specific areas where there are significant overspends between the allowance and the expected actual. In the 2015–20 period, we have observed significant overspends in connections, overheads and property.

5.3.2 Conforming capex for the 2020–25 access arrangement period

Figure 5.1 JGN capex trends



Source: AER analysis.

We have assessed the key drivers of forecast capex to consider whether JGN's proposed capex complies with the new capex criteria.[14] In doing so, we relied on the following information:

- the access arrangement submission and access arrangement information, which outline JGN's capex program and the main drivers of those programs
- business cases that detail the expenditure requirements for specific projects
- JGN's RIN responses
- JGN's capex forecast model
- responses to information requests
- engineering advice we commissioned from Zincara to help us assess the prudency and efficiency of selected projects
- submissions from interested parties.

For each category of capex, we considered the scope, timing and cost of the proposed capex in order to form a view on whether it complies with the new capex criteria. We also considered whether cost forecasts were arrived at on a reasonable basis and represent the best forecast possible in the circumstances.[15]

Our assessment results in an alternative estimate of the business's total capex requirements in the forecast period. If we are satisfied the business's total forecast meets the NGR requirements, we accept the forecast. If we are not satisfied, we substitute the business's forecast with our alternative estimate. In making this decision, we take into account the reasons for the difference between our alternative estimate and the business's forecast, and the materiality of that difference. We also take into consideration the interrelationships between the capex forecast and other constituent components of our decision such that our decision is likely to contribute to the achievement of the National Gas Objective (NGO).[16]

5.3.3 Interrelationships

In assessing JGN's total forecast capex, we took into account other components of its access arrangement proposal, including:

- possible trade-offs between capex and opex
- consistencies between demand and customer forecasts (Attachment 12 – Demand)
- differences between the capitalisation policies applied in the 2015–20 and 2020–25 access arrangement periods

[14] NGR, r. 79(1).
[15] NGR, r. 74(2).
[16] NGL, s. 28(1).

- growth in labour price forecasts for opex and capex (Attachment 6 – Operating expenditure)
- we also have identified that Attachments 5.2 and 7.3 of JGN's proposal use different inputs for inflation.[17]

5.4 Reasons for draft decision

5.4.1 Conforming capex for the 2015–20 access arrangement period

Conforming capex for 2014–15

JGN has proposed net capex of $235.9 million ($2019–20) for the 2014–15 year. We accept $235.9 million ($2020) as conforming capex for 2014–15, subject to the following:

- JGN providing information regarding its capex overspend in the category of capitalised overheads and property
- JGN providing information regarding the difference in inflation inputs between the capex model and the roll forward model for the 2014–15 year.

Conforming capex for the 2015–20 access arrangement period

JGN has proposed net capex of $1010.7 million for the 2015–20 period ($2019–20), where capex in 2018–19 and 2019–20 are estimates.

Without the estimate of capex for 2018–19 and 2019–20, JGN has proposed $618.7 million as conforming capex.

We accept $1010.7 million ($2019–20) as conforming capex for 2015–20, subject to the following:

- JGN providing information regarding its capex overspend in the category of capitalised corporate overheads and property
- JGN providing information regarding the difference in inflation inputs between the capex model and the roll forward model during the 2015–2020 period
- we will assess whether capex incurred in 2018–19 is conforming in our final decision, and whether capex incurred in 2019–20 is conforming in JGN's next (2025–30) access arrangement. As such, JGN's proposed 2018–19 and 2019–20 expenditures are considered to be place holders.

In reaching this view, we have considered the following factors:

[17] JGN, *Attachment 5.2 – Capex* Model, 30 June 2019 and JGN, *Attachment 7.3 – RFM*, June 2019.

- JGN's capex is expected to be $60.7 million (5.7 per cent) less than the $1071.5 million ($2019–20) we approved for the 2015–20 period
- the largest underspend in the 2015–20 period occurred in the meter replacement category, where JGN is expected to spend $80.2 million less than forecast ($2019–20, direct costs). JGN submitted that this occurred because of better than expected asset performance allowing deferral of replacement, prolonged life of some meters and improved operational performance[18]
- the largest overspend in the 2015–20 period occurred in the connections category, where JGN spent $144.3 million more than forecast ($2019–20, direct costs). JGN submitted that this was because of greater than forecast new dwelling construction and decreasing average connection costs per new dwelling. The decrease in average connections costs per new dwelling is partly due to relatively less expensive high rise connections making up a larger proportion of connections[19]
- the next largest overspend was capitalised overheads by $28.9 million ($2019–20). JGN has not provided any detail on what, or why this overspend occurred. We are seeking further information from JGN regarding this overspend (section 5.4.9).

Submissions raised concerns with the extent of JGN's current (2015–20) period underspend, and questioned the robustness of the forecasting methodology.[20] We have examined and assessed the methodology employed by JGN, particularly in forecasting demand, and our reasoning is set out in Attachment 12 – Demand.

[18] JGN, *2020-25 Access Arrangement Proposal Attachment 5.1 Capital expenditure*, June 2019, p. 18.

[19] Ibid, pp. 16–20.

[20] Origin, CCP19, AGL and ECA submissions on JGN's proposal.

Table 5.7 JGN capex performance against the allowance by category over the 2010–15 and 2015–20 access arrangement periods ($2019–20, million)

	2010–15		2015–20	
	Allowance	Actual	Allowance	Actual/Estimate
Connections	429.3	361.8	336.6	480.9
Metering	140.1	81.3	165.3	85.1
Facilities and pipes	87.3	58.9	107.1	63.8
Information technology	106.4	141.7	147.6	119.5
Augmentation	81.4	98.8	94.1	40.0
Mains replacement	22.6	16.4	64.5	27.3
Other	47.0	95.1	44.4	45.5
Capitalised network overheads [(a)]	36.5	109.8	128.1	79.8
Capitalised corporate overheads		20.2	6.3	83.5
TOTAL GROSS CAPEX	950.6	984.0	1093.8	1025.4
Customer Contributions	25.1	41.0	22.4	14.7
TOTAL NET CAPEX	**925.5**	**943.0**	**1071.5**	**1010.7**

Source: JGN, *Response to information request IR016*. Totals may not sum due to rounding.

Note: (a) For the 2010–15 period $36.5 million is the combined capitalised network and corporate overheads.

5.4.2 Connections

Distribution businesses have a regulatory obligation to make a connection offer to residential and commercial/industrial customers making applications to connect to its distribution network.[21]

Connections capex is usually forecast by categorising connections into Tariff V (residential customers, and small commercial and industrial (I&C) customers[22]) and

[21] NGR, r. 119S, for basic and standard connections and NGR, r. 119V, for negotiated connections.

[22] I&C customers are generally classified under Tariff V if they consume less than 10 TJ of gas per year.

Tariff D (large I&C customers[23]).[24] Residential customers can be disaggregated further into existing homes, new estates, and medium/high density (or multi-user) dwellings. [25]

Connections capex covers mains along streets, services to homes and businesses, and meters to measure gas consumption for new:

- low density dwellings (new homes)
- medium density and high-rise housing
- electricity to gas conversions
- commercial sites
- industrial and large commercial sites

We have included $363.9 million ($2019–20, direct costs) of connections capex in our alternative estimate. We consider that this amount is conforming capex that complies with rule 79(1) of the NGR. This is lower than JGN's forecast capex of $387.5 million. A reconciliation of our reduction of $23.7 million or 6.1 per cent to both JGN proposal and our allowance is shown in Table 5.8.

Table 5.8 Reconciliation of JGN's proposed connection capex to the AER's draft decision for the 2020–25 access arrangement period ($2019–20, millions, direct costs)

	2020–25
JGN Proposal	**387.5**
Less Unit rate reductions	19.6
Less Aerotropolis (a)	8.8
Less Inflation and labour escalator differences	1.0
Plus Boundary meter strategy adjustment	5.8
AER Allowance	**363.9**

Source: AER analysis. Totals may not sum due to rounding.

Note: (a) See section 5.4.6 for further information.

[23] I&C customers are generally classified under Tariff D if they consume more than 10 TJ of gas per year.

[24] For clarity, I&C volume customers equate to small business customers in the Demand forecast while large I&C demand customers equate to industrial customers in the Demand forecast.

[25] Connections to existing homes are sometimes referred to as 'electricity-to-gas' connections, whereby households replace electric appliances with gas equivalents and require connection to the gas distribution network.

We have assessed whether JGN's forecast connection volumes and unit rates are arrived at on a reasonable basis and represent the best forecasts possible in the circumstances as part of our assessment of conforming capex in this draft decision.

JGN's proposal

JGN's costs and the AER's allowance diverged in the 2015–20 access arrangement period. This was partly due to the unprecedented building boom in Sydney and the higher demand for connections than originally forecast (refer to Attachment 12 – Demand for further information). The difference is also due to unit rates in the AER's allowance (which JGN accepted) being set below costs.[26]

For the 2015–20 period, JGN's capex is expected to be $480.9 million ($2019–20, direct costs) against an allowance of $336.4 million.[27] This is an overspend of $144.3 million or 42.9 per cent of the allowance. Offsetting this capex are capital contributions of $9.4 million, against an allowance of $20.3 million, representing a 53.7 per cent under-collection.[28]

Unit rates for the 2015–20 period were driven by the market and were reviewed and accepted in our remade final decision (the 'remittal') for JGN, whilst volumes were driven by factors outside the control of JGN.

We accept a net capex of $471.5 million ($2019–20, direct costs), being $480.9 million, less $9.4 million capital contributions, as prudent and efficient expenditure.[29]

JGN's proposed forecast methodology is consistent with the 2015–20 remittal, which is based on a historical revealed cost approach, with consideration of current and ongoing contractor rates. For connection types, excluding I&C demand, connections capex is derived by multiplying the forecast unit rate for the connection type by the forecast volume of new connections. I&C demand is a simple average of historical costs.[30]

JGN proposed $387.5 million ($2019–20, direct costs), as shown in Table 5.9, in capex for new connections in the 2020–25 period. It includes new mains along streets, services to homes and businesses, and meters to measure how much gas is used.[31]

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[26] JGN, *2020-25 Access Arrangement Proposal Attachment 5.1 Capital expenditure*, June 2019, p. 17.

[27] JGN, *2020-25 Access Arrangement Proposal Attachment 5.1 Capital expenditure*, June 2019 and JGN, *Response to information request IR016*, 27 August 2019.

[28] JGN, *2020-25 Access Arrangement Proposal Attachment 5.1 Capital expenditure*, June 2019, p. 17.

[29] NGR, r. 79(1).

[30] JGN, *Connection and metering forecast methodology*, June 2019, pp. 7-8.

[31] JGN, *2020-25 Access Arrangement Proposal Attachment 5.1 Capital expenditure*, June 2019, p. 16.

Table 5.9 JGN's proposed connections capex for the 2020–25 access arrangement period ($2019–20, millions, direct cost)

	2020–21	2021–22	2022–23	2023–24	2024–25	Total
New homes	46.4	43.4	42.6	43.7	46.5	222.7
Commercial	6.0	6.0	6.0	6.0	6.0	30.1
Electricity to gas	16.6	16.6	16.6	16.6	16.6	83.1
Medium density / high-rise	8.0	7.1	7.0	7.2	7.5	36.9
I&C demand	2.9	2.9	2.9	2.9	2.9	14.6
Total	**80.0**	**76.2**	**75.2**	**76.5**	**79.7**	**387.5**

Source: AER analysis, based on JGN data. Totals may not sum due to rounding.

Our assessment

Over the past few years there has been sustained high demand for connections and, in particular, a significant increase in high-rise dwelling construction.[32, 33]

Table 5.10 Previous and current access arrangement period connections capex ($2019–20, millions, direct cost)

	2010–15		2015–20	
	Allowance	**Actual**	**Allowance**	**Actual/Estimate**
Connections	429.3	361.8	336.6	480.9

Source: JGN, *Response to information request IR016*.

We engaged Zincara to assist us in the technical aspects of our assessment of JGN's connections capex proposal. We have included $363.9 million ($2019–20, direct costs) of connections capex in our alternative estimate, which we consider conforming capex.[34] Table 5.11 shows the reconciliation of JGN's proposed capex to our allowance. Our reduction totals $19.6 million or 5 per cent.

[32] Zincara, *Access Arrangement 2019 JGN Capital Expenditure Review*, 7 November 2019, p. 31.

[33] Attachment 12 - Demand contains further detail on JGN's historical customer and connection numbers, forecast methodology and our assessment of the reasonableness of JGN's forecast connection numbers that flows into the capex forecast.

[34] NGR, r. 79(1).

Table 5.11 Zincara's recommended connections capex forecast ($2019–20, million, direct cost)

Market Segment	JGN's proposal	Zincara's recommended	Variance
New Homes	222.7	211.2	-11.6
Commercial (I&C Volume)	30.1	27.3	-2.8
Electricity to Gas	83.1	77.8	-5.3
Medium density and high-rise	36.9	36.9	-
I&C Demand	14.6	14.6	-
Total Connection Capex	**387.5**	**367.9**	**-19.6**

Source: AER and Zincara analysis. Totals may not sum due to rounding.
Zincara, *Access Arrangement 2019 JGN Capital Expenditure Review*, 1 October 2019, p.31.

Unit Rate Reductions

Zincara has reviewed the price adjusted unit rate process outlined in the connections forecast methodology document, and accept that it is reasonably described, with outcomes resulting in reduced prices across most of the unit rates where contracts have been implemented.[35] These adjusted unit rates only apply to the mains and services components of costs, meters are not impacted.

Zincara considers that some of JGN's average unit rates may have been distorted by particular historic rates and proposed some adjustments to historic unit rates where there are distortions in the historic data.[36] This will be discussed in the appropriate sections below.

The first stage of the volume forecast is to determine the length of mains and the number of services and meters per connection associated with each market segment.[37] (Refer to each section below for specific information).

New homes

New homes make up more than half of the connections capex. Over the forecast period, new home connections are expected to fall from 23,000 in 2017–18 to about

[35] Zincara, *Access Arrangement 2019 JGN Capital Expenditure Review*, 7 November 2019, p. 36.
[36] Ibid, p. 45.
[37] Ibid, p. 37.

18,000 per year. The bulk of new homes are in new estates where whole suburbs are reticulated at a time.[38]

JGN has used historic actuals over four years (2014–15 to 2017–18) in forecasting its proposed unit rates, volumes and adjusting for contractor prices.

Zincara recommends we accept JGN's unit rates for mains and services. Zincara have recommended an adjustment to meters.[39]

The data shows a reducing trend for the length of mains which is likely to be consistent with smaller frontages for new estate allotments. Zincara recommends the use of the most recent year's data for mains as it is likely to be more representative of the forecast period. Zincara accepts that services and meters appear to be consistent across the four year period.[40]

We accept Zincara's recommendation and our alternate forecast is $211.2 million ($2019–20, direct costs) conforming capex for our draft decision.[41]

Commercial (I&C volume)

The commercial market segment captures all non-residential volume market customers. These customers range from local restaurants up to large users, such as manufacturers or food processors. Commercial customers tend to be located in areas with higher restoration and traffic management costs.[42]

JGN has used historic actuals over four years (2014–15 to 2017–18) in forecasting its proposed unit rates, volumes and adjusting for contractor prices.

Zincara examined historic unit cost data for services and mains, and volume. Zincara made recommendations for revised unit costs.[43] We accept Zincara's recommendation and our alternate forecast is $27.3 million ($2019–20, direct costs) conforming capex for our draft decision.[44]

Electricity to gas

The electricity to gas market segment addresses connecting existing homes which do not already have a gas connection.[45]

JGN has used historic actuals over four years (2014–15 to 2017–18) in forecasting its proposed unit rates, volumes and adjusting for contractor prices. Zincara has made recommendations for unit rates.[46]

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38 JGN, *Connection and metering forecast methodology*, June 2019, p. 3.

39 Zincara, *Access Arrangement 2019 JGN Capital Expenditure Review*, 7 November 2019, p. 35.

40 Ibid, p. 37.

41 NGR, r. 79(1).

42 JGN, *Connection and metering forecast methodology*, June 2019, p.4.

43 Zincara, *Access Arrangement 2019 JGN Capital Expenditure Review*, 7 November 2019, p. 37.

44 NGR, r. 79(1).

45 JGN, *Connection and metering forecast methodology*, June 2019, p.4.

We accept Zincara's recommendation and our alternate forecast is $77.8 million ($2019–20, direct costs) conforming capex for our draft decision.[47]

Medium density and high-rise

This market segment covers all multiple dwelling connections, including townhouses, small walk-up unit blocks and large high-rise apartment complexes. Connections in this category had risen to almost 31,000 in 2017–18, and are forecast to fall back to just under 20,000 per annum for the 2020–25 period. The majority of these new high-rise apartments have been built along transport corridors and inner city areas.[48]

JGN's proposal assumed it would cease offering individual metering for complexes with communal hot water systems from 1 July 2020. (Refer volume boundary metering below in this section for further discussion).

To account for the change, JGN made two changes to its forecasting method:

- calculate meter costs on a market sub-segment level (medium density, high-rise with individual meters and high-rise with volume boundary meters) rather than for the segment as a whole
- calculate mains and services on a per site basis, rather than per connection.

Zincara considers JGN's methodology for this segment to be reasonable and that the resulting forecast of $36.9 million ($2019–20, direct costs) is prudent and efficient.[49]

I&C demand

Relative to the volume market segment, the volume of I&C demand connections is significantly lower, and the variability in connection costs is higher.[50] JGN applied a simple average of historical costs to develop the 2020–25 forecast.[51]

Zincara accepted JGN's annual connection capex forecast of $14.6 million ($2019–20, direct costs) as being reasonable. We accept Zincara's analysis.[52]

Aerotropolis

In section 5.4.6, we discuss JGN's proposed Aerotropolis augmentation project and our analysis thereof. Consistent with our augmentation decision, we have reduced connections by $8.8 million ($2019–20, direct costs). Table 5.12 provides a breakdown of the components of the reduction.

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46 Zincara, *Access Arrangement 2019 JGN Capital Expenditure Review*, 7 November 2019, p. 37.

47 NGR, r. 79(1).

48 JGN, *Connection and metering forecast methodology*, June 2019, p. 3.

49 Zincara, *Access Arrangement 2019 JGN Capital Expenditure Review*, 7 November 2019, pp. 41 and 44.

50 JGN, *Connection and metering forecast methodology*, June 2019, p .23.

51 Ibid, p. 8.

52 Zincara, *Access Arrangement 2019 JGN Capital Expenditure Review*, 7 November 2019, p. 45.

Table 5.12 Connections reductions due to Aerotropolis ($2019–20, million, direct cost)

	Core Precinct	Science Park	Western Sydney Airport	Variance
Residential	3.7	3.2	-	6.9
Commercial	0.4	0.8	0.1	1.3
Demand	-	-	0.6	0.6
TOTAL	**4.1**	**4.0**	**0.8**	**8.8**

Source: AER analysis. Totals may not sum due to rounding.

Volume boundary metering

For its 2020–25 access arrangement, JGN proposes to no longer offer individual metering in new high-rise buildings with centralised hot water services. JGN currently has a boundary metering product which allows developers the choice of a single boundary meter for a new development. The proposal removes the option to have either individual metering or a boundary meter.

As discussed in Attachment 1 – Services covered by the access arrangement, we do not accept JGN's volume boundary strategy for the 2020–25 access arrangement. This will require additional capex than included in the proposal, hence $5.8 million ($2019–20, direct costs) is to be added to capex.

Table 5.13 Volume boundary metering scenarios ($million, direct cost)

Scenario		Savings
JGN Proposal	$2019–20	56.0
JGN Revised number	$2017–18	36.5
AER Calculation	$2019–20	5.8

Source: AER analysis.

JGN's proposal stated:

> 'The introduction of our boundary metering product in 2015 and the removal of hot water metering for new high-rise buildings from 1 July 2020 has resulted in a forecast cost reduction of $56m ($2020, direct costs) over the 2020–25 period.'[53]

[53] JGN, *2020–25 Access Arrangement proposal Attachment 5.1 Capital expenditure*, June 2019, p. 17.

In response to an information request, JGN advised that there had been an error in the calculation and it should have reported a cost reduction of $37 million ($2017–18).[54]

We do not accept the amount of $37 million as an appropriate cost reduction, as JGN has assumed in its base modelling that there was no existing boundary metering product. We have developed a number of scenarios using the JGN connections capex model. The scenario upon which our draft decision is based accepts JGN's forecast uptake in the 2015-20 period, and then holds annual uptake constant at 65 per cent for high-rise buildings opting for volume boundary metering for the 2020–25 period.

Our draft decision is to provide an additional $5.8m ($2019–20, direct costs) of prudent and efficient capex for JGN to continue to offer individual metering in new high-rise buildings with centralised hot water services.[55]

Contributions

Our review of the capital contributions forecast of $10.0 million ($2019–20) (as shown in Table 5.14) is consistent with historic trends in capital contributions. Accordingly, we accept the proposed contributions of $10.0 million ($2019–20) in our draft decision. We note that total capital contributions also comprised of larger contributions based on forecast augmentation capex (section 5.4.6).

Table 5.14 Current and next access arrangement period capital contributions for connections ($2019–20, million)

Connections	2015–20		2020–25
	Allowance	Actual/Estimate	Forecast
Contributions (Non-project specific)	20.3	9.4	10.0
Contributions (Project specific)[(a)]	2.1	5.3	2.9
Total Contributions	22.4	14.7	12.9

Source: JGN, *2020–25 Access Arrangement proposal Attachment 5.1 Capital expenditure*, June 2019, p. 17. AER analysis. Totals may not sum due to rounding.

Note: (a) See section 5.4.6 for further information.

5.4.3 Meter replacement

Meter replacement is an ongoing capex activity that covers all metering types that require replacement either as part of a planned program or when found to be defective.

54 JGN, *Response to information request IR005*, 14 August 2019.

55 NGR, r. 79(2)(b).

JGN has regulatory obligations to manage the integrity of meters and ensure they operate within the prescribed tolerance band for metering accuracy.[56]

Table 5.15 shows JGN's proposed meter replacement capex for both the 2015–20 and 2020–25 periods.

Table 5.15 Metering allowance, actual and forecast expenditure 2010–15 to 2020–25 access arrangement periods ($2019–20, million, direct cost)

	Allowance 2010–15	Actual 2010–15	Allowance 2015–20	Actual 2015–20	JGN forecast 2020–25	AER draft decision
Metering	140.1	81.3	165.3	85.1	118.0	105.7

Source: JGN, *Response to information request IR016.*

JGN is forecasting metering expenditure of $118.0 million ($2019–20, direct cost) over the 2020–25 period. In each of the previous and current periods (2010–15 and 2015–20, respectively), actual expenditure has consistently been well below the allowance. For example, the allowance in 2015–20 was $165.3 million ($2019–20, direct cost), while actual expenditure was $85.1 million, or $80.2 million below the allowance. It is JGN's largest capex underspend in the 2015–20 period. The allowance has also been consistently underspent in previous access arrangement periods.

Based on all the information before us, we are not satisfied JGN's capex forecast of $118.0 million ($2019–20, direct cost) for meter replacement is conforming capex.[57] We have included $105.7 million of meter replacement expenditure in our alternative capex forecast. Our alternative forecast principally adjusts unit rates, and provides for a meter family life extension.

We consider other aspects of JGNs proposal are justified on the grounds of being necessary to maintain the integrity of services. We have accepted:

- JGN's forecast expenditure on Metreteks (communication devices enabling remote reading of consumption for larger customers)
- other metering devices (dew point analysers)
- JGN says that it has the capability to ramp up and down the contractors and suppliers needed to meet its meter replacement projections.

Our assessment of these projects is set out below.

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[56] JGN, *2020–25 Access Arrangement Proposal Attachment 5.1 Capital expenditure*, June 2019, p. 18.

[57] NGR, r. 79.

JGN's proposal

JGN states that the aim of its metering program is to maintain the performance of its fleet of gas meters to ensure it:

- replaces meters prior to failure to avoid estimating bills and to minimise the impact on customers
- meets obligations to provide at least two actual meter reads every 12 months
- accurately bills customers to ensure network and gas usage charges are fair.[58]

JGN states that its underspend in this (2015–20) period is explained by: the deferral of replacements of residential and hot water meters, prolonged life of meter data loggers, improved operational performance, and identified synergies that lower costs.[59] JGN also states the forecast capex builds on the efficiencies identified in the current period.

Meter categories, and current and forecast expenditure is set out in Table 5.16.

Table 5.16 Meter replacement capex ($2019–20, million, direct cost)

	Allowance 2015–20	Actuals/estimate 2015–20	JGN's forecast 2020–25
Residential gas meters	44.5	36.2	55.9
Residential hot water meters	45.7	17.6	22.9
Meter data loggers	26.6	5.4	6.9
I&C meters	33.8	21.8	28.8
Metreteks	3.0	2.9	1.7
Testing	9.2	1.0	1.6
Other	2.6	0.2	0.1
Total	**165.3**	**85.1**	**118.0**

Source: JGN, *2020–25 Access Arrangement Proposal Attachment 5.1 Capital expenditure*, June 2019, p. 19.

[58] JGN, *2020–25 Access Arrangement Proposal Attachment 5.1 Capital expenditure*, June 2019, p. 18.

[59] Ibid.

Our assessment

Our assessment was informed by analysis of metering by our consultant, Zincara, and our own review of the proposal. Detailed analysis for each metering category can be found in the Zincara report, while in this section we have focused only on our alternative forecasts for the metering replacement program.

Residential gas meters

Residential meters are tested in accordance with Australian Standards to identify the accuracy and leak tightness of meters. This involves statistical sample testing of meter families.

Zincara has reviewed the historical performance of each meter family and based on its performance, and that of similar families, determined the likelihood of whether each family has to be removed when it reaches a life of 25 years, or whether it can extend past the 25 year life. Given that a large number of meters are reaching their 25 years field life during 2020–25 period, the program is substantial. Zincara's analysis is that a number of meter families can be extended past the 25 year life which will result in a reduced meter replacement program.

JGN's program includes replacing all meters reaching 30 years during 2020-25. Given limited information to justify extending the life of these meters past 30 years, we ask that statistical sample testing be undertaken by JGN to determine whether any families pass so that their life can be extended.

The result of Zincara's analysis is a reduced planned meter replacement program of 226,250 meters compared with JGNs program of 281,718 meters. A net reduction of 55,468 meters. Our assessment is that the unit rate is reasonable.

Applying this assessment our replacement capex proposal is $47.5 million ($2019–20, direct cost) compared with JGN's plan of $55.9 million, a reduction of $8.4 million. Other capex in this category is considered prudent and efficient.

Residential hot water meters

Hot water meters are generally installed together with a meter data logger to record consumption of each dwelling at a central location. As a result, most hot water meters are powered by a battery to enable communication between the meter and the data logger, with the battery being a limiting factor in terms of field life of the meter (hence statistical sampling is not used). JGN deferred a large volume of meters in the current (2015–20) period.

Zincara notes that JGN's forecast replacement unit costs are made up of planned and defective meters. The planned replacement forecasts are reasonable. The defective meter forecast is based on a historical average yearly spend. Zincara recommends the removal of outliers as they distort the average. Removing the outliers results in a lower average unit cost.

Applying this lower average, our replacement capex proposal for residential hot water meters is $20.3 million ($2019–20, direct cost) compared with JGN's plan of $22.9

million, a reduction of $2.6 million. Other capex in this category is considered prudent and efficient.

Meter data loggers

Meter data loggers record consumption from each hot water meter in a high-rise building then communicate consumption back to a central server.

For the defective meter data loggers replacement program, JGN uses historical expenditure. Zincara recommends the removal of outliers and this results in a lower average.

Applying this lower average, our replacement capex proposal for meter data loggers is $6.5 million ($2019–20, direct cost) compared with JGN's plan of $6.9 million, a reduction of $0.4 million. Other capex in this category is considered prudent and efficient.

Industrial and commercial meters

JGN's response to an information request corrected an error in its initial model with respect to the unit rate for statistical sampling of I&C meters.[60]

Applying JGN's lower average unit rate, our replacement capex proposal for I&C meters is $28.0 million ($2019–20, direct cost) compared with JGN's proposed expenditure of $28.8 million, a reduction of $0.8 million. Other capex in this category is considered prudent and efficient.

Meterteks, Testing and Other metering

Based on advice from our consultant, Zincara, we accept expenditure in these categories as prudent and efficient. There is a small reduction in testing capex of $0.1 million ($2019–20, direct cost) as a result of a reduction in the total replacement volume.

Overall

Our revised forecasts for meter replacement are consolidated in Table 5.17.

[60] JGN, *Response to information request IR016*, 27 August 2019.

Table 5.17 Meter replacement capex for the 2020–25 access arrangement period, JGN's forecast and AER's draft decision ($2019–20, million, direct cost)

	JGN's forecast 2020–25	AER's draft decision 2020–25	Variance
Residential gas meters	55.9	47.5	-8.4
Residential hot water meters	22.9	20.3	-2.6
Meter data loggers	6.9	6.5	-0.4
I&C meters	28.8	28.0	-0.8
Metreteks	1.7	1.7	-
Testing	1.6	1.5	-0.1
Other	0.1	0.1	-
Total	**118.0**	**105.7**	**-12.3**

Source: AER analysis. Totals may not sum due to rounding.

5.4.4 Facilities and pipes

Facilities and pipes relates to capex for high pressure pipelines and facilities. Expenditure in this category is primarily focussed on maintaining the safety of JGN's aging assets.

On the basis of advice provided by Zincara, we are satisfied that projects in this category are justified.[61, 62] This is because the capex is required to maintain safety, reliability, to meet minimum pressure obligations, and to be able to meet existing levels of demand. JGN also note that the expenditure will help reduce costs where cheaper inspection methodologies are used.

We have included $63.2 million ($2019–20, direct cost) of facilities and pipes expenditure in our alternative capex estimate. We are not satisfied that JGN's proposed amount of $72.2 is prudent and efficient as we are not satisfied that sufficient justification has been provided for eight projects (out of approximately 80 projects assessed).[63]

61 Zincara, *Access Arrangement 2019 JGN Capital Expenditure Review*, 7 November 2019, p. 70.

62 NGR, r. 79(2)(c)(i)–(iv).

63 NGR, r. 79(1).

JGN's proposal

JGN proposed facilities renewal and upgrade capex of $72.2 million ($2019–20, direct cost) for the 2020–25 access arrangement period. This is approximately nine per cent of JGN's proposed total capex forecast. It represents a 13 per cent increase in expenditure compared with actual expenditure in the 2015–20 period. JGN's actual expenditure of $63.8 million is $43.3 million below the 2015–20 allowance of $107.1 million.

Table 5.18 Facilities and pipe replacement capex ($2019–20, million)

Project Categories	Allowance 2015–20	Actual/estimate 2015–20	JGN's forecast 2020–25
Facilities country upgrade	14.2	0.0	-
Facilities safety upgrades	28.4	20.4	17.5
Facilities capacity upgrades	2.7	9.1	0.5
Sydney Primary Mains risk reduction	14.2	10.5	28.2
Pigging, validation & integrity digs	26.7	11.7	-
Shallow secondary mains	-	1.2	16.1
Secondary district regulator replacement	12.5	5.1	3.0
Other minor works	8.8	5.9	6.6
Total	**107.1**	**63.8**	**72.2**

Source: JGN, *2020–25 Access Arrangement proposal Attachment 5.1 Capital expenditure*, June 2019, Table 3-12.

Our assessment

We assessed JGN's facilities and pipes projects by considering the requirement for the proposed works, the scope and timing of the proposed works, and whether the input cost of each project represents the efficient, lowest sustainable cost. Based on the advice we received from Zincara, we accept that 72 of the approximately 80 projects,

costing $63.2 million ($2019–20, direct cost) are prudent and efficient.[64] These projects are summarised in aggregate categories in Table 5.19.

Although we can reconcile the total expenditure for facilities and pipes using other JGN sources, our consultant, Zincara, had difficulty allocating the projects and programs to the same categories shown in Table 5.18 in its assessment. For the purposes of this draft decision, we will use the same categorisation as Zincara and seek further information from JGN following publication of this draft decision.

Table 5.19 Facilities and pipes capex included in AER's alternative capex estimate ($2019–20, millions, direct cost)

Project categories	JGN's proposal 2020–25	JGN's proposal Alternate format	AER's draft decision	Variance
Facilities safety upgrade	17.5	17.2	12.3	-4.9
Facilities capacity upgrade	0.5	0.0	0.0	0.0
Sydney primary mains risk reduction	28.2	28.5	28.4	-0.1
Shallow secondary mains	16.1	16.1	16.0	0.0
Secondary district regulator replacement	3.0	3.9	3.2	-0.7
Other minor works	6.6	6.5	3.2	-3.3
Total	**72.2**	**72.2**	**63.2**	**9.0**

Source: Zincara and AER analysis. Totals may not sum due to rounding.

Based on advice from Zincara, we are not satisfied that 8 programs, costing $9 million ($2019–20, direct cost), are prudent and efficient. These projects are summarised in Table 5.20.

We will reconsider these projects if JGN provides information on them as part of its revised proposal.

[64] Zincara, *Access Arrangement 2019 JGN Capital Expenditure Review*, 7 November 2019, p. 86.

Table 5.20 Facilities and pipes capex not included in the AER's alternative capex estimate ($2019–20, million)

Facilities and pipes sub category	Project and program name	Total
Facilities and safety upgrade	Minor capital TRS	1.1
	Minor capital SRS	2.1
	Appin POTS upgrade Stage 2	0.5
	Installation of secondary isolation valve	1.1
Secondary district regulator replacement	Minor capital: PRS	0.6
Other minor works	Minor capital pipe works	1.3
	Minor capital washaway works	1.6
	Path valves - low medium and secondary pressure	0.4
Escalation differences	Labour and inflation	0.3
	Total	**9.0**

Source: Zincara and AER analysis. Totals may not sum due to rounding.

Facilities and safety upgrade

Our analysis and that of our consultant has found that for each of the projects under this category further detail is required to justify that the proposed capex is reasonable, and consistent with the rationale given. [65]

Secondary district regulator replacement

For one of the projects no justification has been provided, and how the proposed estimated capex was derived.

Other minor works

Zincara has questioned why certain projects should not be opex, and noted the lack of information to justify the expenditure.[66] For another project in this category we have adjusted the unit costs based on historical actuals resulting in lower forecast expenditure.

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[65] Ibid, pp. 65–70.

[66] Ibid, p. 83.

Other facilities and pipes

Sydney primary mains risk reduction

The Sydney primary mains risk mitigation strategy is made up of 10 projects in both the facilities and pipes and augmentation categories.

Based on our findings, and advice from Zincara, we accept JGN's proposed Sydney primary mains risk mitigation strategy for a total of $52.9 million ($2019–20, direct cost) which is comprised of $28.4 million under facilities and pipes, and $24.5 million under augmentation (section 5.4.6) given they are directly related from a driver and planning perspective.

Shallow secondary mains

JGN engaged an independent consultant (GPA Engineering) to carry out an 'as low as reasonably practicable' or ALARP study and has submitted their report and analysis as part of its proposal.

GPA analysis has shown that JGN's proposed capex of $16 million ($2019–20, direct cost) is within the maximum justifiable range of $6.6 million to $20.8 million.

Although JGN's proposed capex sits on the high end of the maximum justifiable range, and contains work outside of the Sydney CBD where these risks are less prevalent, we are satisfied that the overall proposed capex is within an acceptable order of magnitude and that further delays or deferrals are not in the long term interests of consumers due to public safety concerns.

5.4.5 Information technology

We have included $73.3 million ($2019–20, direct cost) for information technology (IT) capex in our alternative capex estimate for the 2020–25 access arrangement period. This is 31.6 per cent less than JGN's proposed forecast expenditure of $107.2 million for its IT capex program.

JGN has not provided us with sufficient justification for its project expenditure given the size of the IT program. Information briefs and responses to request need to provide more detail. In response to information requests, we received four net present value analyses relating to metering systems and customer experience projects.[67] JGN has not provided any other cost benefit or net present value (NPV) analysis for its IT expenditure.

In reviewing IT capex, we undertook a bottom up analysis, followed by a top down review using historical Regulatory Information Notice (RIN) data. JGN has split its capex into recurrent and non-recurrent expenditures (Table 5.22). This allocation seems broadly consistent with our consultation paper on IT assessment. We note a

[67] JGN, *Response to Information Request 029*, 19 September 2019.

number of projects have been allocated to the recurrent category, which are contingent upon non-recurrent projects being undertaken.

JGN's proposal

Table 5.21 Prior and current access arrangement period Capex — allowance and actual/estimate ($2019–20, million, direct cost)

	2010–15		2015–20	
	Allowance	**Actual**	**Allowance**	**Actual/Estimate**
Information technology	106.4	141.7	147.6	119.5

Source: JGN, *Response to information request IR016*.

JGN estimates it will underspend the 2015–20 IT allowance by $28.1 million ($2019–20, direct cost) or 19.0 per cent.[68] JGN delivered planned projects for:

- geospatial information systems (GIS)
- field workforce mobility
- corporate systems
- Supervisory Control And Data Acquisition (SCADA) and real-time systems
- IT infrastructure and end user services
- cyber-security
- technology network management and capability
- business reporting and analytics
- regulatory driven changes

JGN planned but did not deliver projects for metering and customer systems.

JGN's proposed IT expenditure of $107.2 million ($2019–20, direct cost) was classified as either recurrent $79.5 million or non-recurrent $27.7 million (revised to $67.4 million and $39.8 million, respectively), as shown in Table 5.22.

[68] JGN, *2020–25 Access Arrangement Proposal Attachment 5.4 Information Technology Plan*, June 2019, p. 32.

Table 5.22 JGN's forecast of 2020–25 IT Capex – Recurrent and non-recurrent ($2019–20, million, direct cost)

Category	Recurrent	Non-recurrent	Total
Asset management & GIS	7.4	2.1	9.5
Corporate systems/SAP ERP	12.9	7.4	20.3
Customer experience	1.2	5.7	6.7
Cyber-security	7.6	2.7	10.3
Enabling platforms & networking	20.9	0.3	21.3
End user services & support	11.7	-	11.7
Market interactions & regulatory compliance	-	9.3	9.3
Metering	16.4	-	16.4
Real time systems/SCADA	1.4	0.2	1.6
Proposed total capex	**79.5**	**27.7**	**107.2**
Adjustment - metering[69]	(12.1)	12.1	-
Adjusted proposed capex	**67.4**	**39.8**	**107.2**

Source: AER analysis. Totals may not sum due to rounding.

JGN's non-recurrent expenditure is comprised of six projects:

- GIS improvements, $2.1 million ($2019–20, direct costs)
- Migration to SAP S4/HANA and cloud environment, $7.4 million ($2019–20, direct costs)
- Improved customer experience, $5.7 million ($2019–20, direct costs)
- Metering systems, $12.1 million ($2019–20, direct costs)
- Cyber-security, $2.7 million ($2019–20, direct costs)
- Replace the Short Term Trading Market (STTM) system, $9.3 million ($2019–20, direct costs)

Our assessment

We approve conforming capex of $40.6 million ($2019–20, direct cost) in the 2014–15 year and $86.8 million ($2019–20, direct cost) for the 2015–16 to 2017–18 years.[70] We

[69] JGN, *Response to Information Request 029*, 19 September 2019, p. 7.

will assess 2018–19 actual data as part of the final decision, and 2019–20 as part of the next (2025–30) access arrangement.

Our top-down review excluded Corporate Systems and GIS due to significant programs in these areas over the current (2015–20) period.

Despite JGN's assertion that the '…2020 Plan only includes investments which generate enough customer benefits by 2050 to exceed costs', it provided no evidence in support of its proposed expenditure on information technology.[71]

JGN provided an analysis which shows expenditure related to maintenance of $101.4 million ($2019–20, direct cost), and customer driven expenditure of $5.8 million ($2019–20, direct cost). However, there is no proposed value in terms of customer benefits or consequences.[72, 73]

JGN forecast only the current and part of the next calendar year in detail, and high level projections for the next two years. JGN develop long term IT forecasts for subsequent years using an IT Project Estimation tool.[74] From this, we conclude all IT capex included in JGN's proposal was developed using its estimation tool.

The estimation tool uses three inputs to estimate capex for a project: size, timeframe and complexity.[75] Calibration of the estimation tool was undertaken, using 44 projects.[76]

> 'The process depends upon the fact that this is long-term forecasting for a program of work. Projects may be expected to have unders and overs but these cancel each other out in a larger program of work when they are totalled.'[77]

We have no issue with the overall methodology of the IT Project Estimation Tool in developing the costs of proposed projects. However this tool does not, nor should it, provide justification for the proposed capex.[78]

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70 NGR, r. 79.

71 JGN, *2020–25 Access Arrangement Proposal Attachment 5.1 Capital expenditure*, June 2019, p. 15.

72 Ibid*, p. 33, Table 3-20.*

73 CCP, *Submission on the JGN AA 2020–25 proposal*, August 2019.
CCP19 noted that IT is a category that JGN materially underspent its allowance in the current regulatory period. Further, IT expenses of network businesses are hard to assess as to their reasonableness and their benefit to the long term interests of consumers. However, they are significant, representing more than 10% of JGN's proposed capex. CCP19 stated that IT expenditure is an area of ongoing concern for the CCP.
AGL, *Submission on JGN 2020–25 AA proposal,* August 2019.
AGL also expressed concerns regarding IT.

74 JGN, *IT Capex Forecasting Usage and Governance Guide*, June 2019, p. 6 and JGN, *2020–25 Access Arrangement Proposal Attachment 5.4 Information Technology Plan*, June 2019, p. 42.

75 JGN, *IT Capex Forecasting Usage and Governance Guide*, June 2019, p. 9.

76 Ibid, p. B-1.

77 Ibid, p. B-3.

78 NGR, r. 79(1)(b).

JGN asserts that it is not practical to perform full business cases for projects beyond 12–24 months.[79] JGN needs to provide analysis demonstrating IT projects are prudent, efficient and justifiable.[80] The investment briefs provided as part of JGN's proposal do not support the conclusion that the projects are prudent and efficient.[81]

JGN states its IT Governance model provides a framework of accountabilities, processes, and auditable and measureable controls to ensure all investment decisions are prudent, efficient and in the long-term best interests of customers.[82]

It is understood that there will be greater forecast error factors for projects into the future, but this risk is likely similar or proportional between alternatives if the same estimation tool is used. As such, a prudent and efficient analysis would provide costings for all options using this estimation tool. It is not clear how the investment briefs are consistent with JGN's governance model, or meet the new capital expenditure criteria.[83]

JGN's Information Technology Plan has not provided any clarity on how JGN have assessed IT projects as prudent and efficient, and justified the recommended options in its investment briefs.[84,85]

The investment briefs are not sufficient to justify projects as conforming capex:[86]

- they do not contain an indicative value for a 'do nothing' scenario
- they do not provide a cost of alternative options, only the preferred option
- we expect any prudent business, even when faced with future uncertainty, to carry out investment analysis.[87]

Table 5.23 shows the amounts we have accepted and not accepted in this draft decision.

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79 JGN, *IT Capex Forecasting Usage and Governance Guide*, June 2019, p. 8 and JGN, *2020–25 Access Arrangement Proposal Attachment 5.4 Information Technology Plan*, June 2019, p. 46.

80 NGR, r. 79(1).

81 JGN, *2020–25 Access Arrangement Proposal Attachment 5.4 Information Technology Plan*, June 2019, p. 46.

82 Ibid, p. 49.

83 NGR, r. 79.

84 JGN, *2020–25 Access Arrangement Proposal Attachment 5.4 Information Technology Plan*, June 2019.

85 NGR, r. 79(1).

86 NGR, r. 79(1).

87 JGN's Investment Framework, provided in response to an information request, is clear that the expected analysis is undertaken as part of the development of a business case. However, JGN has not prepared business cases for the projects included in the 2020-25 proposal.

Table 5.23 Proposed IT capex ($2019–20, million, direct cost)

Category	Accepted	Not Accepted	Total
Asset Management & GIS	3.9	5.7	9.5
Corporate Systems/SAP ERP	7.7	12.6	20.3
Customer Experience	0.8	6.1	6.9
Cyber-Security	10.3	-	10.3
Enabling Platforms & Networking	20.5	0.7	21.3
End User Services & Support	11.7	-	11.7
Market Interactions & Regulatory Compliance	9.3	-	9.3
Metering	8.5	7.8	16.4
Real Time Systems/SCADA	1.6	-	1.6
Labour and Inflation adjustments	**-1.0**	**1.0**	**-**
Total Capex	**73.3**	**33.9**	**107.2**

Source: AER analysis. Totals may not sum due to rounding.

Table 5.24 IT capex profile over time ($2019–20, million, direct cost)

	2010–15 Actual	2015–20 Act/Est	2020–25 Proposed	2020–25 Accepted
Total Capital Expenditure	142.8	119.5	107.2	74.3
Less Corporate Systems/SAP ERP	81.3	50.5	20.3	7.7
Less Asset Management & GIS	1.8	13.6	9.5	3.9
Underlying capex trend	**59.7**	**55.4**	**77.4**	**62.7**

Source: AER analysis. Totals may not sum due to rounding.

In the current and previous periods, JGN spent significant amounts in relation to its corporate systems which largely related to replacing GASS+ functionality, SAP upgrades, and implementing a GIS. Given these recent investments in both SAP and GIS, we are not convinced it is prudent to invest further in these systems prior to them being bedded down in JGN. We will comment further on this below.

Table 5.24 demonstrates our allowed capex for the 2020–25 period of $62.7 million ($2019–20, direct cost) is consistent with the current period underlying expenditure of $55.4 million.

> 'IT … expenditure is generally necessary to maintain the safety (Rule 79(2)(c)(1)) and integrity (Rule 79(2)(c)(ii)) of our network by ensuring that we retain the capability to efficiently operate our network, respond to network incidents and manage the rising risk of cyberattacks.'[88]

Rule 79(2)(c) of the NGR can be used to justify significant expenditure on IT. JGN has not demonstrated that the proposed expenditure is justified. Under this rule, we have accepted expenditures on cyber-security and the STTM system. The following discussion sets out our assessment of these projects.

Asset Management & Geospatial Systems

JGN's proposal for the 2020–25 period included $9.5 million ($2019–20, direct cost) for asset management and GIS.

Asset management and GIS were subject to significant investment and replacement in the 2015–20 period ($13.6 million, $2019–20, direct cost). It is the opinion of Zincara that in the 2020–25 period, these systems should be stable and be embedded in the business before the next wave of investment.

JGN's investment brief for $5.7 million ($2019–20, direct cost) described the preferred option as 'leverage the existing investment in GIS technology and improve the data quality and visibility of assets without any major system change.'[89] No tangible benefits have been identified for this project, nor has a NPV analysis been provided to support the prudent investment in this expenditure. It appears that there is some dependency of this project on the SAP expenditure.

We have not allowed non-recurrent enhancement expenditure of $5.7 million ($2019–20, direct cost) in relation to system enhancements in the 2020–25 period. JGN has not adequately demonstrated how the enhancements will contribute to maintaining safety, nor how the expenditure is prudent.

The preferred option in JGN's investment brief for $3.9 million ($2019–20, direct cost) is to upgrade to the 'most recent supported version' of the software.[90] We appreciate the benefits of maintaining systems inside the vendor support umbrella, but pending any support for the requirement for the most recent supported version, we question the magnitude of the proposed expenditure. We have allowed $3.9 million ($2019–20, direct cost) as a placeholder to support existing systems in this draft decision.

Corporate systems/SAP ERP

JGN's proposal included $20.3 million ($2019–20, direct cost) in relation to enterprise systems. Approximately $9.5 million related to systems maintenance, lifecycle patches, support and upgrades, whilst $10.8 million 'establishes a new platform to perform high-

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88 JGN, *2020–25 Access Arrangement Proposal Attachment 5.1 Capital expenditure*, June 2019, p. 49.

89 JGN, *Technology Plan Investment Brief Asset & GIS Systems – Enhancement*, April 2019.

90 JGN, *Technology Plan Investment Brief Asset & GIS Systems – Lifecycle*, April 2019.

level finance, procurement, human capital and perhaps other simple functions as a precursor to performing the full migration in the following regulatory period'.[91]

We have allowed $7.7 million ($2019–20, direct cost) relating to the maintenance of current system capabilities. We found that some of the proposed lifecycle costs relate to SAP S/4 HANA and have excluded these items.

JGN proposed upgrading 'some functions (HR, Procurement, & Finance) to the new SAP S/4 HANA ERP before 2025' as phase 1 of a migration of its enterprise resource planning software (SAP) to the newer version, at an estimated cost of $12.6 million ($2019–20, direct cost).[92] This responds to SAP's 2015 announcement that it will cease support for the version JGN currently uses after 2025.[93]

JGN has not adequately considered reasonable responses to the loss of vendor support deadline that may be available at lower cost. We are aware that third party providers offer to maintain support for older versions of SAP (e.g. security patching, responses to taxation changes) at reduced fees and beyond SAP's December 2025 deadline. Other organisations also with significant security requirements (e.g. networks, government agencies) have adopted third party support.[94]

JGN's business case does not consider this option. When asked, JGN stated it had ruled out third party support due to:

> '…perceived savings are not sufficient to offset the reduced benefits and increased risks. Third–party support works not by developing new versions of the software or as patches but by customising the existing code to produce workarounds to bugs and for new functionality. This will make the eventual migration even more difficult. Moreover, adopting third-party support now would be premature as it could close off potential future options. If Jemena were to stop paying for support from SAP and decided at a future date that the SAP roadmap still needed to be followed then SAP would require Jemena to repay all the back-maintenance and repurchase the licences again.'[95]

Regarding the possible eventual cost of returning to vendor support, SAP could extend the deadline it issued in 2015, and the option of third party support considerably reduces the risk of waiting to see if this occurs.[96] Delaying the upgrade also delays the significant business change risks it involves.[97]

However, other organisations use third party support, and JGN has not discussed whether and how its operations differ sufficiently such that the risks of third party

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91 JGN, *Technology Plan Investment Brief Enterprise Systems – ERP Migration*, April 2019.

92 JGN, *Response to information request IR029*, p.17, 16 September 2019.

93 JGN, *Technology Plan Investment Brief Enterprise Systems – ERP Migration*, April 2019.

94 The Australian, Rimini Street Signs 10 Agencies, 28 January 2019, see: https://www.theaustralian.com.au/business/technology/rimini-street-signs-10-agencies/newsstory/18358cf52a20027dfd1c80b9d951103e.

95 JGN, *Response to information request IR029*, p. 17, 16 September 2019.

96 AER, *Draft Decision SA Power Networks Distribution Determination 2020 to 2025 Attachment 5 Capital Expenditure,* October 2019, pp. 70–72.

97 Ibid.

support rule it out as a reasonable alternative. JGN has not considered that it may maintain its SAP support until SAP withdraw these services, and then switch to a third-party support provider. Alternatively if JGN were to commit to migrating to SAP S/4 HANA, or similar, in the 2025–30 access arrangement, SAP may extend support to its existing version during their upgrade period. Support is not due to expire until the start of the 2025–30 period.

JGN has not established that upgrading is lower cost than third party support, or that third party support is not feasible to maintain service standards, hence we cannot conclude that this is conforming capex. Our position is consistent with our draft decision for SA Power Networks, where we did not include the upgrade to SAP S/4 HANA ($12.6 million, $2019–20, direct cost) in our substitute estimate.[98]

In its revised proposal, we encourage JGN to provide a robust cost benefit analysis for the upgrade to SAP S/4 HANA and migration to a cloud environment (and viable alternatives such as Oracle and Microsoft systems), and to further investigate third party support as a possible bridge between the end of SAP support for the current version and possible future dates for the upgrade and migration.

Customer experience

JGN proposed $6.9 million ($2019–20, direct cost) capex for customer experience related systems 'to meet customer needs, by providing a seamless, personalised, customer focused digital experience to enable customers to self-serve, manage their energy needs and interact with us through mechanisms of their own choice'.[99]

JGN envisages better customer engagement through the web, mobile or even conversational interfaces such as Amazon Alexa, iOS Siri or Microsoft Cortana.[100] The investment brief rejects the option to manage the existing customer portal as it 'does not deliver any improvement on today's capability'.[101]

Examples of the digital solutions customers are seeking, according to JGN, include:

- finding out about progress on connections and build work
- learning about interruptions to supply
- gaining better access to meter data to understand energy usage patterns
- providing usage and billing information to identify better pricing structures
- the ability to opt-in and out of notifications easily through mobile apps.[102]

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98 Ibid.

99 JGN, *Technology Plan Investment Brief Customer Experience*, April 2019 and JGN, *2020–25 Access Arrangement Proposal Attachment 5.4 Information Technology Plan*, June 2019, p. 45.

100 JGN, *2020–25 Access Arrangement Proposal Attachment 5.4 Information Technology Plan*, June 2019, p. 16.

101 JGN, *Technology Plan Investment Brief Customer Experience*, April 2019.

102 JGN, *Technology Plan Investment Brief Customer Experience*, April 2019.

In response to questions, JGN provided a NPV comparing two scenarios, maintain existing systems and a new customer experience hub. For the new customer experience hub, annual benefits of $0.9 million ($2017–18) were included, based upon a 1.5 per cent uplift in connections due to the new hub.[103] There was no explanation provided for the assumption of a 1.5 per cent uplift in customers. Additionally, the 1.5 per cent uplift in customer numbers was not included in the demand forecast.

We have allowed $0.6 million ($2019–20, direct cost) conforming capex to maintain existing systems as proposed by JGN. We have not accepted $6.6 million as there is not sufficient information at this time to approve the proposed capex.

We encourage JGN to provide additional supporting documentation for the customer experience related systems in its revised proposal, specifically:

- a demonstration of how the project meets the conforming capex criteria
- a roadmap for the system, showing its integration with other systems and timing of each stage of the project
- further information about the source of the 1.5 per cent customer uplift and how it has been integrated into the demand forecast.

Metering systems

JGN's actual/forecast spend in the current period is expected to be $6.5 million lower than its allowance, which despite the GASS+ to SAP migration addressing the metering and billing functions is reflective of the deferral of the spend on the meter read collection systems.[104]

JGN proposed $16.4 million ($2019–20, direct cost) capex on the replacement and enhancement of metering systems. Table 5.25 shows the proposed and our allowed capex for metering systems.

[103] JGN, *Response to information request IR029*, 16 September 2019.

[104] JGN, *Technology Plan Investment Brief Metering,* April 2019.

Table 5.25 Metering systems capex ($2019–20, million, direct cost)

Project	Proposed	Approved	Not Approved
Mass market no access solutions	3.6	3.6	-
Large customer systems	2.9	1.2	1.7
Meter data logger backend	2.8	0.8	2.0
Multi-vendor reading system	4.1	-	4.1
STTM related	0.4	0.4	-
Integration technologies	2.5	2.5	-
Total Metering Capex	**16.4**	**8.5**	**7.8**

Source: AER analysis. Totals may not sum due to rounding.

Mass-market no-access solutions

JGN notes: 'lack of access to many mass-market meters also makes it difficult to reduce the number of estimates used in billing'.[105]

JGN's asset management plan is to install remote reading units to meters with radio frequency (RF) communications that can be read by passing meter readers, and other potential solutions, including self-reads that see the data come in to the central IT systems through other mechanisms.[106]

Consumers and retailers have noted that there are issues with the volume of estimated meter reads.[107]

In response to an information request, JGN provided a NPV analysis for a mass-market no-access solution. There was no analysis for option 1. Option 2 included capex, minor estimated opex savings, and benefits of estimated customer value of improved satisfaction, estimated customer value of reduced effort to self read, and estimated customer value of reduced intrusiveness.[108] The benefits calculations provided details of inputs, for example value per satisfaction point, but did not explain the source or validation of input data.

However having regard to the concerns of retailers and consumers over the number of estimated meter reads, we have allowed $3.6 million ($2019–20, direct cost), but only as a place holder in our draft decision.[109] We require JGN to provide further information

105 Ibid.
106 Ibid.
107 JGN, *2020–25 Access Arrangement Proposal Attachment 5.4 Information Technology Plan*, June 2019, p. 12.
108 JGN, *Response to information request IR029*, 16 September 2019.
109 NGR, r. 79(2)(c)(ii).

regarding the benefits contained in the NPV analysis, specifically the source of inputs to these calculations.

Larger customers

JGN say Metretek, a remote meter reading and load management system which collects meter readings from larger customers, is on a version that is approaching end-of-life and will either be upgraded or replaced through a market search.[110] JGN's proposed expenditures on updating or replacing the Metretek system are in the first half of the 2020–25 period.

In response to an information request, JGN provided a NPV analysis for a larger customer meter reading solution. The analysis compared lifecycle remediation of the existing Metretek system and the replacement with a new unspecified system. JGN's per annum estimated minimum benefits of $0.3 million ($2017–18) supporting the system replacement option have not been substantiated or explained.[111] This analysis shows an incremental NPV of $0.08 million ($2017–18) favouring replacement with a new system.

We seek further information from JGN in regards the assumptions used to derive the system benefits, and costs of replacement systems. At this time, we do not approve JGN's proposed $2.9 million ($2019–20, direct cost) to replace large customer systems, as conforming capex.[112] Instead, we substitute $1.2 million ($2019–20, direct cost) to upgrade and remediate the existing system as indicated in the NPV retain and update option.[113]

Meter data logger backend solution

JGN proposed $2.8 million to either 'rebuild from scratch' or replace the meter data logger (MDL) backend system with a commercial product.

> 'The MDL system for reads in medium to high density domestic apartment blocks is a bespoke system for which there is no longer access to the developer and the software has been provided to us on an "as is - where is" basis. It needs to be rebuilt from scratch or replaced with a commercial product. The project to deal with it will select the best option through a market search.'[114]

In response to an information request, JGN provided an NPV analysis for the MDL backend solution. The analysis compared delaying system replacement to the 2025–30 period and maintenance in 2020–25, with replacement in the 2020–25 period and maintenance in 2025–30. The delayed replacement will incur additional operating expenditure (opex) of $0.1 million in the next period. The analysis shows an

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110 JGN, *Technology Plan Investment Brief Metering,* April 2019.

111 JGN, *Response to information request IR029*, 16 September 2019.

112 NGR, r. 79.

113 JGN, *Response to information request IR029*, 16 September 2019.

114 JGN, *Technology Plan Investment Brief Metering,* April 2019.

incremental NPV of $0.02 million ($2017–18) favouring the earlier replacement with a new system.

Based upon the information available, we do not accept the need to replace the MDL backend in the next (2020–25) period, nor that it is conforming capex. Hence we do not allow $2.8 million ($2019–20, direct cost).[115] We substitute $0.8 million ($2019–20, direct cost) for lifecycle support and increased opex, identified in the NPV analysis, to maintain the existing system.[116]

Multi-vendor reading system

JGN proposes $4.1 million ($2019–20, direct cost) to either upgrade or replace the multi-vendor reading system (MVRS) with a commercial product.

> 'MVRS is used with handheld meter-reader devices for mostly domestic customers and also needs to be made current. In addition, the readers themselves are now out of support. It is expected that towards the end of the next regulatory period a major upgrade or replacement for this system will also be required.'[117]

JGN has provided no other documentation in support of this project. We do not approve the $4.1 million ($2019–20, direct cost) in the absence of appropriate supporting information and documentation. Without additional information in regards the MVRS solution, we are unable to assess it for conforming capex.[118]

STTM system

There is $0.4 million ($2019–20, direct cost) included in metering systems associated with the changes to the STTM system. We accept this expenditure as conforming capex, as we have accepted the non-recurrent spend of $9.3 million ($2019–20, direct cost) on relacing the STTM system (refer Other IT below).[119]

Integration technologies

JGN proposed $2.5 million ($2019–20, direct cost) to maintain existing systems on the most recent supported version for the three systems they utilise for integration: MSI Java, Webmethods and Agile Development.[120] We approve this expenditure as conforming capex.[121]

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115 NGR, r. 79.

116 JGN, *Response to information request IR029*, 16 September 2019.

117 JGN, *Technology Plan Investment Brief Metering,* April 2019.

118 NGR, r. 79.

119 NGR, r. 79(2)(c)(iii).

120 JGN, *Technology Plan Investment Brief Integration Technologies,* April 2019.

121 NGR, rr. 79(2)(c)(i), 79(2)(c)(ii).

Other IT

Cyber Security

JGN's proposed capex of $10.3 million ($2019–20, direct cost) comprising $2.7 million non-recurrent, and $7.6 million recurrent expenditures. We accept the cyber-security capex as conforming capex on the basis of safety and integrity of services.[122]

STTM System

JGN software for the participation in the STTM is a remnant of the unsupported bespoke GASS+ system. The majority of GASS+ functionality has been migrated to SAP in the current period. JGN have not identified a commercial off-the-shelf solution to replace the existing system.

Whilst documentation does not provide an analysis, such as cost benefit or NPV, to support the assessment of prudent expenditure, the investment brief has outlined four positions, and reasoning for the preferred option.

We accept the proposed non-recurrent expenditure of $9.3 million ($2019–20, direct cost) to rewrite the "STTM system as a new, bespoke in-house development" as conforming capex.[123, 124]

5.4.6 Augmentation

Network augmentation capex is directed at increasing the capacity of the existing network to meet the demands of existing and future customers. Augmentation capex is required to maintain gas pressure and minimise the risk of gas outages.

Based on all the information before us, we do not accept JGN's proposed augmentation forecast of $60.8 million ($2019–20, direct cost) for the 2020–25 access arrangement period for the following reasons:

- The planning scope associated with the Aerotropolis development is more uncertain compared with other developments. While we acknowledge that JGN has been attending various planning forums and stakeholder meetings, key decisions are yet to be made. It is not clear to us what level of synergies have been incorporated within the project scope to reflect the impacts that the Aerotropolis Authority and Utilities Coordination Group might bring to a development of this significance.
- JGN's assumptions mean that the Aerotropolis passed the incremental revenue test under rule 79(2)(b) of the NGR. We are not satisfied that it passes the efficient and lowest sustainable cost test under rule 79(1)(a).

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122 Ibid.

123 JGN, *Technology Plan Investment Brief Short Term Trading Market*, April 2019.

124 NGR, r. 79(2)(c)(iii).

- For major developments with a project completion year in 2020–21 and to some degree in 2021–22, it is not unreasonable to expect to see detailed planning scope and cost estimates including the calculated and agreed capital contribution component of the project. However, this information was not provided at the time of our review.
- Although sensitivity tests have been carried out on penetration rates for each new development, we still have concerns over the limited historical samples JGN has used to derive its 94 per cent penetration rate for new developments. Given that the average penetration rate in JGN's proposal is 74 per cent, and has gone as low as 66 per cent in the past 10 years, we find that a penetration rate with a lower bound of 80 per cent high for the purpose of a robust sensitivity test.[125]
- Although JGN has adjusted the incremental revenue calculation on certain developments to take into account that customer benefits cannot be realised until after the completion of the augmentation component of the project, we have concerns there might still be a lag between capex expenditure and demand realisation.

We would like JGN in its revised proposal to provide the following:

- Further clarifications of the demand and project risks at each site within the Aerotropolis development including:
    - Clearly separating committed demand from developers as opposed to inferred demand from third party sources as well as their supply arrangements.
    - Exploration of other planning options that might offer greater investment flexibility other than different main sizes and their associated timing.
    - Identify any efficiencies and synergies that might have been discussed in the various planning forum and stakeholder meetings JGN participated in which are not typically available in other developments and how JGN has considered and incorporated them into the proposal.
- For developments with a project completion year in 2020–21 and 2021–22, provide further details on project scope and cost estimates beyond Gate 1 requirements.
- Given the size of JGN's network and the amount of construction activities in NSW over the past 5 to 10 years, provide further details on why JGN used only seven sites to represent the penetration rate for all new developments.
- Based on recent developments and the associated billing data, provide the indicative timeframe between capex spend and demand realisation.

For the purpose of the draft decision, we propose an alternative capex forecast of $47.6 million ($2019–20, direct cost) comprised of the following:

[125] JGN, Capacity Augmentation Plan AA2020-25, June 2019, p.5.

- Substitute the Aerotropolis development with $2.1 million ($2019–20, direct cost) allowance so that JGN can continue planning and design until such time when the planning and project scope is more certain. This allowance should provide sufficient funding and lead time for JGN to seek further allowance under the Rules.
- As the reticulation of mains, services and meters are part of Aerotropolis development, $8.8 million is also removed from connections capex to reflect the same uncertainty in planning and asset scope (section 5.4.2).
- While we do not accept JGN's proposed Aerotropolis expenditure in our draft decision, this is primarily due to significant planning and asset scope uncertainty rather than demand risks. As such, we did not adjust the demand forecasts as we accept CORE's demand forecast as reasonable (Attachment 12 – Demand).

JGN's proposal

For the 2015–20 period, JGN's capex is expected to be $40.0 million ($2019–20, direct costs) against an allowance of $94.1 million.[126] This is an underspend of $54.1 million or 57.5 per cent of the allowance. The underspend is primarily the result of slowing peak demand growth due to the saturation of instantaneous hot water systems and the deferral of the northern primary main. Offsetting this capex are capital contributions of $5.3 million ($2019–20), against an allowance of $2.1 million, representing a 152.4 per cent over-collection (Table 5.14).[127]

Table 5.26 JGN's proposed augmentation capex ($2019–20, millions, direct cost)

	2015–20		2020–25
Augmentation driver	**Allowance**	**Actual/estimate**	**Forecast**
Addressing peak demand growth	28.1	7.2	2.9
Connection driven	40.2	32.0	33.3
Northern primary main	22.2	0.5	-
Sydney Primary Main (Lane Cove to Willoughby)	-	0.0	24.5
Total	**94.2**	**40.0**	**60.8**

Source: JGN, *2020-25 Access Arrangement Proposal Attachment 5.1 Capital expenditure*, 30 June 2019, p.37.

JGN has proposed $60.8 million ($2019–20, direct costs) in capex for augmentation in the 2020–25 access arrangement period. It includes the connection driven

[126] JGN, *Response to information request IR016*, 27 August 2019.

[127] JGN, *2020-25 Access Arrangement Proposal Attachment 5.1 Capital expenditure*, June 2019, p. 36.

augmentation associated with the Aerotropolis development site, and the Lane Cove to Willoughby section of the Sydney primary main integrity management program driven by asset condition risks.

Table 5.27 JGN's 2020–25 augmentation capex breakdown ($2019–20, millions, direct cost)

Project	2020–21	2021–22	2022–23	2023–24	2024–25	2020–25
Aerotropolis [(a)]	1.2	10.5	0.4	3.1	-	15.2
Sydney Primary Main	4.3	6.8	9.3	4.1	-	24.5
Sydney South West Development	7.3	-	-	-	-	7.3
Box Hill	-	-	0.3	2.3	-	2.6
Wilton North	-	0.3	2.4	-	-	2.6
Lidcombe CBD	1.8	-	-	-	-	1.8
Cecil Park	1.3	-	-	-	-	1.3
Other minor projects	0.6	2.3	0.9	1.2	0.6	5.6
Total	**16.5**	**19.9**	**13.2**	**10.7**	**0.6**	**60.8**

Source: AER analysis based on JGN data. Totals may not sum due to rounding.

Note: (a) Aerotropolis includes Aerotropolis Core, Sydney Science Park and Western Sydney Airport.

Our assessment

Our assessment for augmentation consist of reviewing the reasonableness of the following core elements that makes up each project:

- the need for the investment given forecast demand[128]
- the efficient planning and asset scope associated with meeting the capacity shortfall which includes the exploration of various feasible planning options and the quantum of assets required under each option based on known route length and other network constraints[129]
- the unit rates associated with each asset type including a reasonable assessment and adjustment based on expected site conditions[130]

[128] NGR, r. 79(1)(a).

[129] Ibid.

[130] Ibid.

- an assessment either in the form of an overall economic value that is positive, or having the expected incremental revenue exceeding the capital costs in present value terms, as required under rule 79(1)(b) of the NGR.

We note that the Lane Cove to Willoughby section of the Sydney primary main integrity management program does not fit well into our definition of augmentation as this project is no longer driven by demand growth, but is part of a series of projects under facilities and pipes to mitigate asset condition risks. It is unclear to us why JGN did not re-categorise this expenditure in their proposal when there is a clear shift in the project's primarily driver since its initial conception. We have assessed this project on a bottom-up basis as part of the overall Sydney primary main risk mitigation strategy (section 5.4.4).

In terms of augmentation projects driven by existing and future demand growth, of JGN's proposed $36.3 million ($2019–20, direct cost), the Aerotropolis makes up $15.2 million or 41.9 per cent of the augmentation portfolio.

Given the significance of the Aerotropolis development and the magnitude of the project, we have focused our resources in reviewing the reasonableness of JGN's proposed capex for this development in this draft decision.

Expected demand growth and investment need

A third city for Sydney is being developed with the Western Sydney airport at its centre. The initial precincts of the Aerotropolis Core, Sydney Science Park and Western Sydney Airport will be the main focus for the next 5 to 7 years.

Although JGN has provided an overview of the type and magnitude of expected demand at each site, it is not clear to us which are committed demand from developers through reviewed load applications, and which are non-committed demand inferred through third party sources or websites.

While we accept that JGN would need to invest in augmentation in some form to supply the area, the accuracy of demand projections impacts on the feasible planning options available, their timing, and the associated economic assessment that might trigger the need for capital contributions.

In particular, we find JGN's 94 per cent penetration rate for new estates difficult to accept as a base case given that it is based on a sample of only seven suburbs going as far back as 2003–04.[131] Even if we accept that these are random samples, the sample size is simply not statistically significant enough to support 94 per cent penetration rate as an appropriate figure to use for a base case scenario.

While we acknowledge that JGN has made an attempt to carry out sensitivity analysis using an 80 per cent penetration rate, the average penetration rate in JGN's proposal is 74 per cent, and has gone as low as 66 per cent in the past 10 years. We find that a

[131] JGN, *Capacity Augmentation Plan AA2020-25*, June 2019, p. 66

penetration rate with a lower bound of 80 per cent high for the purpose of a robust sensitivity test.

Planning and asset scope

JGN have no details on the locations of new roads and any potential removal of existing roads. JGN stated that it is its intention to construct new mains prior to the new roads being built to avoid costly restoration based on customer feedback.[132] JGN may wish to reconsider this position from a planning perspective, and also importantly from an economic perspective and consider how to achieve the least cost for consumers over the long term.

In addition, demand uncertainty combined with scope uncertainty ultimately impacts on planning options.

As a result, we find the planning and asset scope for Aerotropolis materially more uncertain compared to other sites, especially given that all of JGN's proposed assets for this development resides within the Aerotropolis development boundary.

Unit rates

As the Aerotropolis development can be considered a greenfield site, JGN have selected similar projects as the basis for their cost estimation. While we acknowledge that JGN may have used the best available project as a sample, we also established that there is no representative sample that JGN can use with the scale and significance of Aerotropolis.

Due to the establishment and involvement of the Aerotropolis Authority and Utilities Coordination Group as well as other government bodies, we would expect a certain amount of synergies above and beyond historical observations between the different utilities and stakeholders. It is not clear to us how the cost estimates proposed by JGN fully capture these potential benefits through future negotiations and memorandums of understanding (MOUs).

In addition, as noted in Zincara's report, we expect JGN to provide updated project cost estimates including any negotiated capital contributions for any project with a completion year in 2020–21 and 2021–22.

Economic assessment

For each growth driven augmentation project, JGN has selected to justify its capex expenditure by carrying out analysis to demonstrate that the revenue generated as a result of the expenditure exceeds the present value of the capex.[133] JGN has also carried out the analysis based on an investment horizon to 2050, and an investment horizon to 2070 where no further costs and benefits are taken into account post that time.

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132 JGN, *Response to information request IR07*, 23 August 2019. p.7.

133 NGR, rr. 79(1)(b), 79(2)(b).

In line with our previous decisions, we do not consider costs and benefits for these types of investments beyond 30 years given uncertainties beyond that point. As such, we do not accept JGN's incremental revenue analysis for an investment horizon to 2070.

While we seek further clarifications on project scope and cost uncertainties, for the purpose of reviewing JGN's incremental revenue analysis, we have used JGN's proposed project costs as the basis of the analysis given we have no alternative.

During our initial review of JGN's incremental revenue analysis for the Aerotropolis development, we found that revenue benefits are being realised prior to the completion of the project.[134] While JGN has since amended the model to better reflect reality, we are still unclear how JGN can realise the demand for hundreds of customers in the same project completion year in its incremental revenue analysis. Especially when CORE's demand and customer forecast report stated that first year residential customers are forecast to consume 29.3 per cent of their mature demand and 81.6 per cent of their mature demand in their second year based on historical averages. [135]

It is unclear to us the reason why JGN did not align its demand forecast to its own consultant's methodology.

It is also unclear to us the reason why JGN used direct costs for capex in its analysis when the revenue appears to be based on total cost. Depending on which cost allocation method JGN decides to adopt between access arrangement periods, we would expect a 10 to 15 per cent increase to the capex inputs to reflect an appropriate overhead allocation so it can be compared against revenue on the same basis. For the purpose of our review and for simplicity, we have introduced a 10 per cent uplift to capex inputs.

Overall

We do not accept JGN's proposed capex of $60.8 million ($2019–20, direct cost) and propose an alternative capex forecast of $47.6 million ($2019–20, direct cost).

Our alternative capex forecast is based on advice from Zincara and our assessed planning and asset scope uncertainty of the Aerotropolis development. We have substituted the Aerotropolis development with $2.1 million allowance for JGN to continue planning and design until such a time the planning and project scope is more certain. This allowance should provide sufficient funding and lead time for JGN to seek a further allowance under the rules as uncertainty is reduced.

In addition, as the reticulation of mains, services and meters are part of Aerotropolis development, $8.8 million has also been removed from connections capex to reflect the uncertainty in planning and asset scope (section 5.4.2).

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134 JGN, *Response to information request IR007*, 23 August 2019.

135 JGN, *Attachment 8.2 – Demand Forecast Report*, June 2019, p. 38 and p. 45.

We also expect JGN to review and update the capital requirements for the other augmentation projects in its revised proposal based on our findings.

Table 5.28 AER's augmentation capex draft decision ($2019–20, millions, direct cost)

Project	2020–21	2021–22	2022–23	2023–24	2024–25	2020–25
Aerotropolis [(a)]	1.2	0.9	-	-	-	2.1
Sydney Primary Main	4.3	6.8	9.3	4.1	-	24.4
Sydney South West Development	7.2	-	-	-	-	7.2
Box Hill	-	-	0.3	2.3	-	2.6
Wilton North	-	0.3	2.4	-	-	2.6
Lidcombe CBD	1.8	-	-	-	-	1.8
Cecil Park	1.3	-	-	-	-	1.3
Other minor projects	0.6	2.3	0.9	1.1	0.6	5.5
Total	**16.4**	**10.3**	**12.8**	**7.5**	**0.6**	**47.6**

Source: AER analysis. Totals may not sum due to rounding.

Note: (a) Aerotropolis includes Aerotropolis Core, Sydney Science Park and Western Sydney Airport.

5.4.7 Mains replacement

Mains replacement relates to the replacement of mains (and associated services) that have significantly deteriorated with an increasing number of reported gas leaks. The replacement program manages old and deteriorating pipes so that the network is operated safely, reliably and affordably. The proposed mains replacement plan consists of proactive and reactive replacement programs.

We have included $36.2 million ($2019–20, direct cost) of mains replacement capex in our alternative estimate in this draft decision. This is 19.1 per cent less than JGN's proposed forecast of $44.8 million. In making this decision we have relied upon technical advice from our consultant Zincara.

For the reasons set out below, we are not satisfied that JGN's proposed forecast capex of $44.8 million for its mains replacement program is conforming capex that complies with the NGR.[136]

JGN's proposal

JGN submitted that its mains replacement program manages its old and deteriorating pipes to ensure the safety, reliability and affordability of its network.

JGN proposed expenditure of $44.8 million ($2019–20, direct cost) for the 2020–25 access arrangement period,[137] which is 39.1 per cent higher than the $27.3 million it incurred in the 2015–20 period.[138]

JGN states it has adopted a risk based medium term approach[139], which balances the cost of each piece of work against the customer benefits to prioritise and then rank which areas are replaced and when. Assessments are based on information from publicly reported leaks, condition assessments and, where possible, leak surveys. JGN says that its investment approach aims to get as much use as possible from the older mains before they are replaced.[140] JGN's Asset Management Plan says 'we prioritise these sections for replacement based on risk. Our aim is to maintain these ferrous mains ALARP until they can be completely removed from service as part of the ongoing mains rehabilitation program'.[141]

Taking into account the results of recent leakage surveys, JGN is planning to complete six projects during the 2020–25 period (Table 5.28). In total, JGN is planning to replace 146 kilometres during the 2020–25 period, the majority of which will be in Newcastle where 104 kilometres will be replaced.

JGN's response to our information request included a Rehabilitation Plan (the Plan) which considered safety risks, leakage rates, cost benefits of rehabilitation versus repair, incidents and reliability.[142] The Plan provides a prioritisation of projects and an overall timeframe. The current prioritisation relates mainly to cast iron and unprotected steel mains which the Plan shows will be mostly rehabilitated by around 2040. There is also an increasing level of rehabilitation projects addressing old generation polyethylene (PE) and nylon mains, extending the Plan out to 2049.

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136 NGR, r. 79(1).

137 JGN, *2020–25 Access Arrangement Proposal Attachment 5.1 Capital Expenditure*, June 2019, p. 16.

138 JGN, *Response to information request IR016*, 27 August 2019.

139 JGN, *2020 Plan*, June 2019, p. 64.

140 Ibid, p. 66.

141 JGN, *Asset Management Plan*, June 2019, p. 44

142 JGN, *Response to information request IR025*, 19 September 2019.

Our assessment

We accept that mains replacement is justified on the grounds that it is necessary to maintain and improve the safety of services and to maintain the integrity of services.[143] Our forecast for mains replacement capex over the 2020–25 access arrangement period of $36.2 million ($2019–20, direct cost) reflects our analysis and review of the mains rehabilitation projects which indicates that the condition of the cast iron and unprotected steel mains are deteriorating, with leakage rates being a key condition indicator.

While we support JGN's aim to get as much use out of the mains as possible, our analysis shows that there are opportunities to further extend asset lives.

There are increasing levels of reported leaks in multiple mains, including the Kurri Kurri, Matraville, Mittagong, Bankstown and Haberfield pipeline systems. While there are differing levels of reported leak rates across the pipeline systems, the rates indicate that the mains are likely to be deteriorating and in poor conditions, which supports the need for the rehabilitation projects.

The information provided for the Newcastle mains rehabilitation project shows that while the networks are in poor condition, they are not deteriorating at any significant rate, based on the leakage data. Using the leakage data, we agree with Zincara that the Newcastle mains can continue to be effectively managed for at least one to two years, maximising the use of the existing asset.[144]

Based on our analysis of the projects and review by Zincara, five projects should be supported as proposed, with one project delayed by one year. Delaying the Newcastle project by one year results in a saving of $8.5 million ($2019–20, direct cost) (Table 5.29).

[143] NGR, rr. 79(1)(b), 79(2)(c)(i)(ii).

[144] Zincara, *Access Arrangement 2019 JGN Capital Expenditure Review*, November 2019, pp. 108–111.

Table 5.29 Mains replacement capex forecast ($2019–20, million, direct cost)

Mains Replacement Project	JGN's 2020 Plan	AER draft decision
Kurri Kurri	3.7	3.7
Matraville	9.9	9.9
Mittagong	1.3	1.3
Newcastle	22.5	14.1
Bankstown	0.3	0.3
Haberfield	0.4	0.4
Minor mains renewal	1.6	1.6
Minor connection renewal	5.0	5.0
Total	**44.8**	**36.2**

Source: AER analysis. Totals may not sum due to rounding.

The addition of minor mains and connection renewal costing is considered to be a prudent capex provision, which will occur as a result of reported leaks that may not be satisfactory for repair only.

5.4.8 Other capex

This category captures remaining capex that does not fall into the categories discussed above.

JGN's proposal

JGN's proposed conforming capex for the 2015–20 and 2020–25 periods is shown in Table 5.30.

Table 5.30 Other capex ($2019–20, million, direct cost)

	2015–20 Allowance	2015–20 Actual/ Estimate	2020–25 JGN's proposal	2020–25 AER's draft decision
Property	6.1	21.9	6.9	6.9
Vehicles	18.3	10.2	18.6	15.5
Relocations	2.8	4.5	3.7	2.6
Telemetry	10.5	2.4	2.2	2.2
Mobile Plant and equipment	4.5	3.2	2.9	2.9
Mine subsidence	2.0	3.2	-	-
Total	**44.4**	**45.5**	**34.3**	**30.1**

Source: JGN, *2020–25 Access Arrangement Proposal Attachment 5.1 Capital expenditure*, June 2019, Table 3-31 and AER.

JGN explained the significant under and over spends within this category for the 2015–20 period:

> 'Capex was higher than expected, as the forecast costs from our property relocation project was based on preliminary estimates and some spend was deferred from 2015 into the 2015–20 period. This was partially offset by our strategy to smooth the peakiness of our vehicle replacement program.'[145]

JGN's 2020–25 proposed other capex includes:

- $18.6 million ($2020, direct cost) to maintain vehicle fleet[146]
- $6.9 million ($2020, direct cost) for the maintenance of existing properties and the relocation of existing offices in Bathurst[147]
- $3.7 million ($2020, direct cost) for JGN funded relocations of its own assets which were laid within a customer's property and without an easement[148]
- $2.9 million ($2020, direct cost) for mobile plant and equipment[149]
- $2.2 million ($2020, direct cost) for JGN's SCADA system.[150]

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145 JGN, *2020-25 Access Arrangement Proposal Attachment 5.1 Capital Expenditure*, June 2019, p. 44.

146 Ibid, p. 45.

147 JGN, *2020-25 Access Arrangement Proposal Attachment 5.1 Capital Expenditure*, June 2019, p. 45 and JGN, *JGN Property Capex Program 2020-25*, May 2019.

148 JGN, *2020-25 Access Arrangement Proposal Attachment 5.1 Capital Expenditure*, June 2019, p. 45 and JGN, *JGN Minor Capital Allocations – Budgeting and Approval Process*, May 2019, p. vii.

149 JGN, *2020-25 Access Arrangement Proposal Attachment 5.1 Capital Expenditure*, June 2019, p. 46.

Our assessment

JGN's actual/estimates for other capex for the 2015–20 period was $45.5 million ($2019–20, direct cost) against an allowance of $44.4 million, which is a $1.1 million or a 2.6 per cent overspend.

The $15.8 million ($2019–20, direct cost) overspend on property captures the costs of purchase and fit out of JGN's office and depot locations. This was largely driven by the relocation of the Jemena Melbourne head office, with $12.7 million attributed to JGN.[151]

It is not clear to us how the overall cost of the relocation has been allocated to the various regulated and non-regulated entities given that Jemena and its holding company owns and operates a numbers of businesses within and outside of Australia. Also Jemena has offices in Sydney as well as Melbourne. We seek assurance and a reconciliation that the cost allocation is reasonable and appropriate. In addition, we also expect JGN to demonstrate that the relocation provides an overall benefit to NSW gas customers. Further, to establish the relocation is not primarily driven by Jemena's other business entities, or for branding purposes, in which costs are allocated to the JGN business based on a simple cost based methodology that is disproportional to the benefits NSW customers receive.

For the purpose of the draft decision, we allow the 2015–20 capex of $45.5 million ($2019–20, direct costs) as a placeholder pending the information requested above.

JGN provided the justification of its proposed $34.3 million ($2019–20, direct cost) for other capex for the 2020–25 period in a number of supporting documents. Our assessment of JGN's proposed capex involved a bottom up analysis of projects, followed by a top down check.

JGN proposed capex of $14.2 million ($2019–20, direct cost) to replace 169 light commercial vehicle using deterministic criteria, where a vehicle must be replaced once it reaches 150,000 km.[152]

In JGN's Fleet Asset class strategy, it states that 'the overall condition of the fleet asset class is good' based on the fleet and plant numbers as at 31 December 2018.[153] In addition, the risks associated with the fleet and plant assets in the asset risk register have shown that the 'Current risk rating' are the same as the 'Target risk rating'.[154]

This informs us that the risks associated with the fleet and plant profile as at 31 December 2018 are acceptable. When we investigated the fleet profile for light commercial vehicles as at 31 December 2018, we found that 54 out of 216 light commercial vehicles have already exceeded 150,000 km. There appears to be an

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150 Ibid, p. 45.

151 JGN, *Response to information response IR009,* 18 September 2019.

152 JGN, *Fleet Asset Class Strategy*, June 2019, Table 4-3.

153 JGN, *Fleet Asset Class Strategy*, June 2019, p. 6 and p. 8.

154 Ibid, Table 4-2.

inconsistency between the deterministic criteria for replacement and JGN's own acceptable risk for light commercial vehicle. As such, we maintain the same risk profile using JGN's fleet model and propose an alternative capex of $11.8 million ($2019–20, direct cost).

Similar to light commercial vehicle, there appears to be an inconsistency with trailers, where JGN has proposed capex of $1.0 million ($2019–20, direct cost) to replace trailers using deterministic criteria, where a trailer must be replace once it reaches 10 years old.[155] However, based on the JGN's Fleet Asset class strategy and other businesses' practices, the replacement life is typically at 15 years under normal condition. As such, we have set the deterministic criteria to 15 years using JGN's fleet model and propose an alternative capex of $0.3 million ($2019–20, direct cost).

JGN proposed $3.7 million ($2019–20, direct cost) for relocation of its assets in private properties without easements based on a historical average method. Given this program is mostly driven by a legacy asset installation policy, we would expect to see a declining trend in expenditure requirements moving forward. Since the historical trend is not available for our review, we took the 2019–20 year estimate of $0.5 million ($2019–20, direct cost) as a flat base and provided an alternative forecast of $2.6 million ($2019–20, direct cost). In addition, we would like JGN to clarify if any past expenditures on this program might have overlapped with any shallow mains requirements.

In terms of mobile plant and equipment, we would like JGN to provide some insight into the proposed $2.9 million ($2019–20, direct cost) capex for tools in its revised proposal. For this draft decision, we accept that the proposed $2.9 million ($2019–20, direct cost) is conforming capex.[156]

Based on the available information, we are satisfied that the proposed capex of $13.5 million ($2019–20, direct cost) for property, relocations, and SCADA is conforming capex under the NGR.[157]

5.4.9 Capitalised overheads

Overheads are costs that are not directly attributable to the output of distribution businesses but are necessary to support its operations. Examples of overhead costs include network planning, procurement and human resources.

In JGN's regulatory accounts, overheads are made up of three elements (Table 5.31): network overheads; corporate overheads; and direct overheads.

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155 Ibid, Table 4-3.

156 NGR, r. 79.

157 NGR, r. 79(2).

Table 5.31 Capitalised overheads allowance and actual/estimate in 2015–20 ($2019–20, million)

Overhead Category	Allowance /Actuals	2015–16 Actual	2016–17 Actual	2017–18 Actual	2018–19 Estimate	2019–20 Estimate	Total
Direct overheads	Allowance	8.3	7.9	8.1	7.6	7.1	39.1
	Actual	7.7	4.5	4.9	5.7	5.8	28.7
Network overheads	Allowance	17.2	17.1	17.3	17.2	17.1	85.9
	Actual	8.6	10.9	11.1	10.2	10.3	51.1
Corporate overheads	Allowance	1.2	1.2	1.2	1.2	1.3	6.1
	Actual	16.6	16.1	17.3	16.6	16.9	83.5

Source: JGN, *Response to information request IR016*, 27 August 2019.

JGN has proposed that from 1 January 2021, it will expense its corporate overheads for regulatory purposes making the treatment consistent with its accounting practice. This is to allow JGN time to implement the required changes to its enterprise reporting system and update relevant internal processes and procedures in readiness for the change.[158] There is a half year of forecast capitalised corporate overheads before movement to the expense category of $8.4 million ($2019–20, direct cost).

Capex during the 2015–20 period is inclusive of corporate overheads and we need to assess whether the expenditure on corporate overheads meets the definition of conforming capital expenditure.[159]

We examined JGN's proposal and made information requests to make sure we understood the make-up of corporate overheads and its treatment.[160] We had to make these requests as we identified no separate capex attachment on capitalised overheads, and no discussion in the capex attachment.[161] We also examined JGN's RIN data.

Based on the information requests, JGN expects to spend $163.3 million ($2019–20) (representing 16.2 per cent of its total actual capex) in the current (2015–20) period. This represents an overspend of $28.9 million in this category compared to the 2015–20 allowance (Table 5.32).

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158 JGN, *JGN 2020 Plan*, June 2019, p. 74.

159 NGR, r. 79(2).

160 JGN, *Response to information request IR016*, 27 August 2019 and JGN, *Response to information request IR033*, 9 October 2019.

161 JGN, *2020–25 Access Arrangement proposal Attachment 5.1 Capital expenditure*, June 2019.

Table 5.32 JGN's capitalised network and corporate overheads ($2019–20, million)

	2010–15		2015–20		2020–25
	Allowance	Actual	Allowance	Actual	2020 Plan
Capitalised network overheads (inclusive of direct capitalisation) (a)	36.5	109.8	128.1	79.8	79.2
Capitalised corporate overheads		20.2	6.3	83.5	8.5
Total capitalised overheads	36.5	130.0	134.4	163.3	87.7

Source: JGN, *Response to information request IR016*, 27 August 2019.

Note: (a) For 2010–15 period the $36.5 million is the combined capitalised network and corporate overheads.

We focused on three areas to better understand the overspend:

- the basis on which the overhead allowance was calculated in previous resets
- any underlying trend associated with JGN's historical overheads expenditures
- changes associated with JGN's capitalisation policy, cost allocation methodology and/or practices.

The basis on which the allowance was calculated in previous review

Issues with capitalisation of overheads have been identified and discussed with JGN in the 2010–14 and 2015–20 access arrangement reviews. In each of these past review periods, JGN overspent its allowance.

In JGN's 2015–20 review, we did not accept JGN's proposed overheads forecast as we considered that it did not represent the efficient costs that a prudent operator would require to achieve the capex criteria. Instead we provided an allowance of $130.0 million ($2019–20) as an alternative capex forecast. We raised concerns at that time with the instability of JGN's overhead expenditure, noting that a system of cost allocation was introduced in 2009. We also considered that overheads should be lower due to an organisational restructure.[162]

[162] AER, *Final decision JGN distribution access arrangement – Attachment 6 – Capital expenditure*, June 2015, p. 46.

At that time JGN stated that system limitations where a key factor in its lack of data on the elements that made up overheads.[163] Since then JGN has overhauled and replaced legacy corporate financial systems.[164]

JGN has noted that direct overheads are now classified as capitalised network overheads in the current categorisation.[165] For reconciliation proposes, JGN has split out the overhead categories (Table 5.31 and Table 5.32).

Despite these adjustments, there remains a material variance between the actual and allowance.

Any underlying trend associated with JGN's historical overheads expenditures

We examined JGN's RIN data for its historical overheads trend (see Figure 5.2 and Figure 5.3). The historical RIN data is considered to be a reliable source given the audit and assurance requirements.

Network overheads and direct overheads were combined in the forecast period and JGN explain the difference between the allowance and the actual in 2015–20 as due to:

- the recording of actual costs more accurately
- IT cost reclassification from networks to corporate capitalised overheads (on average $11.0 million per year).

The RIN data shows that Network (inclusive of direct overheads) and Corporate overheads (inclusive of IT reclassification) are forecast to be more stable.

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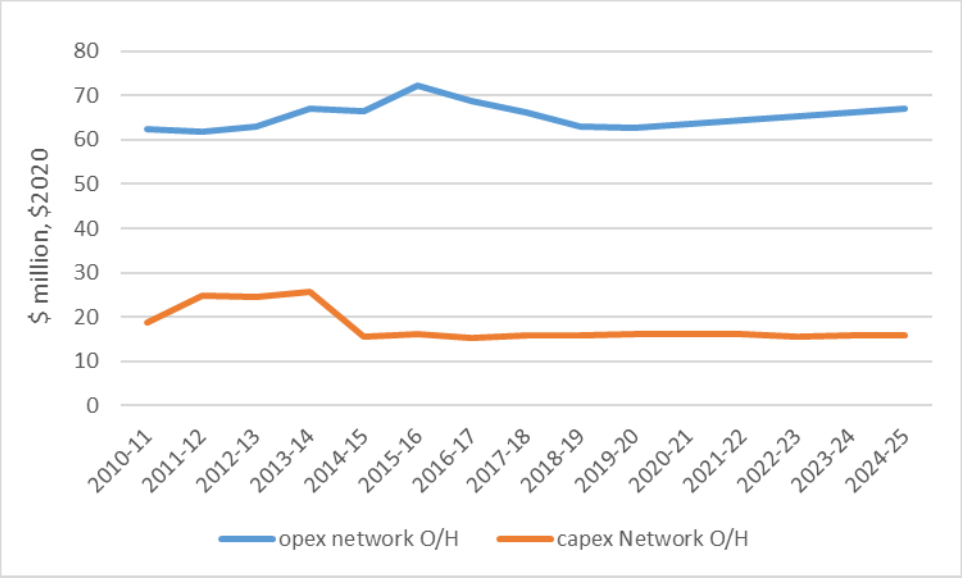
[163] AER, *Draft decision Jemena Gas Networks Access Arrangement – Attachment 6 – Capital expenditure*, November 2015, p. 44.

[164] JGN, *2020–25 Access Arrangement proposal Attachment 5.1 Capital expenditure*, June 2019, p. 34.

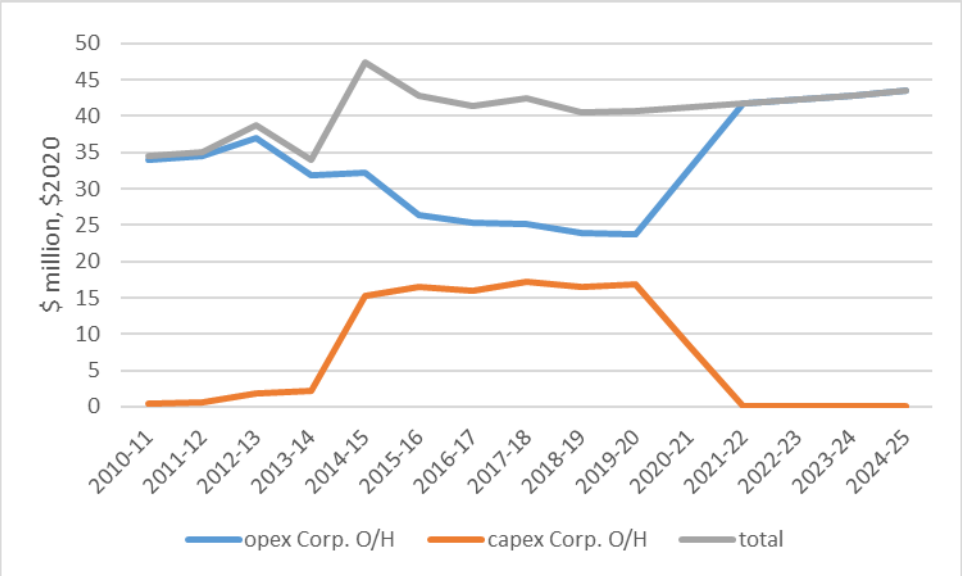
[165] AER, *Draft decision Jemena Gas Networks Access Arrangement – Attachment 6 – Capital expenditure*, November 2015, p. 44.

Figure 5.2 Network overheads trend



Source: JGN, *RIN Attachment 6 workbook 2*, 30 June 2019 and AER analysis

Figure 5.3 Corporate overheads trend



Source: JGN, *RIN Attachment 6 workbook 2*, 30 June 2019 and AER analysis

The critical observation is that opex and capex expenditure on corporate overheads shows a number of step changes. The shift between opex and capex categories raises the potential for double counting.

In simple terms, double counting can occur when a cost is recorded as both a capital cost and simultaneously as an operating cost between the time of the final decision and the actual expenditure. For each regulatory period, the business is allocated a capex and opex allowance – during a review period, a business cannot shift

expenditures between the capex and opex categories, as to do so creates the risk that an expenditure is recovered more than once. For example, if a cost is originally forecast as an opex allowance, then this cost has already been factored into our decision for service providers to recover this cost from customers within one regulatory period. If this cost is re-allocated to capex after the fact, it will also be capitalised into the capital base which earns a return and is depreciated over its economic life across multiple regulatory periods. Aside from the fact that this is unfair to consumers, this is not allowed under the NGR as this expenditure will effectively be recovered twice – once as an immediate expense from opex, and again as capex over a longer term.[166]

Changes associated with JGN's capitalisation policy, cost allocation methodology and/or practices

In its response to our information request, JGN noted that the 2014–15 step changes relate to the implementation of SAP and the reclassification of IT costs from network to corporate capitalised overheads.[167] However, these reasons alone do not adequately address or quantify 'how' JGN overspent $28.9 million ($2019–20) on capitalised overheads this period against the allowance.

As a result, we issued a further information request on other possible changes that might have also occurred since the implementation of SAP, as well as requesting JGN classify and quantify the nature of the changes in a simple template. [168]

JGN did not complete the template citing that the information required to complete the template is not available but provided the following response:

- JGN has underspent against the total allowance this period
- JGN's total capex benchmarks well against its peers (top three)
- total overheads trend is stable
- JGN no longer has the relevant people in the business that understand how the previous financial system (GASS+) capitalised overheads
- there have been no changes to capitalisation policy, cost allocation method (CAM) or booking practices since the implementation of SAP, and SAP has enabled JGN to improve cost capture and allocation.[169]

JGN's response to our information request does not address the reasons for the overspend of $28.9 million ($2019–20) on capitalised overheads this period against the allowance. Further, JGN has not provided any explanation on what this overspend was on, nor given us any comfort that no double counting has taken place.

In its revised proposal, the AER would like JGN to:

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166 NGR, r. 89(1)(d).

167 JGN, *Response to information request IR016*, 27 August 2019.

168 AER, *Information request IR033*, 3 September 2019.

169 JGN, *Response to information request IR033*, 9 October 2019.

- provide an explanation for the overspend in the corporate overheads category and the overall capitalisation overspend in the current period
- provide assurance that the movement of overheads between capex and opex does not contain any double counting of costs under the regulatory regime.

JGN's proposed forecast methodology for capitalised overheads is consistent with our previous decisions, which is based on a 75 per cent fixed and 25 per cent variable split of JGN's historical overheads. Under this methodology, the variable portion will increase or decrease depending on the relative difference between the total historical direct cost and the total forecast direct cost. We accept JGN's proposal which adopted a similar approach in its forecasts.

Based on the information before us, our draft decision:

- accepts JGN's proposal to remove all corporate overheads from capex starting 1 January 2021
- accepts JGN's proposed 75 per cent fixed and 25 per cent variable split for forecast purposes.

We require JGN to adjust its capitalised overheads to account for the same productivity factors used in the opex forecast. Given the nature of overheads and JGN's ability to move overheads between capex and opex, as well as across and within regulatory periods, we find that the productivity factors associated with opex should also be applied to capitalised overheads to better reflect reality given that JGN cannot identify the specific capex and opex projects that drives productivity.

In addition, we also found a number of discrepancies between the $87.7 million ($2019–20) quoted by JGN in IR016 and the $88.1 million ($2019–20) calculated in Attachment 5.2 – Capex model. For the purpose of the draft decision, we have taken the figures from the Capex model as it aligns with the RIN data.

Table 5.33 AER's draft decision and JGN's proposal for capitalised overheads for the 2020–25 access arrangement period ($2019–20, million)

Capitalised Overheads	JGN's proposal	AER's draft decision	Difference
Network Overheads	79.6	75.8	-3.8
Corporate Overheads	8.4	8.2	-0.2
Total Overheads	**88.1**	**84.0**	**-4.1**

Source: AER analysis. Totals may not sum due to rounding.

5.4.10 Cost Escalation and Reconciliation

Our draft decision for the 2020–25 access arrangement period, makes the following adjustments to each capex category:

- labour real cost escalators in line with our opex assessment based on Deloitte Access Economics (DAE) forecast (Attachment 6 – Operating expenditure)
- we have found a discrepancy between JGN's Attachment 5.2 – Capex Model and Attachment 7.3 – RFM on inflation for 2018–19. As we have accepted the inputs from the RFM, we have adjusted the capex forecasts to align with the inflation used for the RFM. This discrepancy also extends to the $2019–20 calculation of capex from 2014–15 to 2019–20.

Both we and our consultant found the reconciliation of data from JGN's proposal challenging. Information requests have helped to alleviate some of the issues, however discrepancies may remain.

We recommend that JGN provide a revised proposal in which all figures are in $2019–20, and models for capex, revenue and pricing are linked and reconciled.

Table 5.34 JGN's cost escalation forecast ($2019–20, per cent)

Cost escalator	2018–19	2019–20	2020–21	2021–22	2022–23	2023–24	2024–25
JGN real labour	0.79	0.86	0.73	1.05	1.20	1.16	1.06
AER real labour	0.95	0.83	0.17	0.55	0.41	0.48	0.67
JGN inflation [(a)]	2.00	2.25					
AER inflation [(a)]	1.78	2.25					

Note: (a) for the purpose of the capex forecast in $2020, only the CPI for 2018-19 and 2019-20 is relevant as JGN base inputs are mostly in $2018.

Table 5.35 Cost escalation impact to capex forecast ($2020, million)

Total capex	2020–21	2021–22	2022–23	2023–24	2024–25	2020–25
JGN's proposed [(a)]	189.0	163.0	150.8	149.0	156.0	807.7
AER's draft decision	188.5	162.4	150.1	148.1	154.9	804.0
Variance	-0.5	-0.6	-0.7	-0.9	-1.0	-3.7

Source: AER analysis. Totals may not sum due to rounding.

Note: (a) these figures represent our draft decision using JGN proposed escalators including contributions.

5.5 Proposal to use the speculative capital expenditure account

5.5.1 Proposal

Like other gas networks, JGN is exploring hydrogen as a potential alternative energy source to natural gas. The Western Sydney Green Gas Trial (Green Gas Trial) is a pilot project that seeks to demonstrate how hydrogen can be generated, measured and injected into the JGN's network.[170]

The total cost of the project is $14.7 million ($ nominal). In December 2017, Australian Renewable Energy Agency (ARENA) approved funding of 50 per cent of the Green Gas Trial. JGN proposed to access $6.7 million ($ nominal) from ARENA and fund the rest of the project itself. Out of the total hydrogen generated by the trial, 67 per cent or 6.4 terajoules (TJ), will be injected into the gas network.[171]

Given the uncertainty over the outcome of the project, JGN is not seeking approval for the forecast capex as conforming capex, but approval for the capex (net of ARENA funding) to be placed in a speculative capital expenditure account.[172] If the project is successful, JGN would apply to include the capex in the capital base as part of a future access arrangement proposal.

JGN has identified a number of potential benefits if the project is successful:

- promoting future sustainability
- reducing current operating costs (unaccounted for gas (UAG))
- delivering on the Council of Australian Governments' (COAG) hydrogen policy.

Speculative investment

The NGR allows for the creation of a speculative capital expenditure account.[173] In assessing capex against the criteria in rule 79 of the NGR, we may conclude that a certain amount does not satisfy the criteria and is speculative in nature. Under these circumstances, the non-conforming capex can be allocated to a notional speculative capital expenditure account. The access arrangement would reflect this decision.

5.5.2 Our assessment

Based on our assessment of the current rules, the project is unlikely to meet the conforming capex criteria – we do not accept the project on two grounds.[174]

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170 JGN, *Western Sydney Green Gas Trial, Options Analysis*, April 2019.
171 Ibid, p. 4.
172 NGR, r. 84.
173 Ibid.
174 NGR, r. 79(2).

- hydrogen is not covered by the definition of natural gas
- our analysis is that an electrolyser is akin to a production facility which cannot be part of the distribution system.

The integration of hydrogen as a fuel requires rule and law changes – this has been identified and commented on by the Australian Energy Market Commission (AEMC):

> 'The COAG Energy Council should progress the national hydrogen strategy, including considering what changes to the National Gas Laws and National Gas Rules may be required to enable the use of existing gas pipelines for the transport of hydrogen. Hydrogen is a potential zero emissions fuel source that may be a viable alternative for natural gas in the medium term.'[175]

On the first point, the NGL contains a definition of natural gas:

> ***natural gas*** means a substance that:
>
> (a) is in a gaseous state at standard temperature and pressure; and
> (b) consists of naturally occurring hydrocarbons, or a naturally occurring mixture of hydrocarbons and non-hydrocarbons, the principal constituent of which is methane; and
> (c) is suitable for consumption.

Our reading of this definition is that it precludes hydrogen.

Our analysis is also that the hydrogen plant can be read to be akin to a gas processing plant – which is also excluded from the definition of a pipeline under the NGL. JGN also proposed a number of uses for the hydrogen that is produced by the plant, and at this time, only 67 per cent of the hydrogen produced will be for network purposes. It may well be that the future production of hydrogen is contestable – other technologies may develop.

Our understanding of speculative investment is that it may eventually meet the criteria in the Rules for conforming capex and will be rolled into the capital base in a future access arrangement period. We do not see this as likely for this proposed project based on the information provided and the current regulatory framework.[176] We do not approve JGN's proposal that capex for its Western Sydney Green Gas Trial be placed in a speculative capital expenditure account.

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[175] AEMC, *Submission to the Select Committee into Fair Dinkum Power*, February 2019, pp. 21–20. https://www.aemc.gov.au/sites/default/files/2019-03/AEMC%20Submission%20Fair%20Dinkum%20Power%20Inquiry.pdf

[176] PIAC also expressed reservations regarding the operation of the speculative expenditure account.

5.6 Revisions

We require the following revisions to make the access arrangement proposal acceptable:

Revision 5.1:	Make all necessary amendments to reflect our draft decision on conforming capex for the 2020–25 access arrangement period, as set out in Table 5.2.
Revision 5.2	Remove the Western Sydney Gas Trial from the speculative capital expenditure account.