Zincara

From strategy to action

AER Access Arrangement 2017

Multinet

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1. EXECUTIVE SUMMARY

The AER has engaged Zincara to provide technical advice on a number of matters related to Multinet's capital expenditure. They include:

- Augmentation
- Connection
- Mains Replacement
- Other Capex
- Meter Replacement
- SCADA
- Information Technology

In carrying out the review, Zincara has taken into consideration the requirements of the National Gas Law and the National Gas Rules. Zincara's approach was to review the submission provided by Multinet and responses provided by Multinet resulting from clarification sought by the AER.

The results of the assessment are discussed below.

1.1 AUGMENTATION

Multinet initially submitted four augmentation projects, with one (South Melbourne) being deferred following an update of network performance reports for NIEIR's final network growth forecasts. The costs for the forecast period are shown in the table below.

Table 1: Augmentation Project Summary - Revised ($million, 2017, Real)

Augmentation Projects	2018	2019	2020	2021	2022	Total
Oakleigh HP network	3.3	2.7	3.7	-	-	9.8
Korumburra HP network	-	-	-	0.8	-	0.8
Eastern network	1.0	2.6	-	1.8	-	5.4
Augmentation Projects Total	**4.3**	**5.3**	**3.7**	**2.6**	**-**	**16.0**

(Source: Capex Overview-Augmentation: Table 8; and revised per advice in response IR #4;)
Note: Totals may not add up due to rounding error.

Zincara reviewed how Multinet had derived its projects including its network planning process. In relation to the cost build, Zincara examined the methodology used by Multinet to prepare its forecast costs.

Conclusion

For each of Multinet's Augmentation projects Zincara considers that the network planning process and the load forecast methodology to be consistent with industry standards. The estimation methodology for the projects is also considered to be consistent with industry standards.

Initial information provided by Multinet was not sufficient, in many cases, to justify its augmentation projects as prudent or efficient. However, following responses to a number of questions from the AER, the additional information, including network planning reports and a business case has enabled Zincara to more fully assess Multinet's proposals.

Zincara believes that it is prudent to ensure that the pressures in the network meet the required regulatory minimum pressure. However, Multinet is currently operating a number of their networks at higher than normal pressures (i.e. > 450kPa), and with further growth, albeit generally nominal, Zincara finds that the projects are prudent, in order to bring the operating pressures back above the regulatory minimum pressure.

The cost estimates provided by Multinet's independent estimator have been well detailed and Zincara finds them to be efficient.

1.2 CONNECTIONS

Multinet is proposing Connections capex of $115.6 million over the next AA period. The following table provides a breakdown of Connections capex for Residential, I&C (tariff V) and I&C (Tariff D).

Table 2: Total Connections Capex ($million, 2017, Real)

Connections	2018	2019	2020	2021	2022	Total
Residential	19.3	18.2	17.3	17.7	18.3	90.8
Residential marketing	0.6	0.6	0.6	0.6	0.6	3.1
Residential - total	**19.9**	**18.9**	**17.9**	**18.3**	**19.0**	**94.0**
I&C – tariff V	3.7	3.7	3.8	3.9	3.8	18.9
I&C – contract	0.5	0.5	0.5	0.5	0.5	2.7
I&C - total	**4.2**	**4.2**	**4.3**	**4.4**	**4.4**	**21.6**
Total (without marketing)	**23.5**	**22.4**	**21.6**	**22.1**	**22.7**	**112.4**
Total	**24.1**	**23.1**	**22.3**	**22.8**	**23.4**	**115.6**

(Source: Capex Overview - Connections: Table 4, 15 and Table 16)
Note: Totals may not add up due to rounding error

The forecast connections capex is made up of the number of connections multiplied by the unit cost of mains, services and meters for each customer class. As a result, Zincara analysed the unit costs from the information provided.

Conclusion

Unit Rates. Residential and I&C (tariff V) unit rates are based on the operations contract with Multinet's two service providers and applying the rates determined for 2016-17 (which are based on actual costs for financial year 2015-16):

- Residential connections. Given the fairly flat profile of unit rates over the current period, the forecast rate continues this trend, and the rate methodology appears reasonable.

- I&C (tariff V) connections. During the current AA period, the annual unit rate has been subject to significant variability, due to nature and complexity of connections. If a three-year average was applied as the basis of the forecast unit rate, then this would result in a reduction of around $1.6 million over the 2018-22 AA period. In other aspects, Multinet's methodology appears reasonable.

- I&C connections – tariff D. Multinet has forecast an annual provision ($0.502 million), totalling $2.5 million ($2017, direct) over the period, which is based on the three year-average of 2013-2015. This is consistent with the AER's approach to forecasting capex for this connection type for the current AA period. Zincara considers this approach reasonable.

Marketing capex. Introduction of a marketing program with forecast capex of $3.1 million to connect an additional 1,405 customers. This is discretionary expenditure and is subject to approval of the Opex step change.

On the basis of its review and analysis of Multinet's connections proposal, Zincara finds that the methodology for calculating the capex forecast and unit rates is reasonable and there are no step changes proposed that would impact the forecast. On that basis Zincara finds the Connections capex prudent and efficient.

1.3 MAINS REPLACEMENT

Multinet is proposing Mains Replacement capex of $266.9 million over the next AA period, with an estimated 689 kilometres.

Table 3: Mains Replacement Forecast ($million, 2017, Real)

	2018	2019	2020	2021	2022	Total
LP mains replacement	45.0	42.3	42.0	42.7	36.9	209.0
MP mains replacement	7.2	4.6	6.3	-	-	18.1
HDPE	-	-	-	8.7	7.2	15.9
Reactive mains replacement	0.2	0.2	0.2	0.2	0.2	1.0
Reactive service replacements	1.1	1.1	1.1	1.1	1.1	5.7
Total Direct (excluding escalations)	53.6	48.3	49.6	52.7	45.5	249.7
Overheads	3.2	2.9	3.0	3.2	2.7	15.0
Total incl. o'heads (excl. escalations)	56.9	51.2	52.6	55.9	48.2	264.7

(Source: Capex overview: Mains Replacement: Table1)
Note: Totals may not add up due to rounding error.

Zincara analysed the information provided by Multinet taking the following factors into account:

- Failure analysis
- Prioritisation
- Forecasting volume
- Unit cost

Conclusion

From its failure analysis and review of volumes and unit rates, Zincara has a concern about the significantly increased mains replacement program proposed by Multinet, which is reflected not just in the kilometres of mains, but also in the increased unit rates when compared to the current period. The areas of increasing complexity with the LP to HP mains replacement, along with the proposed inclusion of all medium pressure cast iron mains and some earliest generation HDPE medium pressure mains, increase planning and resourcing efforts. Multinet has noted that it can resource accordingly.

The following tables show actual/forecast for the current AA period, Multinet's proposed forecast for 2018-22 AA period, and Zincara's recommended capex and volumes, based on outcomes of this review.

Table 4: Mains Replacement Capex 2018-22 ($million, 2017, Real)

Mains Replacement – capex	**2013-17**	**Multinet**	**Zincara**
LP to HP mains replacement	133.7	223.4	151
MP mains replacement	-	19.3	11.1
Early Generation HDPE	-	17.0	-
Reactive mains replacement	5.8	1.1	1.1
Reactive Service renewals		6.1	6.1
Total capex	**139.2**	**266.9**	**169**

(Source: Capex Overview Table 1 & 11; Zincara data)
Note: Totals may not add up due to rounding error.

Table 5: Mains Replacement Volumes (kilometres) for 2018-22 AA period

Mains Replacement – volumes	**Historic**	**Multinet**	**Zincara**
LP to HP mains replacement (km)	425	625	425
MP mains replacement (km)	-	24	12.5
Early Generation HDPE (km)	-	40	-
Total (km)	**425**	**689**	**437**

(Source: Capex Overview Table 20, section 4.2.3; Zincara data**)**
Note: Totals may not add up due to rounding error.

1.4 OTHER CAPEX

The following table provides the summary of the proposed capex for the next AA period.

Table 6: Regulator, Valves and Equipment Enclosures - Capex ($000, 2017, Direct)

Strategies	2018	2019	2020	2021	2022	Total
Supply Regulators Strategy	1,379	650	694	536	537	3,796
Large Consumers Regulator Strategy	823	1,156	600	892	773	4,244
Distribution Valves Strategy	245	245	85	86	86	747
Equipment Enclosure Strategy	245	213	171	236	204	1,069
Total	**2,692**	**2,264**	**1,550**	**1,750**	**1,600**	**9,856**

(Source: Strategy documents (0003; 0005; 0011; 0014): Tables 0-1)
Note: Totals may not add up due to rounding error

This Other capex sub-category of Regulators, Valves and Enclosures (ref: Capex Overview – Other Capex: Table 5) includes capex associated with the replacement of:

- Supply regulators (including district regulators, field regulators, above ground regulators and city gates), small and large consumer regulators;
- Distribution valves (including removal of redundant syphons from the network); and
- Equipment enclosures, such as masonry buildings, pits, chain wire fences, steel kiosks and gatic covers.

Conclusion

Multinet's respective strategy documents detail performance and criticality of their assets, identifying issues in particular relating to their obsolescence, difficulty in procuring spares and continuing works programs.

Where possible replacement of valves and regulators are undertaken as part of a planned maintenance of assets and this provides the most cost effective outcome. Maintenance of sites including enclosures is part of an ongoing program arising from inspection audit. Zincara considers Multinet's approach to the various programs covered by "Regulators, Valves and Equipment Enclosures" to be good industry practice and prudent. Multinet has developed the costs of the programs using unit costs which are based on similar historic works and /or competitively sourced prices and on that basis Zincara considers the costs to be efficient.

1.5 METER REPLACEMENT

Multinet's meter replacement consists of the following programs:

- Time Expired (T/E) meter replacement – replacement of meters at the end of compliance periods;
- Field Life Extension (FLE) Testing – testing of qualifying meters nearing the end of their compliance periods;
- Meter Faults – replacement of meters that fail in service;
- Replacement of Hand Held meter reading devices; and
- Data Logger and Flow Computer installations – new and replacement installations to comply with code requirements.

In addition, Multinet proposes to undertake a Digital Gas Metering Pilot Study (Stage 2) to understand the benefits of digital metering and the costs and benefits of a mass rollout of digital meters in the future.

The above programs can be divided into two categories:

- Small Meter Programs
- Large Meter Programs

Small Meter Programs

The following table shows Multinet's proposed capex for 'small' meters, which it defines as those with a maximum capacity of 10 m^3 of flow per hour.

Table 7: Small Metering Programs ($000, 2017, Direct)

Item		2018	2019	2020	2021	2022	Total
1	Small Time Expired	2,363	86	1,355	526	416	4,746
2	Small Field Life Ext.	25	58	47	53	64	247
3	Small Defective / Faulty	103	103	104	105	105	520
4	Meter Reading Devices	70	70	70	70	70	350
5	Digital Metering	623	623	623	208	-	2,077
	Total Small	**3,184**	**940**	**2,199**	**962**	**655**	**7,940**

(Source: Small Meter Strategy: Table 0-1)
Note: Totals may not add up due to rounding error.

Conclusion

Small Meters Replacement Programs

The small meter replacement program consists of the items 1, 2 and 3 from the table above.

Multinet has used a similar methodology to the other two Victorian gas distribution businesses and undertakes its testing in accordance with AS/NZS 4944:2006. Based on its experience, Zincara considers that the methodology and assumptions used in developing the forecast volumes of the program to be prudent. Multinet uses refurbished meters in its meter replacement programs, which it says is the most cost efficient. This has historically been the approach used across Victorian gas distribution businesses.

Multinet only capitalises the purchase of new meters, with refurbished meters and all labour, used in field replacement, being deemed as Opex. As such the Unit Rates and Capex shown in the respective tables reflect meter purchase costs only.

Multinet does not smooth its annual meter replacement programs, instead maximising in-service life of the meters and relying on the service providers to resource accordingly to manage the replacement volumes. As this cost is covered within Opex, it is not clear to Zincara, whether this achieves the most cost efficient outcomes. There is no information to suggest that the delivery costs are compromised using this approach.

Based on its experience and review of Multinet's methodology, Zincara considers that the programs are prudent, and with capex reflecting the meter purchases only, that the costs are efficient.

Hand Held Devices

Hand Held Devices (item 4 from the above table) are subject to significant handling and replacement of [redacted] per year would be reasonable. The devices are used for all meter reading which is essential for Multinet's operations and as such Zincara considers the replacement program to be prudent and the capex cost efficient.

Digital Gas Metering Pilot Study

The proposed Pilot Study (item 5 from the above table) involves the installation of 10,100 digital gas meters across Multinet's gas network. The project cost is in the order of $2million plus additional IT cost ($590,000).

From the information provided, Zincara was not able to find any potential financial cost/benefit analysis to justify this study. As such, Zincara does not consider that information provided justifies a material capital expenditure of approximately $2.6million. Zincara is of the view that a prudent service provider acting efficiently (NGR 79(1)(a)) could not justify spending $2.6million without any potential customer benefits. Furthermore, Zincara does not believe that the expenditure falls under any of clauses in NGR 79(2). Zincara therefore does not consider the project prudent and efficient.

Time Expired Large Meters

The total capital expenditure for the period 2018 to 2022 is approximately $1million. The volume of meters to be replaced can vary from approximately 400 to over 1,200 meters per year. Similar to the small meter program, Multinet has adopted a similar strategy to the other two Victorian gas distribution businesses in managing its replacement program. Zincara therefore considers the program to be prudent.

In addition to the actual meter replacement, Multinet also carries out replacement of data loggers and flow commuters which are installed on large customer installations.

This equipment is critical for reliable meter reading and energy consumption of the large consumers connected to the network. As Multinet's forecast capital expenditure is based on the historical expenditure, Zincara considers the cost to be prudent and efficient.

1.6 SCADA PROJECTS

Multinet has 241 remote terminal units (RTU) at key sites in its network that are connected to its SCADA system. These RTUs are either connected to regulators and meters or installed in fringe locations of the network. Their function is to either control the pressure into the network or monitor the performance of the network or the asset.

Multinet's SCADA strategy has projects commencing from 2017 to 2022. Zincara is aware that 2017 is in the current AA period and Zincara's brief is to review the projects for the forecast period. For completeness, Zincara has reviewed all the projects including those that commence in 2017.

The projects and their related costs are shown in the table below.

Table 8: SCADA Projects ($000, 2017, Real)

Project Name	*2017*	2018	2019	2020	2021	2022	Total 2018-2022
Network Control							
Variable Network Control –High pressure	*130*	33	-	-	-	-	33
Step Control – Medium pressure (non-monitored)	-	324	324	-	-	-	648
Step Control – Medium pressure (monitored)	*98*	-	-	244	244	195	683
Step Control – Low pressure	-	244	244	244	244	244	1,220
RTU relocation / installation	-	16	32	-	16	16	80
Jordan Actuator Replacement	*641*	-	-	-	-	-	-
Aged Pressure Transmitter Replacement	*354*	-	-	-	-	-	-
Hazardous zone non-compliant site refurbishment	-	177	177	167	167	167	855

Kingfisher RTU Replacement	-	209	209	209	209	209	1,045
TRIO radio replacement & streamlining	*182*	541	340	-	-	-	881
Data-logger implementation	*186*	186	186	186	186	165	930
Gas detector installation	*52*	52	52	52	35	35	226
Vortex flow meter installation	*22*	22	22	22	-	-	66
Total	***$1,664***	**1,803**	**1,585**	**1,123**	**1,100**	**1,031**	**16312**

The first three projects are related to installing controls on field and district regulators and the remainder of the projects are related to installing, relocating and replacing RTUs or other related equipment.

Conclusion

Installation of Variable and Step Control

Multinet proposed to install variable controls on the three field regulators in the Vermont HP system. The reason for the installation is to have more effective control on the network and also to harmonise all the controls in the Vermont HP system and the Knox HP system. The Vermont HP system supplies the Knox HP system which is already on variable control.

As such, Zincara considers this project to be prudent. As the costs have been derived from previous projects, Zincara has accepted the costs as efficient.

Multinet also proposed to install step control in the Eastern MP networks and the LP networks. The justification for the project is that these areas are not going to be upgraded in the forecast period.

Zincara does not consider the projects to be prudent as there are no indications that these areas have had material increase in load that requires further control then currently exists. In addition, unlike the HP system that has a large pressure range, the MP and LP system do not and as such, there is limited benefits for installing such controls on the MP and LP systems.

RTU Relocation

The RTUs relocating project is related to the shifting of the fringe RTUs to different locations. This is due to uneven growth in the network resulting in the current RTU locations no longer reflecting the minimum pressure points in the network.

Zincara considers that this project to be prudent as it is important for the effective control of the network to monitor the actual minimum pressure point in the network. Zincara also considers this project to be efficient due to the costs been derived from historical projects.

Replacement of Control and Associated Equipment

There are six projects that are related to the replacement of various equipment due to obsolesce or equipment not complying with current Australian Standards. Zincara considers that it is reasonable to ensure that all equipment are currently supported by the suppliers, not exceeded their useful life and comply with the relevant Australian Standards. Zincara

therefore considers the projects to be prudent. The costs of the projects have been derived from historical projects or advice from the suppliers. Zincara therefore considers the costs to be efficient.

Installation of gas detectors and flow meters

The last two projects consist of installing gas detectors in pits and meters to measure the gas flows into the networks. Zincara considers both projects to be prudent for safety reasons and also for effective network management. The costs again have been derived from historical projects and advice from the supplier. Zincara therefore considers the costs to be efficient.

1.7 INFORMATION TECHNOLOGY PROJECTS

The AER sought Zincara's advice on projects related only to Multinet's gas operations. Details of these projects are shown in the table below.

Table 9: IT Gas Specific Projects ($000, 2017, Real)

Project Ref	Project Name	2018	2019	2020	2021	2022	Total
IT01	Asset Data Quality Program	105	415	311	-	-	830
IT03	GIS Gas Transmission Pipelines	-	-	2,069	-	-	2,069
IT07	Network Monitoring Capability	27	79	-	-	-	106
IT08	Mobility Integration	3,693	922	-	-	-	4,614
IT09	Digital Meters IT Support	591	-	-	-	-	5901
IT38	Customer Experience Improvements Program	1,641	-	-	-	-	1,641
IT40	Business Intelligence	230	230	231	230	230	1,151
	Total	**6287**	**1646**	**2611**	**230**	**230**	**16312**

(Source: MG_13.13.1.1_MG IT Capital Plan Cost Model 2018 -2022)
Note: Totals may not add up due to rounding error.

Zincara reviewed the position papers of the projects and Multinet's responses to questions seeking further clarification from the AER. Multinet also advised that it was no longer proceeding with the mobility integration project and as such Zincara did not review that project.

Conclusion

Asset Data Quality Program

Multinet has identified improvement opportunities after replacing its core SAP ERP asset management system and its geographical information system in the current AA period. Multinet says that it had not included the improvements when replacing the core systems to limit the risk of cost and timing overruns.

Zincara has reviewed the enhancement and considers this project to be prudent.

GIS Gas Transmission Pipeline Project

The project is related to extending the functionality of the GIS for transmission pipeline to store data for maintenance, emergency response and augmentation of the pipelines. Zincara is aware of the need to ensure that all pipeline data are stored in easily retrieval system and as such, considers this project to be prudent.

Multinet had says that the costs have been derived from previous projects. Zincara has accepted the cost as efficient.

Network Monitoring Capability

This project is related to replacing the pressure chart recorders that are approaching its end of useful life. Zincara considers this project to be prudent. Similarly, Zincara has accepted the costs as efficient as it has been derived from historical projects.

Digital Meters IT Support

This project is related to the trail of installing remotely-read digital meters. Zincara has not recommended this project as prudent (refer 1.5) and as such do not consider this project to be prudent as well.

Customer Experience Improvement

Multinet proposes to provide a customer portal to enable customers to register for digital communications and track the status of their supply and provide an improved customer transfer process. Multinet says that the system would avoid additional staff to manage an increasing volume of customer interactions.

The AEMC says that the rate of customer churn in gas has decreased and as such, the marginal increase in customer inquiries would not just this project. Zincara therefore does not consider this project to be prudent.

Business Intelligence

The project is based on developing analytical tools for carrying out business intelligence. Whilst the business case is written round improved analysis, the issue seems to be the data issues in the various systems. In addition, Multinet had not quantified the number of issues that it had experienced or the impact of the issues on its asset management. In fact, Multinet says that it was meeting its regulatory and customer services obligations.

Given the above, Zincara does not consider the project prudent.

2. INTRODUCTION

2.1 BACKGROUND

In December 2016, the Australian Energy Regulator (AER) received Multinet's revision to its Access Arrangement for the period 2018-2022. To assist in the review of the capital expenditure, the AER engaged Zincara P/L (Zincara) to advise it on some aspects of the forecast capital expenditure. In particular, the AER sought advice on the following topics:

- Augmentation
- Connections
- Mains Replacement
- Meter Replacement
- Other Costs
- SCADA
- Information Technology

In providing the advice, Zincara had to take the following factors into account:

- the efficiency and prudence of the size, scope and timing of Multinet's proposed capital expenditure (capex) allowances;

- the justification for each project or area of forecast capex ;

- the relationship of the capex allowances to the respective drivers of capex, and the efficiency and prudence of Multinet's proposed capex allowances in relation to these drivers;

- the efficiency and prudence of the service provider's proposed capex allowances in relation to capex–opex (operating costs) interactions and potential trade-offs; and

- the appropriateness of the Multinet's methods for determining its proposed capex allowances, including whether the forecasts were arrived at on a reasonable basis and represent the best forecast or estimate possible in the circumstances.

2.2 DEFINITION FOR PRUDENCE AND EFFICIENCY

Zincara has used the following definitions in its analysis:

"Prudence", means "*caution in managing one's activities to avoid undesirable consequences*[1]*".* Zincara has interpreted this to mean that for the project to be prudent, the decision is made on the basis that it is timely for the project to proceed to rectify ongoing safety and reliability issues.

'Efficiency' means *functioning or producing effectively and with the least waste of effort*[1]. This means that the choice of which option to adopt for the project must be made on the

[1] Australian Concise Oxford Dictionary

basis that the most effective solution has been adopted. The "least amount of effort" refers to the cost of the project and in that context the project must be carried out at market rates.

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

2.3 APPROACH

Zincara has carried out a desktop review on the material provided by Multinet and has assumed that the data provided is accurate. Zincara has not verified the accuracy or veracity of the data.

In carrying out this assessment, Zincara has adopted the following approach:

- Analyse the information provided in the Access Arrangement Information, Asset Management Plan and other supporting Plans and responses to AER's information requests (refer Appendix A);
- Determine what the strategic objectives of each project are;
- Consider whether the most efficient option has been adopted and the appropriateness of the timing of the project;
- Ensure that the estimated cost for the project meets the efficiency test; and
- Consider whether there are opportunities for trade-off between capex and opex

3. AUGMENTATION

3.1 INTRODUCTION

Multinet submitted four augmentation projects, with one (South Melbourne) being deferred following an update of network performance reports for NIEIR's final network growth forecasts. In response to requests for further information from the AER (IR #4) Multinet advised that updating the network performance reports for NIEIR's Final Network Growth Projects has resulted in the deferral of two projects. Korumburra is now proposed for 2021, with no change to the total project cost. South Melbourne augmentation project however has been deferred beyond the next access arrangement period and therefore removed from the forecast.

The initial and revised Augmentation forecast is as follows:

Table 10: Augmentation Capex ($million, 2017, Real)

Augmentation Projects	2018	2019	2020	2021	2022	Total
Initial Augmentation forecast	4.4	6.1	3.7	1.8	1.3	17.3
Revised Korumburra (reinforcement)	-	*(0.8)*	-	*0.8*	-	-
South Melbourne (reinforcement)	-	-	-	-	*(1.3)*	*(1.3)*
Total Revised Augmentation project	**4.4**	**5.3**	**3.7**	**2.6**	**0.0**	**16.0**

(Source: Capex Overview-Augmentation: Table 8; and revised per advice in response IR #4;)
Note: Totals may not add up due to rounding error.

Table 11: Augmentation Project Summary - Revised ($million, 2017, Real)

Augmentation Projects	2018	2019	2020	2021	2022	Total
Oakleigh HP network	3.3	2.7	3.7	-	-	9.8
Korumburra HP network	-	-	-	0.8	-	0.8
Eastern network	1.0	2.6	-	1.8	-	5.4
Augmentation Projects Total	**4.3**	**5.3**	**3.7**	**2.6**	**-**	**16.0**

(Source: Capex Overview-Augmentation: Table 8; and revised per advice in response IR #4;)
Note: Totals may not add up due to rounding error.

For the current AA period, Multinet's proposed revised Augmentation capex was $38.8 million and the AER Final Decision approved $26.0 million. Multinet is now forecasting an estimated capex of $8.0 million for the current AA period, of which $4.8 million is forecast to be spent during 2017. Projects have been deferred or no longer required due to lower network growth than forecast, reconfiguring networks and running systems at higher than normal pressures, e.g. Oakleigh HP network during winter of 2016.

However, Multinet's proposed Augmentation capex for the 2018 – 2022 AA period increases from the current period, due particularly for the need to:

- Address localised network growth especially in Korumburra and the Eastern network

- Reduce operating pressures in Oakleigh HP network, which is currently operating outside standard pressures during periods of peak demand, with this project commencing in 2017.

In developing costs estimates for each of the Augmentation projects Multinet has used the following approach:

- Reinforcement estimates are independently prepared by Advisian
- New or upgraded regulating facilities use actual costs from historical projects.

Advisian[2] advises that the construction cost estimates are developed using first principles estimation for direct costs (labour, plant, materials, subcontractor), indirect costs (typical industry benchmarking for planning, design, supervision, site establishment and traffic management), and overheads (assumed 10%). The total construction cost is the sum of the direct cost, indirect cost and contractor's margin. Escalation has not been included in Advisian's cost estimates and they are based on 2016 rates.

3.2 OAKLEIGH HP NETWORK

Proposal: Install a new field regulating station in Princes Highway Oakleigh and lay 6.7 kilometres of 300NB steel mains interconnecting the supply point to the Oakleigh HP. This project will commence during the current AA period (2017).

Table 12: Oakleigh Augmentation Capex: ($million, 2017, Real)

Capex	2018	2019	2020	2021	2022	Total
Reinforcement	3.3	2.7	2.8	-	-	8.8
New Regulator	-	-	0.9	-	-	0.9
Project	3.3	2.7	3.7	-	-	9.8

(Source: Capex Overview - Augmentation: Table 8:)
Note: Totals may not add up due to rounding error.

Multinet states[3] that it will spend $3.3 million during 2017, which is not included in the table above.

Multinet has provided a detailed business case for this project, in which it states that the Atkinsons St and Regent St regulators have been running consistently above 490kPa in the past winters in order to maintain minimum pressure above 140kPa, due to lack of capacity, and have been running at 510kPa during high demand hours. Synergi modelling indicates that almost a third of the entire network will be experiencing mains pressure less than 140kPa, if the supply regulators are set to 450kPa (the pressure profile shows -23kPa). Following the augmentation project, minimum network pressures will improve to 300kPa under normal operating conditions.

[2] Advisian – Independent Estimates Report – Augmentation and Mains Replacement Projects, page 2.
[3] Capital Expenditure Overview – Augmentation: section 5.3, page 12

Three options have been considered, including "do nothing", preferred route and an alternative route. The alternate route provides a higher cost solution, and the do nothing solution increases the risk of outages in the near term future. The recommended solution includes construction of a new regulator (off the 840kPa system) and laying 3.1 kilometres of 300 steel main (stage A) with a tie-in to an existing 150mm steel main. Stage B involves laying 3.6 kilometres of steel main with a tie-in to an existing 200mm steel main and then laying 800 metres of 180 P10 with a tie-in to an existing P6 main. This augmentation route provides an additional benefit of providing a high pressure spine that enables the cost effective replacement of large low pressure mains via insertion and other smaller infrastructure that otherwise would not be possible. The timing of this augmentation project takes into consideration the mains renewal program which is also scheduled in this area during the 2018-22 AA period.

Cost estimate:

The business case has included a detailed cost estimate for each stage of the project.

- $11.245 million (including works undertaken during 2017). Comprising 3,100 metres of 300mm steel costing $5.093 million (stage A); and 3,600 metres of 300mm NB steel and 800 metres of 180P10 costing $6.152 million.

- $0.923 million. New supply regulator expenditure shown as 2020. Pricing based on Highett redevelopment works – pressure regulating station[4].

Zincara believes that it is prudent to ensure that the pressures in the network meet the required regulatory minimum pressure. With the Oakleigh network experiencing widespread pressure constraints and the need to operate the networks near maximum allowable operating pressures, together with modelling showing around 30% of the network would experience pressures below 140kpa, Zincara finds that the project is prudent and, following a review of the detailed cost estimates, that the costs are efficient.

3.3 SOUTH MELBOURNE HP NETWORK

Proposal: Lay 1.5 kilometres of 180NB polyethylene main in Lorimar Street, Fisherman's Bend.

Table 13: South Melbourne Augmentation Capex: ($million, 2017, Real)

Capex	2018	2019	2020	2021	2022	Total
Project	-	-	-	-	(1.3)	(1.3)

(Source: Response AER-MG IR #4)

Multinet has advised that revised growth forecasts have enabled this project to be deferred beyond the 2018-2022 AA period (ref: IR #4).

[4] Capital Growth Plan section 5.7.4 Table 5.6.

3.4 KORUMBURRA HP NETWORK

Proposal: Lay 0.5 kilometres of 100NB steel mains and 1.9 kilometres of 125NB polyethylene from Korumburra City Gate, along Clancy's Road.

Table 14: Korumburra Augmentation Capex: ($million, 2017, Real)

Capex	2018	2019	2020	2021	2022	Total
Project	-	(0.8)	-	0.8	-	0.8

(Source: Response IR #4: revised timing; IR #8: Table 2)

Multinet states that the Korumburra HP network is an isolated network supplying the towns of Korumburra, Wonthaggi and Inverloch, with strong network growth being experienced during the current AA period and forecast to continue in the short to medium term. NIEIR's updated growth forecast has delayed the need for network reinforcement by two years[5]. Burra Foods in Korumburra is a large tariff D customer which accounts for 70% of the total demand for the township. The network performance report provides forecast load growth data by postcode, provided by NIEIR.

The network performance report shows that minimum network pressure will be 121kPa in 2022 without augmentation. After augmentation the minimum network pressure will be 256kPa. Following a request from the AER for additional information, (response IR #8) Multinet provided pressure profile screenshots before and after reinforcement.

In addition, Multinet considered three reinforcement options[6], with the recommended option providing the lowest cost. This option increases network pressure for the South Gippsland network, provides an additional source of supply and hence improved security of supply to the Korumburra region and facilitates additional connections along Clancy's Road.

Cost estimate:

Project cost estimates have been prepared by Multinet's independent estimator, Advisian. Details have been reviewed and considered to be efficient.

Zincara believes that it is prudent to ensure that the pressures in the network meet the required regulatory minimum pressure. Given the fact that an updated NIEIR growth forecast has allowed the project to be deferred for two years, Zincara considered the likelihood of further slowing growth which would enable the project to be deferred into the following AA period. However, given the fact that the Korumburra network modelling shows minimum pressures will drop to 121kPa in 2022 without Augmentation, along with other benefits of proceeding, Zincara accepts that it would be prudent to complete this augmentation in the 2018-22 AA period, and following a review of the detailed cost estimates that the costs are efficient.

[5] *AER-MG IR #4*
[6] response IR #8

3.5 EASTERN HP NETWORK

Proposal: Several network reinforcement projects in the Knox and Ringwood sub-networks in 2018 and the Olinda North and Olinda South sub-networks in 2021. In addition, five supply regulators require upgrading.

Table 15: Cost: ($million, 2017, Real)

Capex	2018	2019	2020	2021	2022	Total
Total cost	1.0	2.6	-	1.8	-	5.4

(Source: Capex Overview – Augmentation Table 8)

Table 16: Augmentation Capex Details ($million, 2017, Real)

Eastern Augmentation project	2018	2019	2020	2021	2022	Total
Reinforcements:						
Sherbrooke Rd, Sassafras	-	-	-	0.955	-	0.955
Old Coach Rd, Kalorama	-	-	-	0.780	-	0.780
Selkirk Ave, Knox	0.212	-	-	-	-	0.212
Ringwood Augmentation: Bedford Rd ($137) Warrandyte/Ringwood Rd ($78) Colman Rd ($21) Braden Brae Dr ($56)	0.292	-	-	-	-	0.292
Reinforcement Total:	**0.504**	**-**	**-**	**1.735**	**-**	**2.239**
Regulator upgrades:						
Vermont (HP stage 2) – P3-002	0.530	-	-	-	-	0.530
Lincoln Rd (Olinda Nth) - P4-120	-	0.750	-	-	-	0.750
Blaxland Dr (Knox) – P4-250	-	0.300	-	-	-	0.350
Glenfern (Olinda Sth) – P4-182	-	0.750	-	-	-	0.750
Azalea Ct (Ringwood) – P4-256	-	0.750	-	-	-	0.750
Regulator Upgrades Total:	**0.530**	**2.550**	**-**	**-**	**-**	**3.080**
Eastern Augmentation Total:	**1.034**	**2.550**	**-**	**1.735**	**-**	**5.319**

(Source: Response IR #8)
Note: Totals may not add up due to rounding error.

The Eastern HP network is Multinet's largest network, supplying approximately 30 per cent of Multinet's customers and comprises four sub-networks, namely Ringwood HP, Knox HP, Olinda North HP and Olinda South HP. The network has experienced "modest but steady growth within pockets" resulting in supply-related constraints, with the network regulators required to operate above normal standard operating conditions.

(a) Reinforcements

The Eastern HP Network Performance Report identifies two groups of reinforcements, the first being for Ringwood/Knox HP networks in 2018 and the second group being for Olinda South/Olinda North HP networks in 2021.

In response for further information from the AER (IR #8), Multinet provided details of minimum pressures before and after augmentation for each of the sub-projects. With respect to Ringwood/Knox networks, figure 5-4, shows pre-augmentation minimum pressure of 72kPa (with three discrete areas experiencing mains pressure below 140kPa). Following a group of five reinforcements the minimum pressure is 141kPa and this pressure would be experienced in the Olinda region, rather than in Ringwood/Knox (refer IR #8). The additional information states that the network supply regulators that feed the Eastern system currently operate at pressures between 450kPa and 490kPa during normal network operations and hence the options of increasing pressure for this system have been exhausted and now require reinforcement solutions.

In 2021, Multinet proposes reinforcement in Olinda South HP network and reinforcement in Olinda North HP network. The pre-augmentation pressure profile shows minimum pressure of 95kPa and post-augmentation pressure profile shows minimum pressure of 143kPa. The additional information in response IR #8 shows the before and after minimum pressures associated with each project. The recommended projects represent the most cost effective options in addressing the localised nature of the affected area.

Advisian cost estimates have been prepared for each of the reinforcement projects. Project cost estimate details have been reviewed and considered to be efficient. Zincara noted that the Advisian cost estimate for Sherbrooke Road, Sassafras, was $0.890 million and the Capital Growth Plan showed $0.912 million. In its response to this question (IR #8), Multinet agreed that there was a discrepancy in the costs when transcribing the Advisian cost estimates into their model. The total project cost of these projects is $0.955 million.

(b) Regulator Upgrades

Multinet engaged Oil Gas Power International to perform regulator capacity analysis. Forecast regulator flow requirements and their capacities are shown in the Eastern Network Performance Report, appendix C. Multinet says that the suite of regulator capacity upgrades scheduled for 2019 are required as they are exceeding their optimum design capacity (two) (per AER-MG IR #4,) or design velocity limit of 36 m/s (two) (refer network performance report). Excessive gas flow rates through three of the five stations have increased the scope of these capacity upgrades to include new supply offtakes which increases the cost of each project.

Vermont (HP upgrade – stage 2). The Capital Growth Plan, table 5-5 and further information provided in response to questions from the AER (IR #8), shows this regulator requires upgrade in 2018, at a cost of $530,000. Note that stage 1 expenditure for Medium Pressure upgrade to High pressure is shown to be undertaken in 2017. The Eastern network performance report states that the forecast flow is around 20,000 m3/h, which is about 150% of its designed capacity. The report recommends upgrade by winter 2017. Response IR #8, states that the stage 2 project involves the consolidation of four regulating runs at Vermont Outstation into two. Both runs feed the Vermont HP network. This will improve the maintainability of the regulating facility, allow SCADA control of the station outlet pressure and increase site capacity to 40,000 SCMH for additional support of the Knox

network. Multinet advises (IR #8) that while the project has been defined as network augmentation given the resulting increase in station capacity, it had not been included in the current network performance report as it was a carryover from an existing strategy to address the functionality of the wider Vermont Outstation.

The Eastern network performance report (and further response IR #8) states that prior to winter 2020, it is recommended to upgrade the Blaxland Dr regulator which is exceeding 80% of its designed capacity. This "capacity upgrade" includes the change-out of existing regulators with larger capacity units and limited associated spooling modifications to accommodate the new units. Three regulator stations require a "velocity" upgrade. They are the Lincoln Rd, Glenfern Rd and Azalea Ct regulators, which are exceeding their designed velocity limit of 36 m/s. Their upgrade includes the same works as for the capacity upgrade and, in addition, a new tapping point to the inlet of the regulator station.

Zincara believes that it is prudent to ensure that the pressures in the network meet the required regulatory minimum pressure. There are a suite of sub-projects associated with the overall Eastern HP network augmentation, which in total provide additional supply capacity to the network. In completing the analysis of these projects, additional information provided by Multinet has enabled Zincara for review the augmentation more fully. Zincara finds that the sub-projects will improve the supply constraints of the Eastern HP network and hence are prudent. Zincara's review of the cost estimates finds that the costs are efficient.

3.6 CONCLUSION

For each of Multinet's Augmentation projects Zincara considers that the network planning process and the load forecast methodology to be consistent with industry standards. The estimation methodology for the projects is also considered to be consistent with industry standards.

Initial information provided by Multinet was not sufficient, in many cases, to justify its augmentation projects as prudent or efficient. However, following responses to a number of questions from the AER, the additional information, including network planning reports and a business case has enabled Zincara to more fully assess Multinet's proposals.

Zincara believes that it is prudent to ensure that the pressures in the network meet the required regulatory minimum pressure. However, Multinet is currently operating a number of their networks at higher than normal pressures (i.e. > 450kPa), and with further growth, albeit generally nominal, Zincara finds that the projects are prudent, in order to bring the operating pressures back above the regulatory minimum pressure.

The cost estimates provided by Multinet's independent estimator have been well detailed and Zincara finds them to be efficient.

4. CONNECTIONS

4.1 INTRODUCTION

Multinet is proposing Connections capex of $115.6 million over the next AA period. The following table provides a breakdown of Connections capex for Residential, I&C (tariff V) and I&C (Tariff D).

Table 17: Total Connections Capex ($million, 2017, Real)

Connections	2018	2019	2020	2021	2022	Total
Residential	19.3	18.2	17.3	17.7	18.3	90.8
Residential marketing	0.6	0.6	0.6	0.6	0.6	3.1
Residential - total	**19.9**	**18.9**	**17.9**	**18.3**	**19.0**	**94.0**
I&C – tariff V	3.7	3.7	3.8	3.9	3.8	18.9
I&C – contract	0.5	0.5	0.5	0.5	0.5	2.7
I&C - total	**4.2**	**4.2**	**4.3**	**4.4**	**4.4**	**21.6**
Total (without marketing)	**23.5**	**22.4**	**21.6**	**22.1**	**22.7**	**112.4**
Total	**24.1**	**23.1**	**22.3**	**22.8**	**23.4**	**115.6**

(Source: Capex Overview - Connections: Table 4, 15 and Table 16)
Note: Totals may not add up due to rounding error.

Residential connections capex (with marketing) is $94.0 million, which represents an increase of $5.1 million (5.7%). Total capex for I&C connections is $21.6 million, an increase of $5.3 million (32%), comprising $18.9 million for I&C (tariff V), plus an annual capex provision ($502,000 direct) for I&C (tariff D) totalling $2.7 million.

4.2 CONNECTIONS FORECAST METHODOLOGY

Multinet forecasts connections[7], other than for tariff D, in four steps:

- Determine volumes of unitised jobs. Volumes are based on the historic average number of unitised jobs undertaken over the last two to three years, depending on data availability, and applying growth indices that are prepared annually by the Australian Construction Industry Forum – ACIF.

- Multiply volumes by the standardised unit rates (agreed with the two service providers) and applying real labour cost escalators (based on advice from BIS Shrapnel), but zero material cost escalations for the forthcoming year. Unit rates applied to the forthcoming AA are the 2016-17 rates that are based on actual outturn costs (AOC) that was incurred from 1 July 2015 to July 2016 (ref: section 6.1.2, page 23).

[7] Capex overview – residential and commercial and Industrial connections: section 6, page 21

- Forecast customer contributions by activity code, based on historical trends.

- Finally undertake a top-down validation of the connections capex forecast

Given the low volume and unique nature of Tariff D connections, Multinet forecast this category based on historical expenditure. This is consistent with the AER's approach to forecasting capex for this connection type for the current AA period.

Zincara believes that the above methodology is reasonable on the basis that Multinet validates growth forecasts and applies unit rates that are contractually agreed with its competitively sourced contractors. Multinet also states that it is the same as recently used to forecast connections for United Energy in its recent Regulatory Proposal and accepted by AER[8].

4.3 SERVICE PROVIDERS

During the current AA period Multinet implemented a business transformation project adopting a two-region model for delivering network operations, with separate service providers for each region. A competitive tender process resulted in Comdain being the successful tenderer. The previous service provider, Jemena, had a right under its Operating Services Agreement, to match Comdain's winning bid. As a result, Comdain and ZNX (a Jemena subsidiary) became the Network Operations Service providers for the two regions.

Multinet provided a description of its unit rate adjustment process[9] and Oakley Greenwood states (ref: Capex overview – connections: section 5.2) "t*he approach for revising those rates over the life of the contract is, in our opinion, reasonable, and likely to provide robust approach to applying competitive tension to the annual process for deriving new unit rates"*.

Each connection comprises a series of unitised jobs, which have standard unit rates, agreed with the two service providers. The exceptions to this are for large customer connections (eg tariff D) where Multinet may establish a project.

4.4 DEMAND FORECAST

Volumes[10] are in line with those experienced during the current AA period, once the additional connections forecast as a result of the proposed marketing initiatives are included. Volume of residential connections is forecast 42,009 (with marketing), compared with 42,141 for current AA period. I&C (tariff V) connections is forecast 2,148, compared with 2,277.

Volumes are based on the number of unitised jobs undertaken over the last two to three years, depending on data availability, and apply growth indices that are prepared annually by the Australian Construction Industry Forum – ACIF. The ACIF Melbourne forecast provides an economic/industry growth forecast at a more granular level and at wider areas than Multinet's supply area. Multinet has checked these indices against actual historical works and it has found a strong correlation to actual works for their specific categories. Multinet has provided its volume forecast in a forecasting model to AER.

[8] AAI 13.10.3 and Capex overview – residential and I&C connections: section 8.2
[9] Capex Overview – Connections: section 6.1.2, page 23
[10] Capex Model: Customer Model - ACIF

Table 18: Connections Volumes

Connections	2018	2019	2020	2021	2022	Total
Residential	8,633	8,173	7,741	7,888	8,169	40,604
Residential marketing	281	281	281	281	281	1,405
Residential (with marketing)	8,914	8,454	8,022	8,169	8,450	42,009
I&C – tariff V	420	418	431	443	436	2,148

(Source: Capital Growth Plan: Table 4.3)

Because I&C (tariff D) is low volume and each connection is unique nature, Multinet has forecast capex based on the three year average 2013-15, rather than a unit rate, which is consistent for this type of connection for the current access period.

4.5 MARKETING STRATEGY

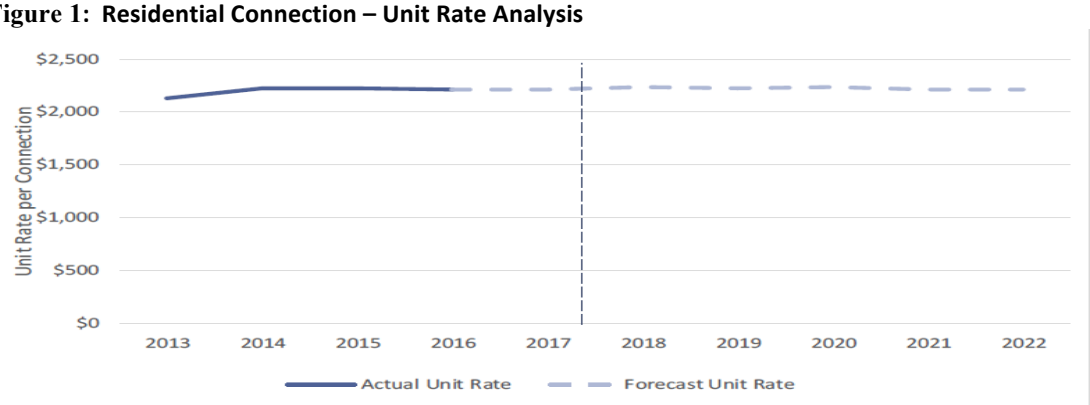
Marketing strategy, proposed to be introduced from 2018, to encourage uptake of natural gas for new and existing customers, is expected to deliver an additional 281 residential connections per year from 2018, totalling 1,405 over AA period, with an additional cost of $3.1 million. The marketing step change has been included in Multinet's Opex forecast for the forthcoming AA period. It only impacts residential connections capex. Marketing connections would be considered as discretionary.

4.6 UNIT RATES FORECAST AND ANALYSIS

Residential and I&C connections[11] unit rates are determined in accordance with the Operational and Management Services Agreements (OMSA) with its two service providers. Multinet uses the most current unit rates, rather than average of the current AA period. For the 2018-22 AA period they are the 2016-17 rates that are based on the actual outturn costs (AOC) that Multinet has incurred from 1 July 2015 to 30 June 2016.

The following figures show the unit rates for the current period and the next AA period. The trends show only marginal change across the two periods.

Figure 1: Residential Connection – Unit Rate Analysis

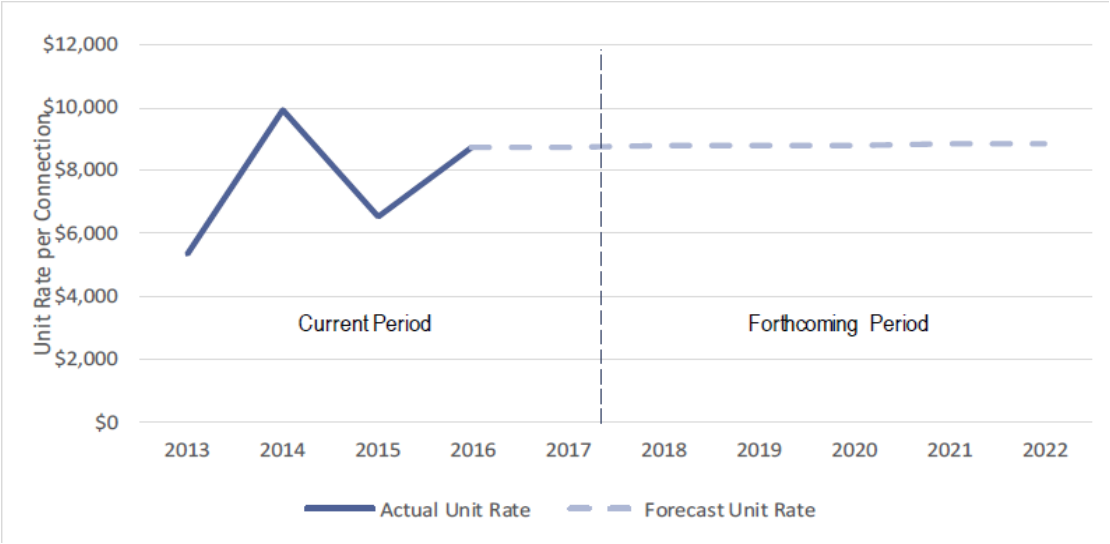


(Source: Capex Overview: Connections: Figure 4)

[11] Capex Overview – Connections: 6.1.2; Capex model – ACIF;

With respect to I&C unit rates, the following figure shows there has been much more variability during the current period, reflecting the differences in the nature and complexity of these connections. As noted above the unit rates are based on the actual outturn costs (AOC) that Multinet has incurred from 1 July 2015 to 30 June 2016.

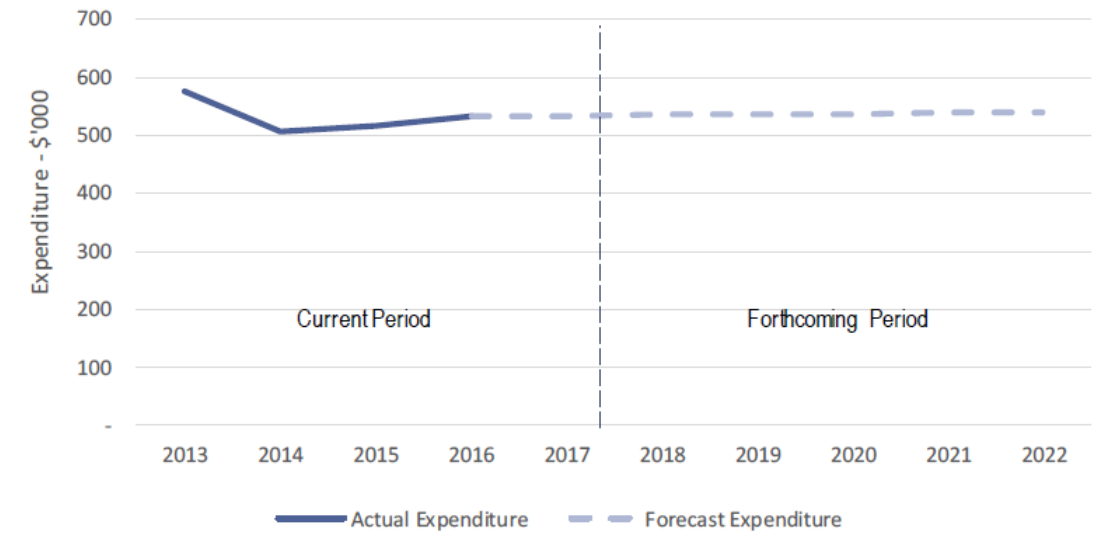
Figure 2: I&C Connections – Unit Rate Analysis



(Source: Capex Overview: Connections: Figure 5)

Given the specialist nature of I&C (tariff D) connections the forecast is based on the historical expenditure, three year average (2013 – 2015). Tariff D consistently around $0.500 million per year since 2013 and forecast $0.502 million per year totalling $2.5 million for the next AA period.

Figure 3: Tariff D – Actual v Forecast Expenditure



(Source: Capex Overview: Connections: Figure 6)

4.7 BENCHMARK ANALYSIS

The following table shows the connections unit rates breakdown into its component assets (mains, services and meters), as calculated using the capex model information.

Table 19: Connections analysis Unit Rates ($million, 2017, Direct)

Connections	Main	Service	Meter	Total
Residential	[redacted]	[redacted]	[redacted]	[redacted]
I&C – tariff V	[redacted]	[redacted]	[redacted]	[redacted]

(Source: Capex Model – customer model - ACIF)

I&C – contract: Multinet proposes an "allowance" of $0.502 million per year totalling $2.5 million ($2017, direct).

By way of a benchmark comparison, with the other two Victorian Distribution businesses, all three have relatively similar forecast unit rates for residential connections. Multinet's service component appears relatively higher but is offset with a lower mains component. These variations may reflect the location and type of connections within Multinet's network. Due to the variety of contracting arrangements across the businesses, only AGN provided information that enabled a further breakdown of residential connections into new estate, existing home, and multi-user.

For I&C connections, AGN and AusNet Services have similar forecast unit rates, while Multinet's rate is significantly lower. There was also significant variation across the businesses for mains, services and meters, which may reflect the variation in size and location of I&C (tariff V) connections.

4.8 CONCLUSION

Volume Forecast. Zincara considers that Multinet's methodology and application of ACIF indices, is reasonable.

Unit Rates. Residential and I&C (tariff V) unit rates are based on the operations contract with Multinet's two service providers and applying the rates determined for 2016-17 (which are based on actual costs for financial year 2015-16):

- Residential connections. Given the fairly flat profile of unit rates over the current period, the forecast rate continues this trend, and the rate methodology appears reasonable.

- I&C (tariff V) connections. During the current AA period, the annual unit rate has been subject to significant variability, due to nature and complexity of connections. If a three-year average was applied as the basis of the forecast unit rate, then this would result in a reduction of around $1.6 million over the 2018-22 AA period. In other aspects, Multinet's methodology appears reasonable.

- I&C connections – tariff D. Multinet has forecast an annual provision ($0.502 million), totalling $2.5 million ($2017, direct) over the period, which is based on the three year-

average of 2013-2015. This is consistent with the AER's approach to forecasting capex for this connection type for the current AA period. Zincara considers this approach reasonable.

Marketing capex. Introduction of a marketing program with forecast capex of $3.1 million to connect an additional 1,405 customers. This is discretionary expenditure and is subject to approval of the Opex step change.

On the basis of its review and analysis of Multinet's connections proposal, Zincara finds that the methodology for calculating the capex forecast and unit rates is reasonable and there are no step changes proposed that would impact the forecast. On that basis Zincara finds the Connections capex prudent and efficient.

5. MAINS REPLACEMENT

5.1 INTRODUCTION

Multinet is proposing Mains Replacement capex of $266.9 million over the next AA period, with an estimated 689 kilometres.

Table 20: Mains Replacement Forecast ($million, 2017, Real)

	2018	2019	2020	2021	2022	Total
LP mains replacement	45.0	42.3	42.0	42.7	36.9	209.0
MP mains replacement	7.2	4.6	6.3	-	-	18.1
HDPE	-	-	-	8.7	7.2	15.9
Reactive mains replacement	0.2	0.2	0.2	0.2	0.2	1.0
Reactive service replacements	1.1	1.1	1.1	1.1	1.1	5.7
Total Direct (excluding escalations)	53.6	48.3	49.6	52.7	45.5	249.7
Overheads	3.2	2.9	3.0	3.2	2.7	15.0
Total incl. o'heads (excl. escalations)	56.9	51.2	52.6	55.9	48.2	264.7
Escalations	0.3	0.3	0.4	0.6	0.6	2.2
Total (incl. o'heads and escalations)	**57.2**	**51.4**	**53.0**	**56.5**	**48.8**	**266.9**

(Source: Capex overview: Mains Replacement: Table1)
Note: Totals may not add up due to rounding error.

Table 21: Multinet Mains Replacement Program (kilometres) – 2018-2022

	2018	2019	2020	2021	2022	Total
LP mains replacement	126.4	127.7	127.8	135.4	107.4	624.7
MP mains replacement	10.2	5.5	8.1	-	-	23.8
HDPE (early generation)				22.3	17.7	40.0
Total	**136.6**	**133.2**	**135.9**	**157.7**	**125.1**	**688.5**
Reactive mains replacement (units)						
Reactive service replacements (units)	*367*	*367*	*367*	*367*	*367*	*1,837*

(Source: Capex overview: Table 20)
Note: Totals may not add up due to rounding error.

Key drivers for mains replacement

Multinet states[12] that its mains replacement strategy "*primarily focusses on minimising, to the extent practicable, public and maintenance personnel safety risks by targeting mains in areas that have high incidence of mains fracture and leakage. Further the strategy targets the integrity and performance of mains in areas that have suffered from loss of supply associated with water in mains incidents, and have limited capacity to service additional demand from existing and new customer connections.*"

Multinet also states[13] that "*a 30 year mains replacement program was introduced by Multinet Gas in 2003 to address societal risk posed from failure of cast iron mains and resulting risk of incidents leading to loss of life or significant property damage. The objective is to decommission all cast iron mains on Multinet's low pressure network by 2033 (i.e. within 30 years).*"

Multinet has extended its mains replacement program to include other materials and pressures, so now includes:

- Continuation of the 30 year program for the decommissioning of all low pressure cast iron mains by 2033;
- Targeted replacement of all remaining medium pressure cast iron mains by end 2021;
- Targeted replacement of earliest 31 kilometres of first generation HDPE mains by 2022

5.2 CURRENT PERIOD

Table 22: AER Decision and Actual – 2013 - 2017 ($million, 2017, Real)

Mains Replacement		AER	Actual
LP to HP replacement	Final Decision	51.8	133.7
	Pass Through	56.7	
LDCI replacement		3.4	-
LPDZ replacement		0.4	-
Unplanned service		6.5	5.8
Total		**118.7**	**139.2**

(Source: Overview: Tables 9, 10, 11)
Note: Totals may not add up due to rounding error.

Large Diameter Cast Iron (LDCI) mains replacement. The AER's Final Decision included capex for three specific projects. Riversdale Road, Hawthorn – rather than downgrade pressure, Multinet now proposes that the MP main be permanently abandoned in 2020 in line with the LP to HP mains replacement in the Hawthorn area. Auburn Road, Hawthorn –

[12] Capex Overview – Mains Replacement: section 6, page 26
[13] Distribution Mains Strategy: Executive Summary, page 3

sections of the MP main are now scheduled to be included in the LP to HP program in forthcoming period. Summerhill Road, Glen Iris – following reassessment, Multinet now proposes to abandon at completion of the LP to HP program in the Ashburton area. Multinet advises that other projects, not included in the AER allowance, have been completed or are scheduled to be completed during the current AA period, while the St Kilda and South Melbourne projects will be deferred to 2018-22.

Low Pressure Designated Zone (LPDZ) mains replacement. Completed as part of the LP to HP mains replacement program.

Unplanned service renewals. The AER's Final Decision was based on Multinet's actual 2012 number of services renewed. Multinet expects that actual renewal volumes will be in line with the AER allowance, totalling 1,797 renewals.

Multinet is confident that it will complete the forecast 527 kilometres of LP to HP mains replacement in the current AA period, albeit with a different profile to the pass through application and allowance. Following the AER's request for an update on progress with the mains replacement (IR #18), Multinet advised that it actually completed 113 kilometres of low pressure mains (versus forecast of 151 kilometres, per Mains Replacement Overview document: table 12) and propose to complete the current period balance of 163 kilometres during 2017 (compared with forecast 125 kilometres). Multinet stated that the lower volume in 2016 was mainly as a result of commencing work in areas with more complex scopes and increasing difficulty.

Table 23: Multinet Mains Replacement Program (kilometres) – 2013-2017

	2013	2014	2015	2016	2017	Total
Benchmark LP mains replacement	56	110	155	91	114	527
Actual / Estimated	56	110	85	113	163	527

(Source: Capex overview: Table 12 and updated following Multinet's IR #18 response)
Note: Totals may not add up due to rounding error.

5.2.1 Unit Rates – Current Period

The forecast total cost of replacing LP mains in the current AA period will exceed the AER allowance due to the increased unit rates. The AER allowance unit rate, including cost pass through, was $206/m, whereas the actual/estimated unit rate will be $253.7/m. While the four years 2013 to 2016 show actual unit rates of $203.6/m, $218.2/m, $242.4/m and $225.8m respectively, the unit rate for 2017 is estimated to be $348.9/m.

Multinet notes that the significant increase in 2017 is due to scheduled construction of 15 kilometres of grid main, with 7 kilometres having a tendered rate of $893/m for the "Grid Main North, Prospect Hill Road to Elgar Road" compared with the AER allowance of $513/m ($, Real 2017). Similarly a tendered rate of $362/m for 6.6 kilometres of the "Balwyn North / Mont Albert" program compared to the AER allowance of $151/m ($, Real 2017), and 43 kilometres being based on estimates ranging from $313/m to $362/m (ref: Capex Overview: section 5.3).

Unplanned Service Renewals. Multinet noted that for the Service renewal domestic LP activity, which accounts for 60% of the annual unplanned service renewal volumes, is 13%

above the average AER allowance when compared to 2015 actuals, which reflects the increased cost associated with a higher proportion of more challenging Service Renewals in higher density areas.

5.3 FORTHCOMING ACCESS ARRANGEMENT PERIOD - 2018-2022

5.3.1 Mains Replacement Forecasting Methodology

Multinet states[14] that its forecasting methodology seeks to optimise the mains replacement work to achieve the lowest sustainable costs over the long-term, considering the following factors, in order of priority:

1. Maintain and improve safety by focussing on the replacement of MP cast iron mains, due to the safety risk, particularly due to the increased release of gas.

2. Address local capacity constraints

3. Minimise local interruptions to supply associated with planned replacement works

4. Optimise maintenance costs

Multinet notes that the location of the LP main replacement works for the forthcoming AA period targets those areas where synergies can be achieved by coordinating LP replacement with the removal of MP cast iron mains.

Multinet also forecasts a capex allowance for unplanned service renewals and reactive replacement of mains. Volumes are based on historical trends.

Multinet's forecast of unit rates reflects the geographic progression of the LP to HP mains replacement program into higher density inner suburban areas.

5.3.2 LP to HP Mains Replacement Program

For the forecast period, 2018 – 2022, Multinet is proposing the following LP to HP mains replacement program.

Table 24: LP to HP Mains Replacement Capex, Volume, Unit Rate – 2018-2022 ($million, 2017, Real)

LP to HP Mains Replacement	2018	2019	2020	2021	2022	Total
Capex ($ million)	48.0	45.1	44.8	45.8	39.6	223.4
Volumes (kilometres)	126.4	127.7	127.8	135.4	107.4	624.7
Unit Rates ($/m)	379.8	353.0	350.6	338.4	369.1	357.5

(Source: Overview: Table 21).
Note: Totals may not add up due to rounding error.

[14] Capex Overview – Mains Replacement: section 6, page 26

Multinet's forecast is consistent with the average annual volume of work required in order to complete their LP to HP mains replacement program by 2033 and it has prioritised the program based on:

- Cast iron high fracture rate postcodes; and
- High leak rate postcodes

Then it has determined which work will be undertaken having regard for:

- The availability of existing HP mains;
- Synergies with the removal of MP cast iron mains
- Their practice of working in from the outer boundary of the LP network, and
- Supply constraints on the network

As a result, Multinet has identified 44 discrete packages of work ranging in length from five kilometres to 28 kilometres, covering 27 postcodes.

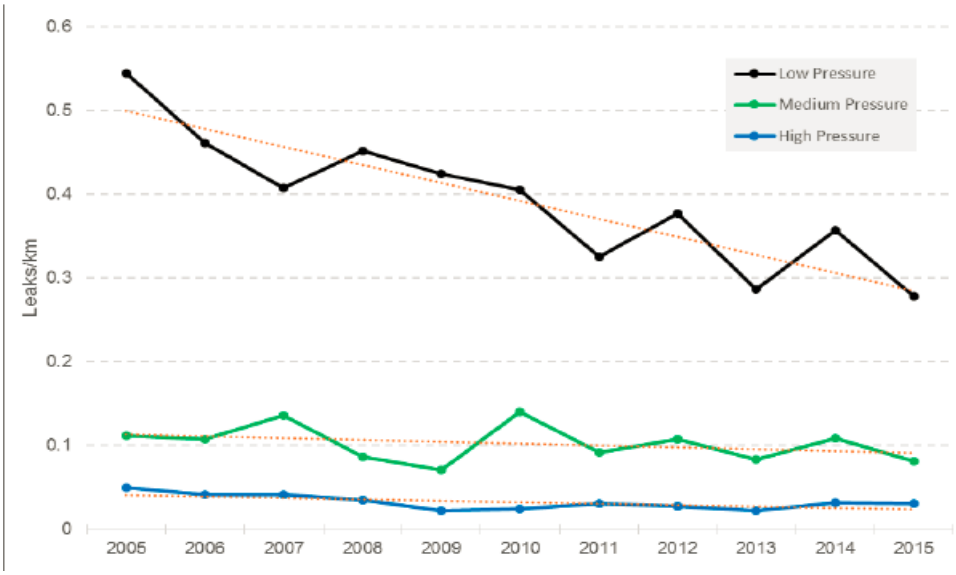
Multinet has approximately 1,271 kilometres of cast iron mains remaining, with 1,234 kilometres (97%) located within the low pressure network. In addition there are 333 kilometres of steel mains (protected and unprotected).

5.3.2.1 Failure Analysis

The primary mode of failure for cast iron is pipe fracture. In addition, cast iron is susceptible to joint failure and corrosion. For unprotected steel mains the primary concern is with corrosion and the development of leaks over time.

Leaks. With reference to the following graph, the low pressure leak incident rate (LIR) has been trending downwards since 2005.

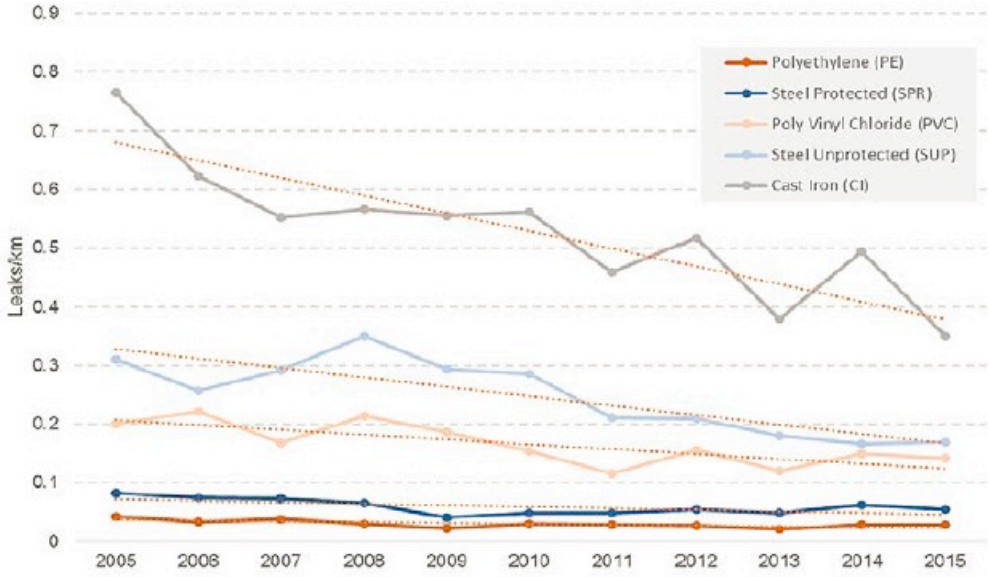
Figure 4: Distribution Mains Leak Incident Rate by Pressure



Source: Distribution Mains Strategy: Figure 2-5)

Similarly the LIR for cast iron and unprotected steel LIR have a downward trend, as shown in the following graph. At 2015, the LIR for cast iron is 0.35 and for unprotected steel it is 0.17. The LIR for low pressure networks is significantly higher than for medium pressure and high pressure. Cast iron and unprotected steel show the highest LIR by material type, supporting Multinet's approach to focus on proactive mains replacement on these asset types.

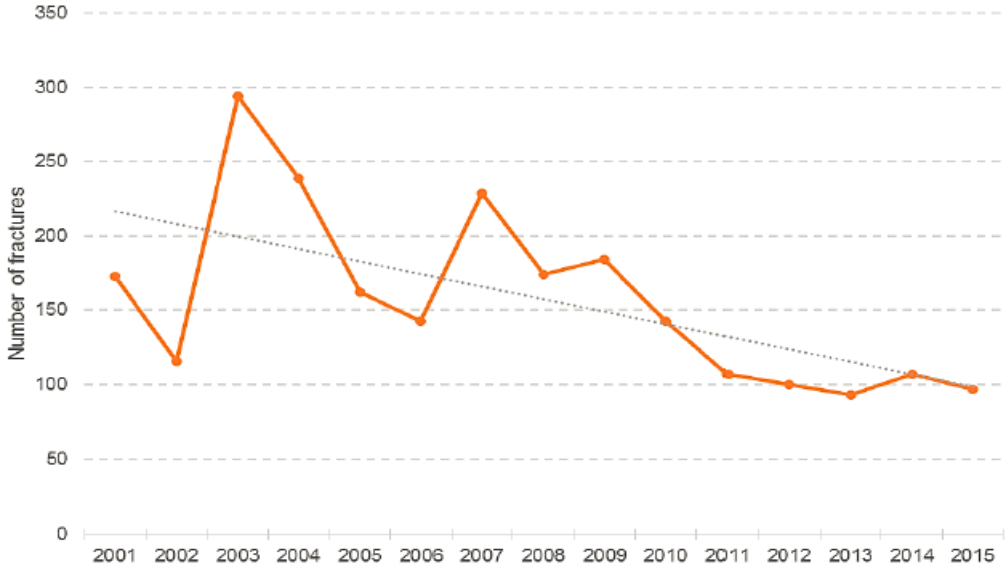
Figure 5: Distribution Mains Leak Incident Rate by Material



(Source: Distribution Mains Strategy Figure 2-6)

Fractures (ref: Distribution Mains Strategy: 2.4.3 and Figure 2.8). Multinet states that historically it has experienced cast iron fractures on 18% of its remaining cast iron network. However, 54% of these fractures are recurring fractures on the same pipe. Since 2003 there has been a downward trend in the number of cast iron fractures, which Multinet says is a direct result of targeted cast iron mains replacement program, see figure below.

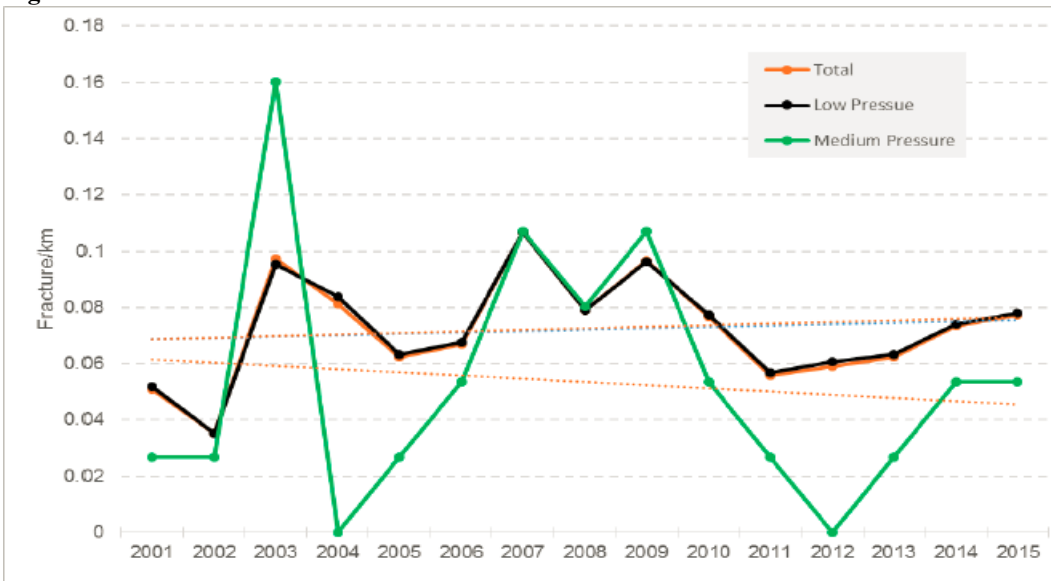
Figure 6: Distribution Mains Cast Iron Fracture Analysis



(Source: Distribution Mains Strategy Figure 2-7)

The cast iron fracture incident rates (FIR) is approximately 0.08 fracture incidents per kilometre (FIR). From 2003 to 2015, the average FIR has been relatively flat (0.078), with annual variability, see figure below.

Figure 7: Distribution Mains Cast Iron Fracture Incident

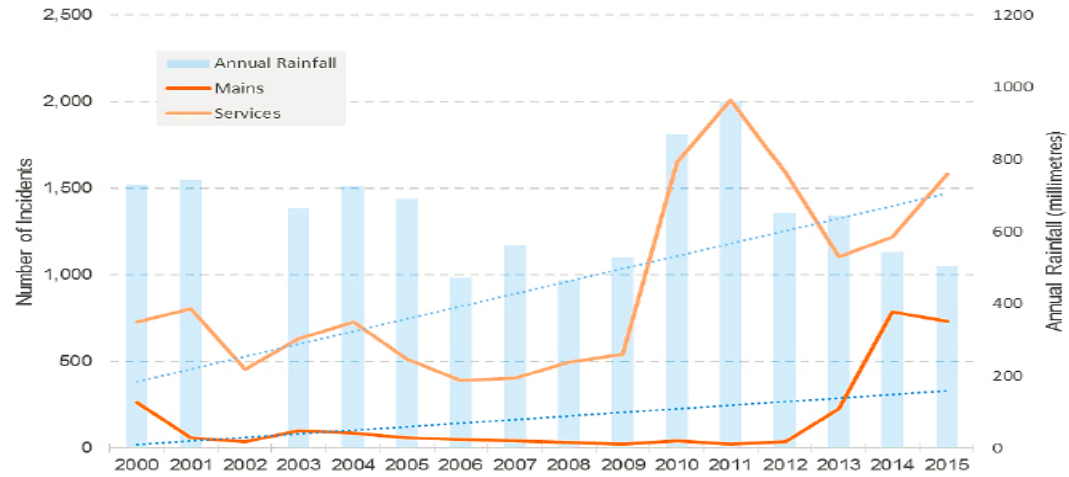


(Source: Distribution Mains Strategy: Figure 2-8)

LIR and FIR data is not available for 2016 and 2017 to analyse the impact of the increased mains replacement program for the full current AA period.

The following graph of water ingress in Multinet's low pressure mains and services shows that for mains, there was a marked increase in incidents since 2013 and tapering from 2014. It is noted that incidents relating to services shows some correlation with annual rainfall, which is also included in the graph. However, there is no clear correlation of mains incidents with annual rainfall. Multinet states that this could be attributed to planned mains syphon pumping, which reduces the volume of reactive water in mains incidents. Further information regarding incidents, syphon pumping programs and data covering 2016 and 2017 would assist to determine the impact of the mains replacement program.

Figure 8: LP Distribution Mains and Services Water Ingress Incidents



(Source: Distribution Mains Strategy: Figure 2-12)

With reference to Multinet's customer service compliance and reliability performance[15] it has been outperforming its KPIs for SAIFI, SAIDI and public reported escapes. Additionally, Multinet shows its positive performance relative to other similar gas distribution businesses. These indicators along with trends in LIR and FIR, including the water in mains and services, suggest that its operations and maintenance programs have been effective in managing its networks and associated risk profile, over several years.

The AER sought additional information (IR #1:Q5) regarding the impact of the mains replacement program on the ongoing efficiency of the operating and maintenance costs by mains pressure and material. Multinet's response advised that it was unable to provide that level of detail.

Asset Life. In Multinet's Distribution Mains Strategy (section 2.3), it provides age profiles by pressure and material. In its table 2-6 (asset life summary by pressure and length), Multinet shows that it has 1,062 kilometres of low pressure and medium pressure mains that exceed their technical life, as at the end of 2017. Zincara believes that "end of technical life" (EOTL) is an indicator that mains should be on a watching brief and not a criterion for replacing the mains. To the extent that mains need to be replaced prior to reaching its EOTL they should be replaced. Where the condition of the mains is such that they can be left in the field for longer periods than their EOTL, they should be. The mains replacement program should therefore be based on the condition of the mains and not the age of the mains.

In summary, Zincara agrees that mains replacement of cast iron and unprotected steel is essentially for safety and reliability issues. Zincara also agrees with Multinet's approach to target the high fracture areas and believes that Multinet will do this regardless of the length of mains replaced. From the above analysis and given the current FIR and LIR trends, Zincara considers that if Multinet were to continue its historical mains replacement rate for the 2018 – 2022 period, there is no reason why it could not effectively manage at least the same level of fractures and as such maintain the same level of risk as experienced of the 2013-2017 period.

5.3.2.2 Volume

Multinet indicates[16] that the volume of replacement "*should be driven by the ability to meet rates of replacement and geographically prioritise replacement around failure rates while taking into consideration network constraints. The 2033 target is therefore used as a key milestone*".

Multinet has considered three options as possible forecast rates of replacement (noting that there will be approximately 2000km of LP mains remaining, at the end of 2017):

A. *Adopting the historical rate of 85 kilometres per annum post 2017;*
B. *Adopting the derived asset life failure (i.e. exceeding EOTL) volumes from 2018 to 2022 with the remainder (post 2022) volumes being an average to meet the 2033 removal target, or*

[15] Access Arrangement Information section 6.2
[16] Distribution Mains Strategy: 4.2.3, page 32

C. Adopting the average (straight line) of the remaining low pressure network (post 2017) to achieve with a 2033 removal target – 125 kilometres per annum.

Multinet states[17] that "*the option of adopting a 85 kilometres rate would in effect see the low pressure replacement program timeline extend from 2033 to 2040. While this is highly achievable from a delivery perspective, the extension in timeframe would undoubtedly result in increased deterioration of the remaining low pressure assets directly resulting in an increased risk of incidents from asset failures along with increased operational expenditure.*"

With respect to option B, Multinet says that "*this approach would require, from a historical viewpoint, an annual rate of replacement larger than has been achieved previously. While technical and physically achievable, it would not be deliverable under a like for like program which is seen as an inefficient delivery model for large replacement rates*."

For option C, Multinet says that "*having regard for the long term safety of the gas network, is seen as an efficient and prudent volume of mains replacement. While the proposed replacement rate of 125 kilometres is 50% greater than the 14 year average of 83 kilometres since 2003, it is only 25% greater than the average replacement rates over the last four years and aligns with volume of replacement being undertaken in 2017*."

Multinet states[18] that "*the AER has accepted the 30 year target for us to complete our LP to HP mains replacement program by 2033, including most recently in its September 2015 decision on our mains replacement cost pass through for the current access arrangement*." The AER has advised Zincara that it has not provided any assurance to Multinet that they accepted the 30 year target date.

From the above, Zincara notes that Multinet's proposed volume is based on kilometres required to achieve completion of the program by 2033, which Multinet sees as a "key milestone". Multinet has also stated that its replacement strategy[19] "*primarily focusses on minimising, to the extent practicable, public and maintenance personnel safety risks by targeting mains in areas that have high incidence of mains fracture and leakage. Further the strategy targets the integrity and performance of mains in areas that have suffered from loss of supply associated with water in mains incidents, and have limited capacity to service additional demand from existing and new customer connections.*"

Based on the above failure analysis and considering the options outlined by Multinet, Zincara considers that option A presents a reasonable volume for the forecast 2018-22 AA period. While this option, if continued until completion of the mains replacement program, would extend the program from 2033 to 2040, the historical FIR, in particular, shows a steady albeit slightly downward trend suggesting that the current risk profile should be able to be maintained. Zincara believes that Multinet, will continue to monitor and manage its various safety and customer service KPIs, and along with its operations and maintenance programs will be able to effectively manage the safety and reliability of the network.

Zincara also acknowledges the increasing complexity of the LP mains replacement program, as it progresses, placing additional work effort on planning and field resourcing efforts, and as reflected in the increasing unit rates.

[17] Distribution Mains Strategy: section 4.2.3, page 32
[18] Capex Overview – Mains Replacement: section 7.2.1.
[19] Capex Overview – Mains Replacement: section 6, page 26

5.3.2.3 Prioritisation

Multinet has prioritised the LP mains replacement by considering:

- Cast iron fracture incident rate postcodes
- Secondarily on High leak rate postcodes

Then consideration of availability of HP mains (for supply), synergies with removal of MP cast iron, the practice of working from the outer boundary of the LP network, and supply constraints on the network.

The resulting postcode priority list, ordered by historical fracture and leak rates is provided in Distribution Strategy: Appendix 5.6, Table 5-21.

As a result, Multinet has identified 44 discrete packages of work ranging in length from 5km to 28km, covering 27 postcodes, as shown in its Distribution Mains Strategy (Table 4-4). Of the 625km of LP replacement, it is estimated that 346 kilometres of LP cast iron will be replaced, leaving a further 734 kilometres of cast iron in future AA periods. Multinet advises, in its response IR #1:Q3, that the most efficient and prudent approach to replacing the LP assets involves block replacement, and this has been the approach since 2003, and is the industry standard approach. Alternatively like-for-like replacement would be required with much higher unit rates and larger mains, more open cut, along with keeping LP network active longer.

In addition to cast iron there is also 333 kilometres of steel mains and while these are classified as either protected (coated) or unprotected, none have any active cathodic protection so are considered unprotected. Like the US, the steel is typically replaced along with the cast iron from a risk and efficiency perspective (ref: Distribution Mains Strategy 4.2).

Zincara agrees with the prioritisation methodology using Fracture Incident Rates, then Leak Incident Rates, along with consideration of availability of HP assets, synergies with removal of MP cast iron mains and supply constraints.

5.3.2.4 Unit Rates

For the LP to HP mains replacement program, the forecasting preference is given to two party tender using Multinet's competitively sourced service providers or actual historical rates where work has been previously undertaken in the postcode. Of the forecast 27 postcodes in the 2018 to 2022 period, 10 have related works where Multinet is able to forecast using these methods. These are noted in Multinet's Distribution Mains Strategy, Table 5-6, which includes the source used in developing the postcode's unit rate.

For 5 postcodes (refer Distribution Mains Strategy: Table 5-7) there were no historical works on which to base development of unit rates. In these cases, Multinet's independent estimator, Advisian, developed the estimate.

There were also 5 postcodes (refer Distribution Mains Strategy: Table 5-8) where density factors were applied to an established unit rate from historical tender or combination unit rates. Density factors relate to dwelling densities and are based on ABS 2011 Census data.

Finally, there were 7 postcodes where estimates have been based on similarity from field experience. Postcodes that have similar profiles from field experience would have identical unit rates and methodology applied (refer Distribution Mains Strategy: Table 5-9).

Zincara has analysed the above methodologies and agrees that they are typical industry practice for developing unit rates and estimates.

5.3.2.5 Conclusion

After assessing the above factors, Zincara considers that there insufficient justification for the level of LP to HP mains replacement proposed by Multinet for the 2018-2022 AA period. Zincara believes that continuing with the historical mains replacement rate (around 85km per annum) for the next AA period along with Multinet's operating and maintenance programs would provide the most prudent and efficient program. This is particularly in view of the increasing complexity of the program, both in planning and field activity, as its progresses into inner urban areas.

In calculating Zincara's recommended volume of 425 kilometres (85 kilometres per annum) for a LP to HP program to continue in line with historic levels, Zincara has used the average unit rate for the 2018-22 AA period of $357.5/m (ref: Capex overview mains replacement Table 21), giving a total capex of approximately $151 million, compared with $223.4 million proposed by Multinet. This represents a reduced capex of $72 million.

5.3.3 MP Cast Iron Mains Replacement Program

For the forecast period, 2018–2022, Multinet is proposing the following MP mains replacement program[20].

Table 25: MP Mains Replacement Capex, Volumes and Unit Rates – 2018-2022 ($, 2017, Real)

MP Mains Replacement	2018	2019	2020	2021	2022	Total
Capex ($ million)	7.7	4.9	6.7	-	-	19.3
Volumes (km)	10.2	5.5	8.1	-	-	23.8
Unit Rates ($/m)	757.2	897.1	829.1	-	-	-

(Source: Overview: Table 22).
Note: Totals may not add up due to rounding error.

[20] Overview: 7.3; Distribution Strategy 4.3

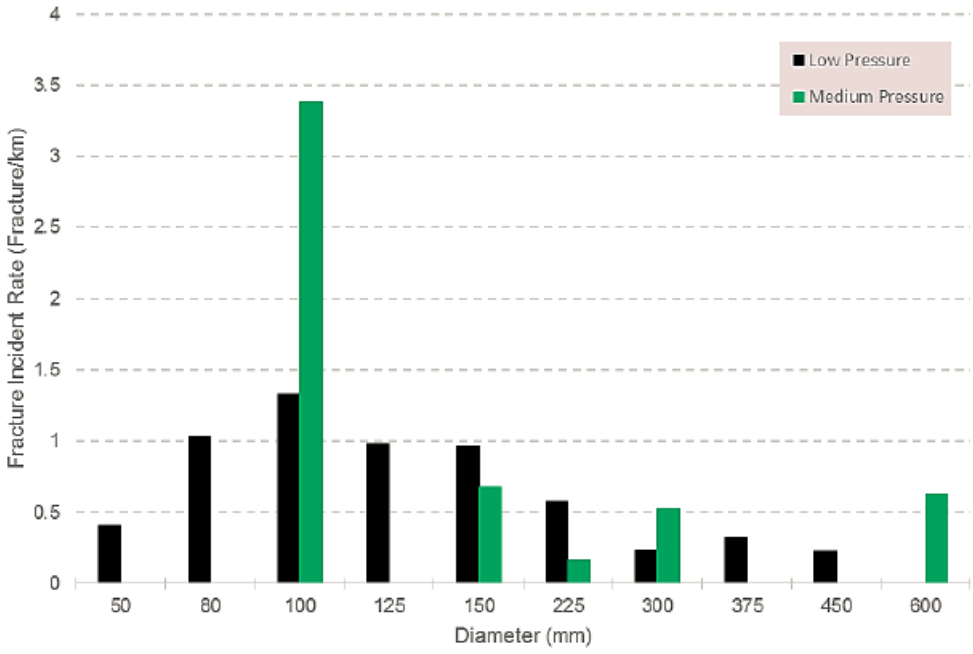
5.3.3.1 Failure Analysis

Leaks (ref: Distribution Mains Strategy: Figure 2.5 and 2.6). The MP leak incident rate (LIR) has been relatively steady since 2005 and at 2015, the LIR for MP was 0.08 (down from 0.11 in 2005). The LIR for MP networks is significantly lower than for LP.

Fractures (ref: Distribution Mains Strategy: 2.4.3 and Fig: 2.8). The MP cast iron fracture incident rates (FIR) are around 0.05 fracture incidents per kilometre (FIR). With the relatively lower volume of MP cast iron mains, the FIR is quite variable on an annual basis, but with a downward trend. Following a request from the AER, additional information from Multinet (IR #1), shows supporting data for the FIR graph, figure 2-8, with incident notifications around one or two per year, since 2010.

The medium pressure networks have a higher proportion of larger diameter mains greater than 150mm diameter (55% in MP v 14% in LP). Multinet says[21] that "*while these larger diameter medium pressure cast iron mains have a lower probability of failure from fracture, in the case of Multinet they are all deemed critical supply mains and are all located within the inner urban areas of metropolitan Melbourne. This combination of higher operating pressures, critical supply and high density geographic location places these assets as "high risk" from a consequence perspective in comparison to that of the overall low pressure coast iron networ*k." 45% of the MP cast iron mains are 150mm diameter or less, and hence are more susceptible to fracture than the larger diameter mains. Multinet states that the FIR for the 100mm diameter cast iron mains is 3.4, around 4 times the average FIR of LP cast iron. Figure 4-6 (ref: Distribution Strategy), see below, shows the FIR comparison by pressure and mains diameter.

Figure 9: Cast Iron Fracture Incident Rate Comparison by Pressure



(Source: Distribution Mains Strategy: Figure 4-6)

[21] Distribution mains strategy 4.3.2

Zincara acknowledges the greater consequence of a MP fracture incident, but the number of incidents has been very low and these have been managed by operations and maintenance.

Asset Life. In Multinet's Distribution Mains Strategy (section 2.3), it provides age profiles by pressure and material. In its Table 2-6 (asset life summary by pressure and length), Multinet shows that it has 29 kilometres of medium pressure mains that exceed their technical life, as at the end of 2017. Zincara believes that "end of technical life" (EOTL) is an indicator that mains should be on a watching brief and not a criterion for replacing the mains. To the extent that mains need to be replaced prior to reaching its EOTL they should be replaced. Where the condition of the mains is such that they can be left in the field for longer periods than their EOTL, they should be. The mains replacement program should therefore be based on the condition of the mains and not the age of the mains.

5.3.3.2 Volume and Prioritisation

Multinet proposes the replacement/abandonment of the remaining 33 kilometres of medium pressure cast iron, listing six projects, which Multinet summarised as follows:

Clayton South, 3169. This consists of the replacement of 4.1 kilometres section of MP, which has 3.2 kilometres of cast iron (comprising 2,123 metres of 100mm diameter and 1,078 metres of 150mm diameter). Multinet states that this project is based on high fracture rate of 100mm cast iron. While the Distribution Strategy, Figure 4-6 shows that 100mm cast iron has a relatively high FIR, no specific information is provided for this project, such as number of fractures by year and the FIR, nor any specific leaks and LIR data. (ref: Distribution Strategy: Appendix 5.5.1). This project also includes the decommissioning of the associated field regulator. Unit rate is [redacted] giving capex of [redacted] million. Zincara does not have sufficient specific information, as noted above, to recommend approval of this project, as prudent and efficient, during the 2018-22 AA period.

Graham St, Port Melbourne, 3207. This consists of 7 kilometres of cast iron in the Port Melbourne and Albert Park area, with 3 kilometres to be replaced as HP grid main to support the LP to HP replacement projects in Port Melbourne. (ref: Distribution Strategy: Appendix 5.5.3).

Table 26: Graham St, Port Melbourne – Length Decommissioned Cast Iron

Diameter (mm)	Length (m)
100	716
150	3,648
225	42
300	2,597
Total length (m)	**7,003**

(Source: Distribution Mains Strategy: Table 5-14)

In order to upgrade the area to high pressure a new field regulator is required. In addition, 17,789m of medium pressure mains will be upgraded to HP along with 1,552 supply points. Total capex is [redacted] million. Without supporting FIR and LIR data relating to the condition

of these MP mains, Zincara does not consider that this project is prudent and efficient during the 2018-22 AA period. However, Zincara notes that Multinet advises that this project is required to provide high pressure to the supply grid for the LP to HP mains replacement in Port Melbourne, which is scheduled for 2018-22, and on that basis it is recommended to be approved.

Aughtie Drive, St Kilda, 3182. Consists of 5.5 kilometres of large diameter cast iron (ranging from 150mm up to 600mm diameter), with 4km to be replaced as grid main to support LP mains replacements in Elwood and St Kilda. The project also includes modifications to four existing district regulators (ref: Distribution Strategy: Appendix 5.5.4). Capex is [redacted] million. Without supporting FIR and LIR data relating to the condition of these MP mains Zincara does not consider this project is prudent and efficient, during the 2018-22 AA period. However, Zincara notes that Multinet advises that this project will provide high pressure supply grid for the LP to HP mains replacement in Elwood and St Kilda which is scheduled for 2018-22 and on that basis it is recommended to be approved.

Like for Like (various). Consists of 8.1 kilometres of MP, size for size replacement, of dispersed lengths of cast iron mains (comprising 1,018 metres less than 100mm diameter, 2,480 metres of 100mm diameter, 3,807 metres of 150mm diameter and 777 metres of 300mm diameter), totalling 30 minor projects. (ref: Distribution Strategy: Appendix 5.5.2). Capex is [redacted] million. Without supporting data relating to the condition of these MP mains, Zincara does not consider this project is prudent and efficient, during the 2018-22 AA period.

Linda Crescent, Hawthorn, 3122. This 851 metres of 225mm MP main is scheduled to be abandoned as part of the LP to HP project, known as Linda Cr, Hawthorn, so no MP capex required.

Ashburton Road, Glen Iris, 3146. This 3.1 kilometres section of large diameter main, is scheduled to be abandoned as part of the LP to HP "Ashburton Rd, Glen Iris" project. This is the final part of the replacement program of 3146 and 3147 postcodes, totalling 62 kilometres. No MP capex required.

5.3.3.3 Unit Rates / Capex

Projects have been estimated by independent estimator Advisian. The estimating methodology applied is reasonable. The field regulator cost for the Graham St, Port Melbourne project and also regulator modifications for the Aughtie Drive, St Kilda project has been developed based on an internal bottom up estimates.

5.3.3.4 Conclusion

Zincara notes that the purpose of the program is to enhance the safety level of the MP network and enhance security of supply, but there is insufficient information to show that the current safety level is unsatisfactory. In addition there is no indication that Multinet is unable to manage the current leak program through its rectification work or that there is a capital and operating expenditure trade off. As such, Zincara considers the program is not prudent and efficient.

However, Multinet advises that the following projects are required in support of LP to HP mains replacement projects during 2018-22, and on that basis Zincara recommends approval of:

- Graham St, Port Melbourne, 3207. Capex is [redacted] million. LP to HP shows Garden City Port Melbourne with FIR of 0.03
- Aughtie Drive, St Kilda, 3182. Capex is [redacted] million. LP to HP shows St Kilda with FIR of 0.06

5.3.4 Early Generation HDPE Replacement

Early (first) generation PE mains[22] were installed between 1970 and 1980, with properties which offer limited resistance against severe environmental and operating conditions. They are classified as class 250 (P2) and class 575 (P7) for operation at medium and high pressure respectively.

Multinet proposes to target the earliest 31km of early generation HDPE (medium pressure) during the next AA period, by replacing 22.3km of mains, including 20.4km of early generation PE in Glen Waverley, and 17.7km of mains, including 11km of early generation PE in Vermont.

Table 27: Forecast PE Mains Replacement Capex, Volume and Unit Rate – 2018-2022 ($, 2017, Real)

MP Mains Replacement	2018	2019	2020	2021	2022	Total
Capex ($million)	-	-	-	9.3	7.8	17.0
Volumes (km)	-	-	-	22.3	17.7	40.0
Unit Rates ($/m)	-	-	-	414.8	439.0	

(Source: Overview: Table 23).
Note: Totals may not add up due to rounding error.

The capex forecast includes an allowance for planned services replacement associated with the packages of work.

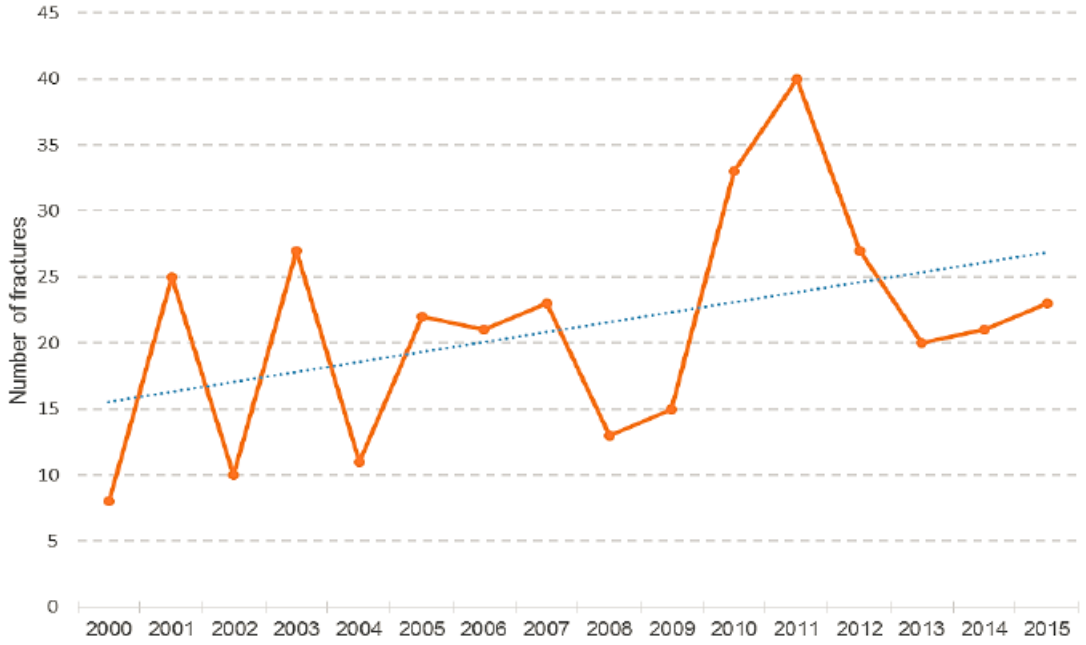
5.3.4.1 Failure Analysis

The general mode of field failure for polyethylene is brittle, slow crack growth through the pipe wall. These cracks can initiate at microscopic stress-raising flaws, inherent in the basic pipe product, or more likely from defects. Failure can also occur prematurely with mains damaged in squeeze-off operations where very high localised plastic deformations occurred from over-squeezing. These squeeze-off failures are referred to as polyethylene fractures or breaks.

Multinet's analysis of PE breaks between 2000 and 2015 are shown in the following graph.

[22] Distribution Strategy: section 4.4

Figure 10: Distribution Mains Polyethylene Fracture Volumes

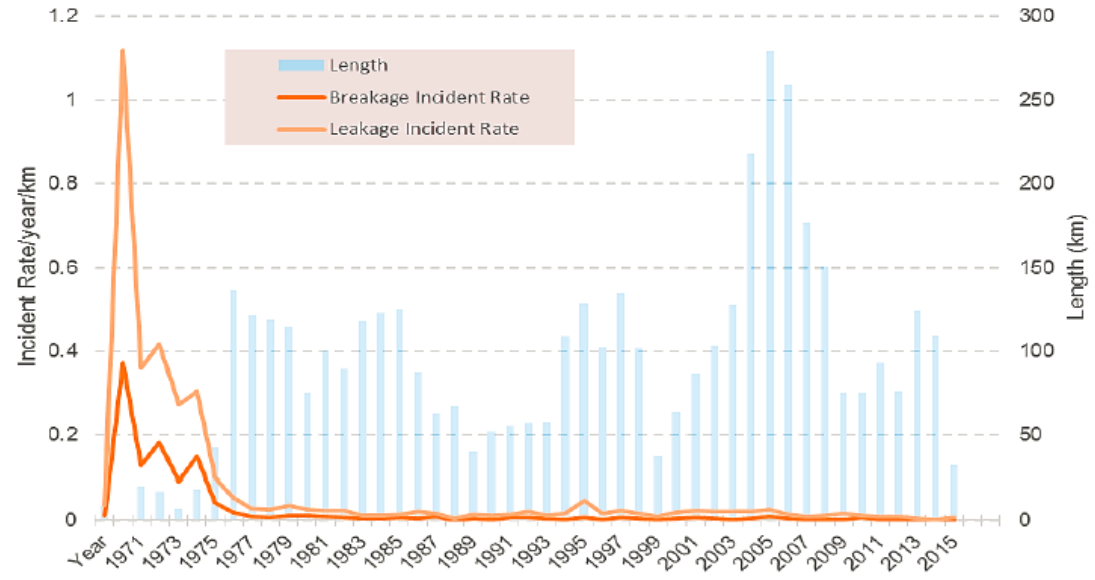


(Source: Distribution Mains Strategy: Figure 2-10)

In analysing the number of breaks (fractures), there were a total of 23 notifications recorded in 2015 down from a high total of 40 in 2011. From 2012 to 2015, there was an average of 25 per year. Apart from the higher volume of breaks in 2010 and 2011, the volume has been in a relatively steady band (approximately 20 – 25) for the last ten years.

Further investigation against the installed year of the PE mains shows higher incident rates associated with PE mains installed pre-1976, see graph below. The graph shows LIRs ranging from 0.2 leaks/km/year to 1.1 leaks/km/year and breakage rates range up to 0.4 breaks/km/year.

Figure 11: Polyethylene Leak and Break Incidents by Year and Length Installed by Year



(Source: Distribution Mains Strategy: Figure 4-8)

5.3.4.2 Volume and Prioritisation

Multinet has provided a spatial dataset to identify the location of the early generation PE mains and fault history (leak and break rates), refer Distribution Strategy figure 4.9 and figure 4-10. Pre-1976 mains account for around 60km of the total PE network, with 48km (80%) being concentrated within Glen Waverley and Vermont.

Multinet's proposed prioritisation is based on:

- Breakage incident rates, and
- Leak incident rates

The program provides a partial replacement of the existing earliest generation PE mains and is considered a longer term program beyond 2022. It covers proactive replacement of early generation HDPE Medium Pressure mains and associated consumer service installations with high pressure assets.

Multinet states that the program may be extended both in relation to volume of replacement and targeted class of PE (250 and 575) subject to the results of this initial replacement program and further investigations and research on failure of these mains.

Replacement would use HP block replacement methodology and therefore includes a proportion of steel mains dependant on the area (ref: Distribution Strategy: 5.5.5 and 5.5.6).

5.3.4.3 Conclusion

The PE leaks and breaks are being managed by Multinet's operations and maintenance programs. Based on the above, Zincara does not believe there is justification for capex of $17 million to replace 31km of MP early generation PE, as well as 9km of steel mains, nor is it considered prudent and efficient. However, Zincara considers it prudent to continue monitoring and analysing the cause of these leaks and fractures.

5.3.5 Reactive Mains Replacement

Involves piecemeal renewal of minor sections of mains outside the planned mains replacement programs. They arise when reactive maintenance is not appropriate. Replacements are typically less than 60m in length and in locations where the planned mains replacement program is not scheduled to take place in the immediate future.

Table 28: Forecast Reactive Mains Replacement Capex – 2018-2022 ($million, 2017, Real)

MP Mains Replacement	2018	2019	2020	2021	2022	Total
Capex ($M)	0.2	0.2	0.2	0.2	0.2	1.1

(Source: Overview: Table 24).
Note: Totals may not add up due to rounding error.

Given that this program is reactive in nature, the work volume and capex will vary, however, Multinet has based the forecast on the annual average of around $0.2 million per annum over the period 2013 to 2015.

5.3.5.1 Conclusion

Multinet's service providers attend reports of leaks either arising from public reports or from leak survey program. In some cases a typical repair will not be practical due to the condition of the main and may require a small replacement. On this basis, Zincara supports an allowance for these minor repairs and which is based on the average expenditure over the period 2013 to 2015.

5.3.6 Unplanned Service Renewals

Similar to reactive mains replacement, unplanned service renewals are required where repair is not adequate.

Table 29: Unplanned Service Renewals Capex, Volume and Unit Rates – 2018-2022 ($, 2017, Real)

MP Mains Replacement	2018	2019	2020	2021	2022	Total
Capex ($million)	1.2	1.2	1.2	1.2	1.2	6.1
Volumes (km)	367	367	367	367	367	1,837
Unit Rates ($/m)	3,320.7	3,318.7	3,325.8	3,337.1	3,342.2	-

(Source: Overview: Table 25).

The forecast volumes is based on the average annual service replacements between 2011 and 2015 and unit rates are based on 2015 actual costs taking into account service provider region and particular service activities.

5.3.6.1 Conclusion

The volume and capex are in line with current AA period and as such Zincara recommends this activity as prudent and efficient.

5.4 CONCLUSION

From its failure analysis and review of volumes and unit rates, Zincara has a concern about the significantly increased mains replacement program proposed by Multinet, which is reflected not just in the kilometres of mains, but also in the increased unit rates when compared to the current period. The areas of increasing complexity with the LP to HP mains replacement, along with the proposed inclusion of all medium pressure cast iron mains and some earliest generation HDPE medium pressure mains, increase planning and resourcing efforts. Multinet has noted that it can resource accordingly.

The following tables show actual/forecast capex for the current AA period, Multinet's proposed forecast for 2018-22 AA period, and Zincara's recommended capex and volumes, based on outcomes of this review.

Table 30: Mains Replacement Capex 2018-22 ($million, 2017, Real)

Mains Replacement – capex	2013-17	Multinet	Zincara
LP to HP mains replacement	133.7	223.4	151
MP mains replacement	-	19.3	11.1
Early Generation HDPE	-	17.0	-
Reactive mains replacement	5.8	1.1	1.1
Reactive Service renewals		6.1	6.1
Total capex	**139.2**	**266.9**	**169**

(Source: Capex Overview Table 1 & 11; Zincara data)
Note: Totals may not add up due to rounding error.

Table 31: Mains Replacement Volumes (kilometres) for 2018-22 AA period

Mains Replacement – volumes	Historic	Multinet	Zincara
LP to HP mains replacement (km)	425	625	425
MP mains replacement (km)	-	24	12.5
Early Generation HDPE (km)	-	40	-
Total (km)	**425**	**689**	**437**

(Source: Capex Overview Table 20, section 4.2.3; Zincara data**)**
Note: Totals may not add up due to rounding error.

5.4.1 LP to HP Mains Replacement

Zincara recommends continuation of the historic average of 85 kilometres per annum, giving a total mains replacement of 425 kilometres for the 2018-22 AA period, which would extend full completion by 7 years if ongoing. Zincara has applied the average unit rate tabled by Multinet for 2018-22 (i.e. $357.5/m) in estimating capex of approximately $151 million.

By comparison, Multinet proposes 625 kilometres mains replacement which aligns with the average annual volume to complete full replacement by 2033.

For cast iron, at 2015, the Leak Incident Rate (LIR) was 0.35 with a downward trend and Fracture Incident Rate (FIR) was 0.08, with a marginally upward trend. Water-in-mains has a marked increasing trend between 2013 and 2014, then slight improvement in 2015. Data relating to 2016 was not available during this review.

Given the increasing complexity as the program progresses to inner urban areas, this volume will require relatively increased levels of planning and field resources, which are

reflected in the higher estimated unit rates. Also note that Multinet advised (IR #18) that it did not complete its forecast volume in 2016 (completing 113 kilometres versus forecast of 151 kilometres), mainly as a result of commencing work in areas with more complex scopes and increasing difficulty. This further demonstrates the planning and resources required as the program progresses. Multinet advised that it aims to complete the full volume by the end of 2017.

5.4.2 MP Mains Replacement

Multinet proposes replacement/abandonment of the remaining 33 kilometres of MP cast iron. Zincara does not support any of the program based on current safety and condition. At 2015, FIR was 0.05 with a slight downward trend. 4 kilometres will be abandoned as part of the LP to HP program, but no capex required.

There are two of the four projects (Graham St, Port Melbourne – [redacted] million and Aughtie Drive, St Kilda - [redacted] million that have an impact on the LP to HP replacement program, both requiring grid mains to support the block replacements. On this basis Zincara recommends their approval.

However, the lower volume of LP to HP mains replacement may result in some rescheduling by Multinet which may impact the prioritisation of these MP projects. Total capex is [redacted] million for 12.5 kilometres MP cast iron replaced with 7 kilometres of grid mains to be laid.

Multinet showed that 100mm diameter cast iron mains, in particular, have the highest FIR. Some of these mains are included in the above projects, while further volumes exist in the other two projects. While Zincara believes these mains are being managed by Multinet, they will require ongoing maintenance and repairs.

5.4.3 Early Generation HDPE Mains Replacement

Multinet proposes 31 kilometres replacement of pre-1976 mains. There was an average 25 fracture notifications per year over the last four years. Zincara does not support the program due to operations and maintenance managing the volume of leaks. Multinet should continue investigation and analysis of the repairs.

5.4.4 Reactive Mains and Service Replacements

Based on average activity over 2013 to 2015, an allowance of $1.0 million and $5.7 million respectively is recommended by Zincara.

6. OTHER CAPEX

6.1 INTRODUCTION

The following table provides the summary of the proposed capex for the next AA period.

Table 32: Regulator, Valves and Equipment Enclosures - Capex ($000, 2017, Direct)

Regulator Strategy Capex	2018	2019	2020	2021	2022	Total
Hydraulic regulator replacement	500	-	-	-	-	500
Obsolete supply regulator replacement	700	550	590	440	440	2,720
Supply Regulators – Miscellaneous	50	50	50	50	50	250
Environmental noise improvements	10	10	10	10	10	50
Valve Actuator Replacement	33	-	-	-	-	33
Obsolete consumer regulator replacement	747	1,084	561	833	721	3,946
Meter Room remediation works	25	-	-	-	-	25
HP2 syphon removal	60	60	60	60	60	300
District regulator isolation v/v rectification	150	150	-	-	-	300
Annual program – Miscellaneous allowance	20	20	20	20	20	100
Structural engineering rectification	80	50	10	70	40	250
Equipment enclosures - Miscellaneous	150	150	150	150	150	750
Total	**2,525**	**2,124**	**1,451**	**1,633**	**1,491**	**9,224**

(Source: Strategy documents (0003; 0005; 0011; 0014): Tables 0-1)
Note: Totals may not add up due to rounding error.

The following table shows the forecast capex by Strategy.

Table 33: Regulator, Valves and Equipment Enclosures - Capex ($000, 2017, Direct)

Strategies	2018	2019	2020	2021	2022	Total
Supply Regulators Strategy	1,379	650	694	536	537	3,796
Large Consumers Regulator Strategy	823	1,156	600	892	773	4,244
Distribution Valves Strategy	245	245	85	86	86	747
Equipment Enclosure Strategy	245	213	171	236	204	1,069
Total	**2,692**	**2,264**	**1,550**	**1,750**	**1,600**	**9,856**

(Source: Strategy documents (0003; 0005; 0011; 0014): Tables 0-1)
Note: Totals may not add up due to rounding error.

This Other capex sub-category of Regulators, Valves and Enclosures (ref: Capex Overview – Other Capex: Table 5) includes capex associated with the replacement of:

- Supply regulators (including district regulators, field regulators, above ground regulators and city gates), small and large consumer regulators;
- Distribution valves (including removal of redundant syphons from the network); and
- Equipment enclosures, such as masonry buildings, pits, chain wire fences, steel kiosks and gatic covers.

During the current AA period, Multinet has undertaken a number of these activities as detailed below:

Regulators. Multinet undertook a variety of large consumer regulator projects including the replacement of Jeavons, Grove, Reliance and Rockwell regulators. Many supply regulator projects were completed, including the replacement of regulators, insulation union replacements, pilot replacements, TP control loop upgrades, and slam shut panel upgrades.

Equipment Enclosures. Multinet undertook miscellaneous minor works and rectification works on the equipment enclosure assets. In August 2014, it commissioned an independent structural engineering review of the condition of the most critical enclosure sites. Following the review, it commenced rectification works at several sites, and propose to continue with this work in the next AA period.

The following table shows the AER allowance and actual expenditure for similar project categories.

Table 34: AER Allowance v Actual ($million, 2017, Real)

Regulators, valves, equipment enclosures	2018	2019	2020	2021	2022	Total
AER Allowance	1.6	1.6	1.7	2.3	1.4	8.6
Multinet actual/forecast	0.1	0.3	0.5	1.9	3.0	5.8

(Source: Capital Expenditure Overview – Other Capex: Table 8 and 9)

The sections below describe Zincara's analysis of the forecast activities.

6.2 SUPPLY REGULATORS

Supply regulators are inclusive of District, Field and City Gate regulators and their function is to regulate and maintain network pressures, and are typically housed in buildings, kiosks and compounds. Multinet has 258 individual regulating stations:

- District regulator – 133
- Field regulator – 118
- City gate – 7

Multinet says that regulators do not tend to exhibit a useful life or end-of-life failures. Their refurbishment / replacement is typically driven by their inability to be serviced due to critical spare parts not being available or specific operational requirements. The current condition of supply regulator installations is predominantly good, with some of the older installations (+ 30 years old) displaying aged coatings that will require repair and / or recoating. Some installations installed during the early 1980's are suffering from corrosion due to some components being of an inferior quality. The supply regulator capex program is summarised in the following table.

Table 35: Supply Regulators capex ($000, 2017, Direct)

Supply Regulators	2018	2019	2020	2021	2022	Total
Hydraulic regulator replacement	500	-	-	-	-	500
Obsolete supply regulator replacement	700	550	590	440	440	2,720
Supply regulators – Miscellaneous works	50	50	50	50	50	250
Environmental noise improvement	10	10	10	10	10	50
Valve actuator replacement	33	-	-	-	-	33
Total Capex	**1,293**	**610**	**650**	**500**	**500**	**3,553**

(Source: Supply Regulator Strategy: Table 4-1)

Multinet's unit costs (Supply Regulators Strategy: section 4.1) have been based on the historical costs previously incurred in completing similar regulator replacement projects.

The sub-sections below provide details of the regulator replacement program.

6.2.1 Hydraulic Regulator Replacement Program

The Welker Jet (Jetstream) regulator has provided good performance at high flows and low temperatures and has been used for city gate installations in the past (circa 1960s). It utilises hydraulic fluid to control pressure. This fluid is susceptible to the ingress of gas and over time this changes its overall properties, creating poor control and reduces the pressure regulation functionality. These regulators are overhauled every three years instead of a reactive overhaul as with most other regulators. Their performance is such that Multinet has an ongoing program of replacement of these regulators at city gates.

While 2 sites containing the regulators are forecast for replacement during the next AA period, one is included in Multinet's Augmentation program, leaving 1 to be replaced as part of this program. Capex is $0.5 million as shown in Table 35, above. Based on the poor control and reduced regulation functionality, Zincara considers this replacement to be prudent. The costs are based on similar works and Zincara therefore considers this to be cost efficient.

6.2.2 Obsolete Regulator Replacement Program

This program targets the replacement of Fisher 298, Grove and Reynolds regulators. These regulators are targeted for replacement due to the original equipment manufacturer no

longer supporting the items, resulting in a scarcity of soft spares, increasing repair cost and network risk. Multinet's Supply Regulator Strategy shows that it will replace its Fisher 298 regulators during the current AA period.

Grove regulators. The "sleeve" for these regulators is no longer in production and the recommended replacement sleeve provides a poor fit, leading to a program to proactively replace the regulators. Based on risk profiles, Multinet has shortlisted the TP – TP, TP – HP and TP – MP sites for replacement. The strategy document lists the sites where these regulators are to be replacement during the next AA period. Their unit cost is mainly [redacted], with four identified as [redacted].

Reynolds regulators. The regulators are no longer in production and spare parts have been unavailable for since 2001. Old regulators are currently kept in order to strip soft spares and useful hardware for the remaining in-service regulators. Multinet proposes to replace [redacted] regulators during the next AA period at a unit cost of [redacted] (with a further regulator being replaced as part of the mains replacement program).

Zincara considers that proactive replacement of these obsolete regulators is prudent and striping down old units to prolong the life of remaining in service regulators is cost effective and good industry practice. The cost estimates being based on historic works is cost efficient.

6.2.1 Supply Regulators – Miscellaneous Works

This program covers the refurbishment or replacement of supply regulators and their associated components. The primary drivers for these works are safety and efficiency and to maintain security of supply. Works are undertaken as a project and where possible aligned with scheduled maintenance activities. Due to the varying age, type, function and utilisation, these works are determined on a case-by-case basis. The miscellaneous works program also includes maintenance of hazardous area dossiers, relocation of district regulator sense lines on a 'as required' basis, replacement of Huber Yale insulating unions in conjunction with other capital works programs at the respective sites and replacement of older style slam shut panels.

Ongoing refurbishment of regulating stations is an important activity to ensure network security of supply and is good industry practice. Also undertaking these works in conjunction with other activities provides the most cost effective outcome. On this basis and given the moderate allowance of $50,000 being proposed, Zincara considers the work prudent and the costs efficient.

6.2.2 Environmental Noise Improvement Investigation Program

Multinet has undertaken a number of programs in the past to identify and address "noisy" regulator sites. Currently the loudest supply regulator is at Aughtie Drive, however, it is not situated close to any residences or areas of consistent public presence. Multinet is currently trialling new silenced regulators to determine the cost/benefit. Their use is considered during the design stage of every new or replacement regulator. Multinet has proposed an allowance of $10,000 per year to address any consumer complaints and fund pro-active investigation works to maintain regulatory compliance and customer satisfaction.

Zincara recognises that it is good customer service to proactively manage noise levels, and to promptly address any issues arising from customer complaints. While Multinet has not identified current issues that are causing concern, it is being proactive in trialling potentially improved equipment. On this basis, Zincara considers the small allowance of $10,000 per year as prudent and cost efficient.

6.2.3 Valve Actuator Replacement Program

Audco valves have been installed in conjunction with newer style valve actuators. This has resulted in the valve being greased inadequately, requiring more frequent inspection and maintenance to ensure correct operation. Replacement with an appropriate unit gives an increased over pressure protection operation and reduces maintenance activities. Multinet has proposed replacement of one actuator at Dandenong Terminal station during the next AA period at a cost of $33,000.

Zincara considers that proactive replacement of the actuator to reduce maintenance and improve operation is prudent and the cost estimates, being based on similar works, is cost efficient.

6.3 OBSOLETE LARGE CONSUMER REGULATORS

Multinet defines its large consumer regulators are those greater than 140 sm^3/h off the Low Pressure system, or greater than 30 sm^3/h off the High Pressure or Medium Pressure systems and at a metering pressure greater than 2.75kPa.

Multinet has been replacing obsolete regulator models and configurations since 2012. Each regulator type has been targeted due to the original equipment manufacturer no longer manufacturing or supporting the equipment, resulting in a scarcity of certain soft spares. The average age of regulators which are planned to be replaced is more than 17 years. Multinet replaces these obsolete regulators when they are due for a full strip down maintenance, using current supported models and build up a level of strategic spares for the remaining population of obsolete regulators. The following table shows the program for the next AA period, including the unit rates for each replacement type.

Table 36: Obsolete Regulator Replacement - volumes and Unit Rates: ($000, 2017, Direct)

Existing Regulator	2018	2019	2020	2021	2022	Unit Rate	Replacement
Dival 250 - LBP	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Dival 250 - LTR	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Dival 100	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Rockwell 243 RPC	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Fisher 298	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Grove	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Reliance 2002M	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

(Source: Large Consumers Strategy: Table 4-2)

Dival regulators have been installed on new connections for at least 20 years, with early models experiencing lock up issues. There is also an issue with the availability of spare parts. These regulators will be replaced as and when overhaul maintenance occurs. The Dival regulators are currently subject to 18-month operational check maintenance schedule.

Rockwell 243 RPC regulators have been installed since 1989, but the availability of spare parts from the original supplier is now limited and Multinet has a program to replace these over a 7 year period which commenced in 2016/17.

Fisher 298 regulators ceased production many years ago and availability of spare parts is increasingly difficult and expensive. Given these difficulties Multinet proposes to replace these regulators as and when scheduled overhaul maintenance occurs over the next 5 years.

Grove regulators. There are only 8 of these regulators remaining on I&C metering installations. Spare parts are not readily available and are expensive to procure.

Reliance 2002M regulators are planned to be replaced over the next 5-10 years as and when they are due for maintenance, due to over protection issues at these sites.

Unit rates for these regulators is based on competitive market prices, with capex forecasts then determined from the volume to be replaced per the above schedule during the next AA period. Multinet proposes capex of $3.946 million for the AA period.

Zincara considers that it is good industry practice to ensure regulator installations are well maintained. Replacing obsolete regulators when they are due for a full strip down maintenance, using current supported models and building up a level of strategic spares for the remaining population of obsolete regulators is good practice. On this basis, Zincara considers that Multinet's proposed program is prudent and with the unit rates being based on competitive market rates and works undertaken proactively during planned full strip downs, the costs are efficient.

6.4 METER ROOM REMEDIATION WORKS

There are some minor meter room remediation works arising from recent audits. Multinet has forecast capex of $25,000 scheduled to occur in 2018. Zincara also considers that this work to be prudent as it is the findings of the recent audit. In addition, the cost of $25,000 is considered to be efficient as Zincara is aware that it would not take much remediation work to reach this amount.

6.5 DISTRIBUTION VALVES

Multinet has 63 SCADA network isolation valves and 81 network isolation valves. Some of the existing valves have not been maintained over the last 10 years and therefore could be buried below current pavement surface. Most of the existing valves were installed to facilitate construction of the system rather than for current or proposed use. All 'system critical' are required to be accessible, operable and maintained to provide one or all of flow, pressure and isolation use. Replacement of network valves is typically driven by their inability to be operated or as part of an associated mains replacement program.

During the next AA period Multinet proposes to complete the following programs to ensure it meets regulatory obligations under the Gas Distribution System Code, which requires them to comply with AS 4645 and AS 2885:

- HP2 Syphon Removal Program;
- District Regulator Isolation Valves Rectification Program; and
- Miscellaneous Valve Replacement / Rectification works

6.5.1 HP2 Syphons investigation and removal

The High Pressure 2 (HP2) system has a total of 104 syphons installed. Historically syphons are installed to extract liquid from HP pipelines prior to the introduction of natural gas. These facilities are now redundant and are generally located in low risk areas. However, in some cases, stress on the fitting increases if roads are built above the syphon, increasing the likelihood of leaks.

Multinet will prioritise the removal of syphons based on location risk factors, depth of cover, maintenance history and ability to obtain cost synergies from multiple removals at one time. It plans to make allowance for the removal of [redacted] syphons per annum based on the outcomes of the risk assessment for each site. Unit costs of [redacted] have been based on the historical costs previously incurred in completing these similar projects. Total capex for this program is forecast as $300,000.

Zincara considers that it is good industry practice to minimise the number of potential leaks, particularly as they are part of mains operating at high pressures. Given that they are redundant and aged and also the fact that these HP2 mains are delicensed (suitable candidates for upgrade to 1,500kPa), replacing [redacted] syphons per year would appear to be reasonable. On this basis, Zincara considers that Multinet's proposed program is prudent and with the unit rates being based on historical costs for similar works, the costs are efficient.

6.5.2 District Regulator Isolation Valves Rectification Program

A number of District Regulators are known to have ineffective isolation valve locations, whereby distribution mains have been connected to the regulator inlet main, downstream of the isolation valve. Under this configuration either the regulator can no longer be isolated, or when the regulator is isolated the areas downstream of the distribution main experience inadequate or total loss of supply. In these cases pipe work and/or valve construction, or valve relocation is required to ensure correct operation and safety.

Accordingly this program aims to carry out rectification works to ensure that the locations are compliant with current network design philosophy and engineering standards. Two locations are scheduled for the next AA period:

- Spencer Road, Camberwell – cost of $150,000 scheduled for 2018; and
- Bowen Crescent, Melbourne – cost of $150,000 scheduled for 2019

Zincara considers that it is good industry practice to rectify the inappropriate configurations as outlined above to ensure that supply is not compromised in the event that the regulator needs to be isolated. On this basis Zincara finds the works prudent, and with the costs based on similar works, to be cost efficient.

6.5.3 Miscellaneous Valve Replacement / Rectification Works

The miscellaneous works program for network valves covers the refurbishment and/or replacement of distribution valves and associated pipework. In 2017, Multinet is planning to remove a line valve at the Dandenong Rd Valve Pit, and replace it with like for like steel main. The pit is near the roadway and the gatic lid cover has failed twice in the past 10 years and now posing a hazard to motorists and Multinet's gas assets. In this case the pit walls and supporting beams are in poor condition and hence it is proposed to remove the valve and bury the pipework on completion of the works to eliminate the pit. This miscellaneous works are typically low and hence an annual allowance of $20,000, which is based on historical expenditure, is proposed.

Zincara considers that it is reasonable to provide a small allowance to address valve refurbishment or replacement. On this basis Zincara finds the works prudent and the cost to be efficient as it is based on historical expenditure.

6.6 EQUIPMENT ENCLOSURES

Multinet notes that its enclosures are predominantly in good condition. However, some current known issues with enclosures:

- All regulator buildings have been independently audited with some found to contain asbestos, and others deemed to contain asbestos. Remedial works and monitoring for these sites is included in the audit report.

- An independent structural review was conducted in 2014 for some above ground regulator sites with masonry buildings and compounds.

Multinet proposes two programs during the next AA period, as shown in Table 32, above. The miscellaneous works program for network enclosures covers the reactive / short lead time works on a broad range of enclosures including masonry buildings, concrete pits, chain wire fences, steel kiosks, gatic covers, SCADA cabinets and weld mesh fencing.

6.6.1 Structural Engineering Rectification Works Program

The buildings subject to the structural engineering review conducted in 2014, have an average age of 50 years. They contain some high-risk assets which are essential to maintain supply to large parts of the gas network. Zincara considers that regular review of these sites is good industry practice and that structural issues are rectified in a timely manner. Multinet's program proposes to continue with the implementation of the review's recommendations during the next AA period, with 11 sites scheduled for rectification works.

The estimated average unit cost is $23,000 for each site, totalling $250,000 over the AA period (ref: Equipment Enclosures Strategy: Table 4-2).

Zincara considers the project to be prudent and the cost efficient as it is based on historical expenditure.

6.6.2 Miscellaneous Works Program

This program covers a broad range of enclosures, and takes into account replacement or refurbishment, and are assessed on a case-by-case basis. Some of the issues included in these works are damage, vandalism, theft, noise, contamination, vegetation management and asbestos management. Multinet proposes an allowance of $150,000 per annum or a total of $750,000 over the next AA period. This amount is based on Multinet's historical expenditure.

Given the nature of these works, Zincara considers the ongoing program to be prudent and cost effective.

6.7 CONCLUSION

The "Other" Capex sub-category includes expenditure associated with the replacement of:

- Supply regulators (including district regulators, field regulators, above ground regulators and city gates),
- Large consumer regulators;
- Distribution valves (including removal of redundant syphons from the network); and
- Equipment enclosures, such as masonry buildings, pits, chain wire fences, steel kiosks and gatic covers.

Multinet's respective strategy documents detail performance and criticality of their assets, identifying issues in particular relating to their obsolescence, difficulty in procuring spares and continuing works programs.

Where possible replacement of valves and regulators are undertaken as part of a planned maintenance of assets and this provides the most cost effective outcome. Maintenance of sites including enclosures is part of an ongoing program arising from inspection audit. Zincara considers Multinet's approach to the various programs covered by "Regulators, Valves and Equipment Enclosures" to be good industry practice and prudent. Multinet has developed the costs of the programs using unit costs which are based on similar historic works and /or competitively sourced prices and on that basis Zincara considers the costs to be efficient.

7. METER REPLACEMENT

7.1 INTRODUCTION

To fulfil its obligations Multinet completes the following annual programs:

- Time Expired (T/E) meter replacement – replacement of meters at the end of compliance periods;
- Field Life Extension (FLE) Testing – testing of qualifying meters nearing the end of their compliance periods;
- Meter Faults – replacement of meters that fail in service;
- Replacement of Hand Held meter reading devices; and
- Data Logger and Flow Computer installations – new and replacement installations to comply with code requirements

In addition, Multinet proposes to undertake a Digital Gas Metering Pilot Study (Stage 2) to understand the benefits of digital metering and the costs and benefits of a mass rollout of digital meters in the future.

As at mid-2016, Multinet had over 690,000 installed meters of which 96.6% were standard small consumer meters. There are 27,231 large gas meters.

7.1.1 Small Meter Programs

The following table shows Multinet's proposed capex for 'small' meters, which it defines as those with a maximum capacity of 10 m^3 of flow per hour.

Table 37: Small Metering Programs ($000, 2017, Direct)

	2018	2019	2020	2021	2022	Total
Small T/E	2,363	86	1,355	526	416	4,746
Small FLE	25	58	47	53	64	247
Small Defective / Faulty	103	103	104	105	105	520
Meter Reading Devices	70	70	70	70	70	350
Digital Metering	623	623	623	208	-	2,077
Total Small	**3,184**	**940**	**2,199**	**962**	**655**	**7,940**

(Source: Small Meter Strategy: Table 0-1)
Note: Totals may not add up due to rounding error.

Multinet has supply contracts with Landis & Gyr and EDMI for the purchase and repair of all meters. These contracts are novated to Multinet's two service providers (ZNX and Comdain) and are bound by the corresponding Operations and Management Service Agreements.

Where possible, Multinet refurbishes small gas meters which it says provides the lowest cost of providing a metering installation to the end consumer. Once refurbished, the meter is identified as "refurbished" in terms of a meter family, but treated as a new meter in terms of initial in-service compliance period.

It is noted that Multinet capitalises the purchase of new meters installed on the network. Installation (labour) is expensed for all meter replacement activities but capitalised when installing a new meter for a new connection. The following table summarises the policy:

Table 38: Multinet's Capitalisation Policy

	New Meter	Repaired Meter	Installation
New Connections	Capex	Opex	Capex
Meter Replacement (incl. T/E, FLE, Faults)	Capex	Opex	Opex

(Source: Small Meter Strategy: Table 4-2)

7.1.2 Large Meter Programs

The following table shows Multinet's proposed capex for 'large' meters, which it defines as those with capacity greater than 10 m^3 of flow per hour.

Table 39: Large Metering Programs ($000, 2017, Direct)

	2018	2019	2020	2021	2022	Total
Large T/E	244	219	262	93	183	1001
Large FLE	38	41	27	26	38	170
Large Defective / Faulty	67	69	72	76	79	363
Data Loggers & Flow Computers	100	100	100	100	100	500
Total Capex	**449**	**429**	**462**	**294**	**400**	**2,034**

(Source: Large Meter Strategy: Table 0-1)
Note: Totals may not add up due to rounding error.

Meters with a capacity greater than 100 Sm^3/hr are removed at 10 years, while meters less than this capacity are removed at 15 year intervals. Diaphragm meters with a capacity less than 30 Sm^3/hr can have their in-service compliance period extended, subject to outcomes of Field Life Extension.

Where possible, Multinet refurbishes all large gas meters which it says provides the lowest cost of providing a metering installation to the end consumer.

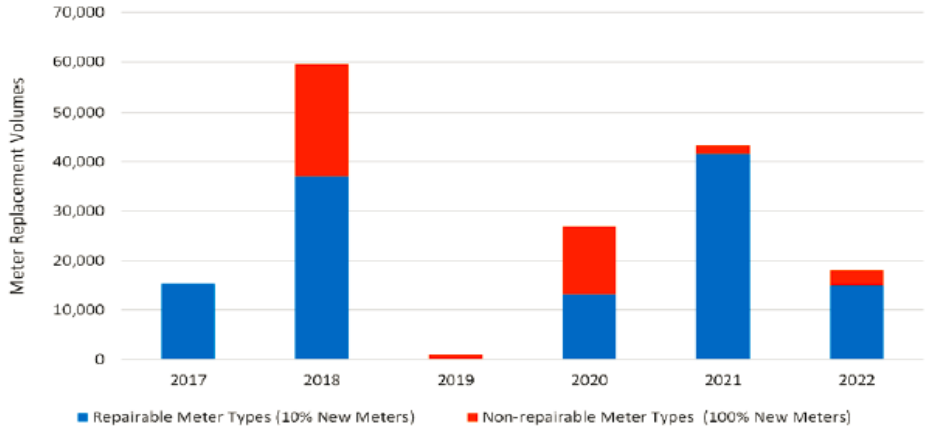
7.2 VOLUME ANALYSIS

Multinet forecasts the volume of meters to be replaced as part of its meter replacement program, through analysis of its annual programs.

7.2.1 Time Expired Meter Replacement – Small Meters

The annual small meter replacement program includes meter families within the final year of their in-service compliance period, and non-compliant meters outstanding from previous replacement programs. It is highly influenced by the predicted results from the annual FLE testing program, and the composition of each program (i.e. meter types) influences the required volume of new meter purchases to service the program. The following figure shows the number of meters forecast to be replaced during the next AA period, based on the results of FLE testing.

Figure 12: Time Expired Meter Replacement – Small Meters



(Source: Small Meter Strategy: Figure 4-2)

The program shows a total of 149,011 meters to be replaced, with annual volumes being highly variable from 59,613 meters in 2018 to 953 meters in 2019. Multinet, forecasts that 35% of meters replaced will require a new meter, with the remaining being replaced with refurbished meters.

Multinet does not have a policy of prematurely removing meter families from operation, before their in-service compliance periods, in an attempt to smooth the program.

Table 40: Forecast Small Meter Time Expired Program – Volume and Capex ($000, 2017, Direct)

	2018	2019	2020	2021	2022	Total
Forecast meters	59,613	953	26,879	43,419	18,147	149,011
Repairable ([redacted] replace)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Non-repair ([redacted] replace)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
New meter purchases	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Unit Rate ($/meter)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Total capex ($000, 2017)	**$2,363**	**$86**	**$1,355**	**$526**	**$416**	**$4,746**

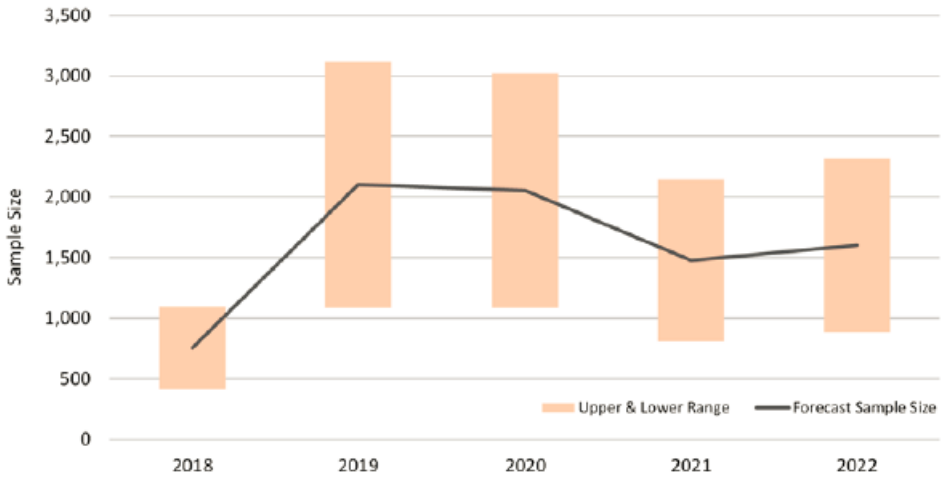
(Source: Small Meter Strategy: Table 4-4)
Note: Totals may not add up due to rounding error.

In the above table, "Repairable ([redacted] replace)" means that the removed meters are capable of being refurbished, with [redacted] expected to be non-repairable due to poor condition following inspection, and replaced with a new meter. Similarly, "Non-repair ([redacted] replace)" means that the removed meters are not suitable for refurbishment and will be replaced by new meters. New meter purchases cover the number of non-repairable meters. As Multinet does not capitalise the cost of refurbishment or the labour component of the meter replacement program, then the resulting Unit Rate and Total Capex, in the table above, reflect the new meter purchases only. This approach is reflected in all similar tables throughout this report.

7.2.2 Field Life Extension – Small Meters

Multinet undertakes Field Life Extension (FLE) testing on selected diaphragm meter families (<30m^3/hr) nearing the end of their service lives. The program is also known as in-service compliance testing. The testing is undertaken in accordance with the requirements of AS/NZS 4944:2006 and is required to extend the in-service compliance period of a qualifying meter family. The standard outlines two methods for in-service compliance testing – 'variables' and 'attributes'. Multinet initially adopts the 'variable' method of sample testing and if a meter family fails, it then applies the 'attributes' method, which requires additional sample volumes.

Figure 13: Field Life Extension Volumes – Small Meters



(Source: Small Meter Strategy: Figure 4-3)

The following table shows the total volumes for the next AA period, rather than also showing the annual volumes. The program shows a total of 7,988 meters to be replaced. As with the Time Expired meters, Multinet does not smooth the annual program.

Table 41: Forecast Small Meter Field Life Extension – Volume and Capex ($000, 2017, Direct)

	2018 – 2022 Total
Forecast meters	7,988
Repairable ([redacted] replace)	[redacted]
Non-repair ([redacted] replace)	[redacted]
New meter purchases	[redacted]

Unit Rate ($/meter)	[redacted]
Total capex ($000, 2017)	$247

(Source: Small Meter Strategy: Table 4-6)
Note: Totals may not add up due to rounding error.

7.2.3 Defective / Faulty – Small Meters

Leakage, inaccuracy, damage, excess noise and seizure are all failures for gas meters. Meter faults are predominantly identified by the public with meters replaced following an investigation by Multinet's primary service provider. In forecasting meter failure, Multinet uses historic failure rates, which shows approximately 0.32% of the meter fleet. This percentage is then applied to the anticipated growing meter fleet to forecast the volume of defective/faulty meters for the next AA period.

Table 42: Forecast Small Meter Defective – Volume and Capex ($000, 2017, Direct)

	2018 – 2022 Total
Forecast meters (0.32% of fleet)	11,058
New meter purchases ([redacted] to be replaced)	[redacted]
Unit Rate ($/meter)	[redacted]
Total capex ($000, 2017)	$520

(Source: Small Meter Strategy: Table 4-7)
Note: Totals may not add up due to rounding error.

As the meters removed are typically faulty, the percentage that can be refurbished is greatly reduced, to [redacted].

7.2.4 Conclusion Small Meters – Replacement Programs

The forecasting methodology is detailed in the Capex Overview – Metering document (ref: section 6.1). Multinet has used a similar methodology to the other two Victorian gas distribution businesses and undertakes its testing in accordance with AS/NZS 4944:2006. Based on its experience, Zincara considers that the methodology and assumptions used in developing the forecast volumes of the program to be prudent. Multinet uses refurbished meters in its meter replacement programs, which it says is the most cost efficient. This has historically been the approach used across Victorian gas distribution businesses.

Multinet only capitalises the purchase of new meters, with refurbished meters and all labour, used in field replacement, being deemed as Opex. As such the Unit Rates and Capex shown in the respective tables reflect meter purchase cost only.

Multinet does not smooth its annual meter replacement programs, instead maximising in-service life of the meters and relying on the service providers to resource accordingly to manage the replacement volumes. As this cost is covered within Opex, it is not clear to Zincara, whether this achieves the most cost efficient outcomes. There is no information to suggest that the delivery costs are compromised using this approach.

Based on its experience and review of Multinet's methodology, Zincara considers that the programs are prudent, and with capex reflecting the meter purchases only, that the costs are efficient.

7.2.5 Hand Held Meter Reading Devices

Multinet uses Itron FC300 Hand Held Unit meter reading devices to read all gas meters. Skilltech (Multinet's contracted meter reading provider) has approximately 60 meter readers. Multinet maintains on average 65 functional devices, and of these approximately [redacted] units require replacement each year, due to the continued high use and exposure. Capex forecast is $70,000 ($2017 direct), per year or $350,000 ($2017 direct) for the next AA period. Zincara considers that these units are subject to significant handling and replacement of 10 per year would be reasonable. The devices are used for all meter reading which is essential for Multinet's operations and as such Zincara considers the replacement program to be prudent and the capex cost efficient.

7.2.6 Digital Gas Metering Pilot Study

Multinet says that it is well placed to investigate and demonstrate the operation of digital gas metering, given its close association with United Energy (UE) who has been involved in the roll out the smart metering in the electricity sector. Approximately 70% of Multinet's customers are located in UE's geographic area, and together the companies have established a single shared point of network operational control. Multinet says that it is to take a lead in the gas industry in investigating the full potential of remotely read gas meters, and to establish the model for the industry.

The proposed Pilot Study involves the installation of 10,100 digital gas meters across Multinet's gas network. A two phased approach will be adopted to investigate the costs and potential benefits of digital gas metering:

- Phase 1 (2017) focusses on integrating a small number of functional meters into the UE AMI Network and demonstrate remote communication. Multinet has engaged Silver Springs Networks (SSN), as a wireless communications specialist, who is working to prove a set of functioning meters on a Multinet approved test bench. Once achieved, a further 100 units will be purchased, integrated and installed in the field. This provides the basis to evaluate potential network and consumer benefits which can then be extrapolated to large scale implementation.

- Phase 2 (2018 – 2021) builds on the success or failures of Phase 1. This Phase allows the lessons learned in Phase 1 to apply to a 10,000 meter implementation into Multinet's network and UE AMI framework. Multinet says that the size of this phase will give a tested basis to determine the cost / benefits of planning a full scale rollout or to continue with traditional gas metering systems.

Multinet says that the 10,100 meter sample size (<2% of the network) represents the minimum study size needed to gather sufficient information to enable a robust evaluation of all costs, benefits and risks of a mass rollout. However, Zincara did not find any supporting information to justify this volume of meters.

Also, results and findings from the Phase 1 study are not currently available for review and to ascertain whether it is then appropriate to progress to Phase 2.

Multinet proposes to use the Helios G6000 digital gas meter, which is certified against international standard. Apart from being a digital meter, it has the ability to utilise remote communications via UE's AMI platform, has remote shutoff capability and provides remote reads for retailer transfer.

Potential benefits noted by Multinet include:

- Eliminating manual reading and estimated bills
- Improved information on gas usage
- Facilitate more efficient retailer change processes
- Enabling more timely move in / move out meter reads
- Enable innovative pricing arrangements
- Potential to improve identification of gas leakage.

While Multinet has outlined potential benefits, Zincara did not find any information relating to potential financial cost/benefit analysis that can assist to justify progress of the study.

The pilot study is to be completed over 5 years, with the larger rollout of meters from 2018 to 2021 (Phase 2). Project costs are shared between Metering and ICT expenditure. Only the Network expenditure component of the program is covered within the Small Meter Strategy, and considered in this report. To minimise the costs of the study, Multinet proposes to install the digital meters in parallel with the time expired meter replacement program and new meter connections. The incremental costs is calculated by taking into account the avoided cost of purchasing 10,000 conventional meters and by utilising existing programs. Zincara considers that this approach is reasonable and will lead to reduced cost of the study.

The following table summarises the scope and incremental costs, with details shown in the Small Meter Strategy Table 5-3 and section 4.7.

Table 43: Scope and cost of Digital Metering Pilot (excluding IT costs) ($000, 2017, Direct)

Function	Units	Unit Price	Cost	Comments
Meter & Installation	10,000	[redacted]	[redacted]	Including cost of meter vendor doing NIC insertion.
	8,000	NA	-	Meters installed as part of T/E program
	2,000	NA	-	Meters installed at new connections
Communications	10,000	[redacted]	[redacted]	License fee per meter
	NA	NA	[redacted]	Support for first deployment
Customer Serv.	3 FTE		[redacted]	Resources for coordination and support
Analysis	1 FTE		[redacted]	Engineer to do analysis
Total cost (excluding IT)			**$2,075**	

(Source: Small Metering Strategy: Table 5-3)

Multinet's "Digital Gas Metering Pilot Study" provides details of the proposed pilot along with potential benefits that may be realised, although Zincara did not find any potential financial cost/benefit analysis to justify progress of the study. The document says that the technology in use at electricity distribution networks is delivering significant on-going cost savings and other benefits to Victorian electricity customers.

Zincara did not find any further information to show what benefits are being realised. In the United States, it is estimated that at least 2.5 million remotely read smart meters have been installed in gas distribution networks since 2002. While the volume of digital meters is large in terms of Australian businesses, it represents a small percentage of the USA gas meter population. As such, it would appear that the application of the technology is still in a development stage and has not yet reached maturity for the gas industry, at least.

With respect to the Digital Meter Pilot Study, Zincara considers that Multinet is taking a prudent approach with the incremental development of its investigations and analysis, leading to trials of increasing magnitude in order to fully appreciate the costs, benefits and risks of the program. However, Zincara did not find potential financial cost/benefit analysis to support progress of the study to a field trial involving 10,000 meters. On this basis, Zincara considers that there is insufficient information provided to enable the capital expenditure to be justified in accordance with Rule 79(2).

Zincara considers that the incremental capex in the order of $2.6 million over the next AA period (including IT capex) is significant, particularly as it relies on the offset costs of 10,000 meter replacements/connections over the period. As such, Zincara does not consider that information provided justifies a material capital expenditure of approximately $2.6million. Zincara is of the view that a prudent service provider acting efficiently (NGR 97(1)(a)) could not justify spending $2.6million without any potential customer benefits. Furthermore, Zincara does not believe that the expenditure falls under any of clauses in NGR 79(2). Zincara therefore does not consider the project prudent and efficient.

As a side issue, Zincara does not have an issue regarding Multinet's approach to building its knowledge of the potential cost and benefits for digital metering. However, Zincara considers that further analysis of existing installations, within Australia or internationally would help inform a reviewer of the proposal, particularly with respect to benefits being realised and lessons learned through the project development and rollout.

7.2.7 Time Expired Meter Replacement – Large Meters

The annual large meter replacement program includes meter families within the final year of their in-service compliance period, and non-compliant meters outstanding from previous replacement programs. A key input to forecast meter replacement capex is a forecast of meter families that are expected to fail FLE testing, and the year in which failure is expected to occur. Meter families that do not qualify for FLE are replaced at the end of their initial in-service compliance periods.

The following figure shows the number of meters forecast to be replaced during the next AA period, based on the results of FLE testing.

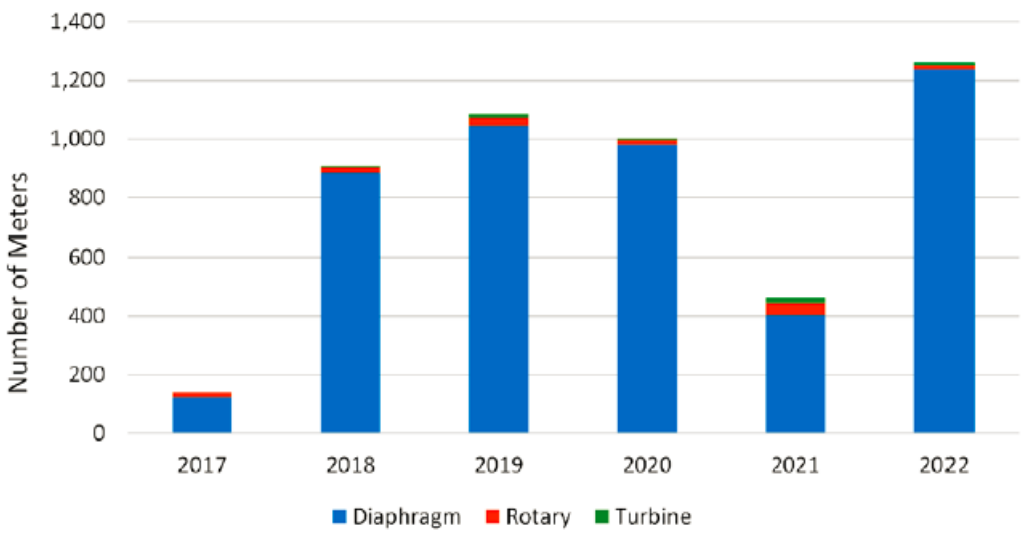
Table 44: Time Expired Replacement – Large Meters – meter type volumes

Meter Type	2018-22 Volume
Diaphragm	4,550
Rotary	122
Turbine	47
Total	**4,719**

(Source: Large Meter Strategy: Table 4-4)

The following figure shows the volume of meters to be replaced each year which is quite variable. As previously noted, Multinet does not have a policy to smooth the annual volumes, as it considers it to be cost efficient to maximise the in-service life of the meters. Its service providers are able to adequately resource the variable program.

Figure 14: Time Expired Replacement Program - Large Meters



(Source: Large Meter Strategy: Figure 4-2)

Table 45: Forecast Large Meter Time Expired – Volume and Capex ($000, 2017, direct)

	2018 – 2022 Total
Forecast meters	4,719
Repairable ([redacted] replace)	[redacted]
Repairable ([redacted] replace)	[redacted]
Non-repair ([redacted] replace)	[redacted]
New meter purchases	[redacted]
Unit Rate ($/meter) (average)	[redacted]
Total capex ($000, 2017)	$1,001

(Source: Small Meter Strategy: Table 4-5)

The build-up of meter types within the replacement program varies from year to year, which results in a variable unit rate by year for the program.

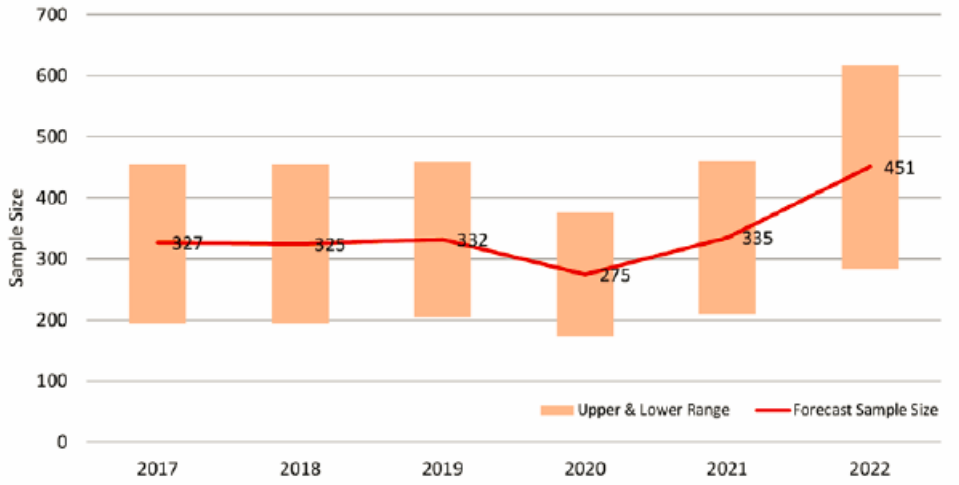
7.2.8 Field Life Extension – Large Meters

Multinet undertakes Field Life Extension (FLE) testing on selected diaphragm meter families (<30 Sm^3/hr) nearing the end of their service lives. The testing is undertaken in accordance with the requirements of AS/NZS 4944:2006 and is required to extend the in-service compliance period of a qualifying meter family.

For large meters, the AL425 and AL1000 meters have sufficient annual meter populations to justify statistical sampling. From 2019, Multinet will also begin testing the AL800.

The following figure shows the sample size (volumes) required each year, with the shaded bands representing the minimum (by variables analysis) and maximum (by attributes analysis). Modelling assumes that 50% of all meter families tested will move to 'attributes' method of testing.

Figure 15: Field Life Extension Volumes – Large Meters



(Source: Large Meter Strategy: Figure 4-3)

The following table shows the volumes of meters being replaced through this program and the required volume of new meters. As with the Time Expired meters, Multinet does not smooth the annual program.

Table 46: Forecast Large Meter Field Life Extension – Volume and Capex ($000, 2017, direct)

	2018 – 2022 Total
Forecast meters	1,718
Repairable ([redacted] replace)	[redacted]
Non-repair ([redacted] replace)	[redacted]
New meter purchases	[redacted]
Unit Rate ($/meter) (average)	[redacted]
Total capex ($000, 2017)	**$170**

(Source: Large Meter Strategy: Table 4-7)

The build-up of meter types within the replacement program varies from year to year, which results in a variable unit rate by year for the program.

7.2.9 Defective / Faulty – Large Meters

Leakage, inaccuracy, damage, excess noise and seizure are all failures for gas meters. Meter faults are predominantly identified by the public with meters replaced following an investigation by Multinet's primary service provider. In forecasting meter failure, Multinet uses historic failure rates, which shows approximately 0.36% of the meter fleet. This is applied to the anticipated growing meter fleet.

Table 47: Forecast Large Meter Defective – Volume and Capex ($000, 2017, direct)

	2018 – 2022 Total
Forecast meters (0.36% of fleet)	541
New meter purchases (to be replaced)	
Unit Rate ($/meter)	
Total capex ($000, 2017)	**$363**

(Source: Large Meter Strategy: Table 4-8)

7.2.10 Conclusion Large Meters - Replacement Programs

The forecasting methodology is detailed in the Capex Overview – Metering document (ref: section 6.1). Multinet has used a similar methodology to the other two Victorian gas distribution businesses and undertakes its testing in accordance with AS/NZS 4944:2006. Based on its experience, Zincara considers that the methodology and assumptions used in developing the forecast volumes of the program to be prudent. Multinet uses refurbished meters in its meter replacement programs, which it says is the most cost efficient. This has historically been the approach used across Victorian gas distribution businesses. For large meters, a significant majority of meters are able to be cost effectively refurbished.

Multinet only capitalises the purchase of new meters, with refurbished meters and all labour, used in field replacement, being deemed as Opex. As such the Unit Rates and Capex shown in the respective tables reflect meter purchase cost only.

Multinet does not smooth its annual meter replacement programs, instead maximising in-service life of the meters and relying on the service providers to resource accordingly to manage the replacement volumes. As this cost is covered within Opex, it is not clear to Zincara, whether this achieves the most cost efficient outcomes. There is no information to suggest that the delivery costs are compromised using this approach.

Based on its experience and review of Multinet's methodology, Zincara considers that the programs are prudent, and with capex reflecting the meter purchases only, that the costs are efficient.

7.2.11 Data loggers and Flow Correctors

These electronic devices count meter pulse outputs from a physical meter index which directly relate to flow of metered gas. This flow is then corrected to energy use for billing purposes. There are two types of interval metering installations:

- Data Loggers are used to record hourly gas flow and converted energy using only fixed temperature and fixed pressure values; and

- Flow Correctors are used to correct gas flow with either fixed / live temperature and live pressure readings on site. These values are aggregated 6 times per hour, with the calculations utilising the average values over the hour.

There is an obligation for energy correction outlined in the Gas Distribution System Code with a detailed basis of calculation outlined by AEMO. Data Loggers and Flow Correctors are used in installations where:

- Use (or planned use) of over 10,000 gigajoules in a 12 month period.
- Require a metering pressure higher than 450kPa; and/or
- Where sites are regulated after the meter.

Multinet has approximately 315 registered sites on the Victorian Market Information Bulletin Board (MIBB), which utilise interval metering equipment and therefore require interval billing practices.

The installation of a Data Logger or Flow Corrector is driven by the requirements of the Gas Distribution System Code. When the customer whose rolling 12 month consumption figures dictate interval metering is required applies for a new connection or an upgrade, Multinet has to install a data logger or flow corrector. However, the converse is also true, when a customer whose rolling 12 month consumption figures dictates that it is no longer an interval metering site, Multinet removes the data logger or corrector. This data logger or corrector that has been removed is generally not in a condition to be installed on the new site.

The number of daily metered sites remains relatively constant which means that the upgrading and downgrading of the sites are approximately the same. Multinet has forecast capex for this program based on historical expenditure, and proposes $94,000 (2017 direct) per year or $470,000 (2017 direct) for the next AA period.

This equipment is critical for reliable meter reading and energy consumption of the large consumers connected to the network. As Multinet's forecast capital expenditure is based on the historical expenditure, Zincara considers the cost to be prudent and efficient.

7.3 UNIT RATES ANALYSIS

Multinet's policy regarding capitalising new meter purchases only, with the remainder of the meter replacement program being Opex makes any analysis of capex unit rates somewhat redundant. The unit rates shown in the various replacement programs relate to the cost of new meters only and reflect competitive pricing experienced across the gas distribution businesses. On this basis, Zincara considers these capex unit rates to be cost efficient.

8. SCADA PROJECTS

8.1 INTRODUCTION

Multinet has 241 remote terminal units (RTU) at key sites in its network that are connected to its SCADA system. These RTUs are either connected to regulators and meters or installed in fringe locations of the network. Their function is to either control the pressure into the network or monitor the performance of the network or the asset.

The table below shows how each network has been controlled or monitored using the SCADA system.

Table 48: Summary of Networks

Asset	Description	Volume
RTUs	Have control or monitored functions	241
Network	HP Network – solenoid control	5
	HP Network – Variable control	13
	HP No SCADA	1
	MP Monitored	All networks
	LP Monitored	All networks

(Source: MG_13.14.2.1_SCADA Strategy –CY2017-CY2022-MG-SP-0002-20161219)

Some networks have SCADA controls which have the ability to regulate and control the network pressures. These networks are also monitored by RTUs installed at the fringe pressure locations of the networks. The monitored networks do not have SCADA control capabilities but are monitored at some regulator and metered sites and at all the fringe pressure locations.

8.2 CAPITAL PROGRAM 2018-2022

Multinet proposes the following program for the next AA period (2018-2022):

- Network control (HP, MP and LP networks) (high pressure control commences in 2017);
- RTU relocation/installation;
- Aged pressure transmitter replacement;
- Hazardous zone non-compliant site refurbishment;
- Kingfisher RTU replacement;
- TRIO radio replacement and streamlining;
- Data-logger implementation (commences in 2017);
- Gas detector installation (commences in 2017); and
- Vortex flow meter installation (commences in 2017).

It is noted that Multinet's Scada Strategy document included projects for 2017 only. The projects are:

- Jordan actuator replacement ($641,000); and
- Aged pressure transmitter replacement ($354,000).

For completeness, Zincara has reviewed all the projects including those that have commenced in 2017.

Details of the expenditure for the projects (2018 – 2022) are shown in the table below.

Table 49: SCADA Specific Projects ($000, 2017, Real)

Project Name	*2017*	2018	2019	2020	2021	2022	Total 2018-2022
Network Control							
Variable Network Control –High pressure	*130*	33	-	-	-	-	33
Step Control – Medium pressure (non-monitored)	-	324	324	-	-	-	648
Step Control – Medium pressure (monitored)	*98*	-	-	244	244	195	683
Step Control – Low pressure	-	244	244	244	244	244	1,220
RTU relocation / installation	-	16	32	-	16	16	80
Jordan Actuator Replacement	*641*	-	-	-	-	-	-
Aged Pressure Transmitter Replacement	*354*	-	-	-	-	-	-
Hazardous zone non-compliant site refurbishment	-	177	177	167	167	167	855
Kingfisher RTU Replacement	-	209	209	209	209	209	1,045
TRIO radio replacement & streamlining	*182*	541	340	-	-	-	881
Data-logger implementation	*186*	186	186	186	186	165	930
Gas detector installation	*52*	52	52	52	35	35	226
Vortex flow meter installation	*22*	22	22	22	-	-	66
Total	***$1,664***	**1,803**	**1,585**	**1,123**	**1,100**	**1,031**	**16312**

(Source: MG_13.14.2.1_SCADA Strategy –CY2017-CY2022-MG-SP-0002-20161219)
Note: The Strategy document includes 2017 costs.

8.3 NETWORK CONTROL

The network control project has been divided into 3 categories:

- Variable network control HP;
- Step control – MP; and
- Step control – LP.

A field regulator under variable pressure control can be either adjusted up or down depending on the gas demand in the network whilst a field regulator with step control can also be adjusted up or down but only to predetermined settings.

8.3.1 Variable Network Control High Pressure

Multinet says that all of the HP networks are controlled with 5 networks on solenoid/step control and 13 networks on variable control. These control systems are connected to city gates and field regulators to automatically regulate the pressures based on seasonal settings, timed settings, fringe pressures or emergency situations.

In 2017 and 2018, Multinet proposes to incorporate variable control onto the following regulators:

- 2017 - Vermont network which consists of 3 supply regulator;
- 2017 - Lorimer Street regulator upgrade; and
- 2018 - Keysborough network; Church Street

Vermont Network

The Vermont network is a solenoid control network consisting of four supply regulators:

- P3-002A/C Vermont outstation;
- P4-2898 Ringwood outstation;
- P4-168 Hedge End Road; and
- PCAD Cadbury (this regulator only supplies Cadbury and a MP network and not into the Vermont HP system).

In 2017, the Vermont outstation is being upgraded to increase its capacity to also supply the Knox HP network. As the Knox HP network is a variable control network, Multinet proposes to upgrade the Vermont outstation to a variable pressure control. At the same time, Multinet proposes to also upgrade the other two regulators, Ringwood outstation and Hedge End Road to variable control.

Lorimer Street

In 2017, Multinet proposes to upgrade the Lorimer Street regulator to variable control to fully utilise the Lorimer Street regulator and reduce the load on the Howe Parade Custody transfer meter as this regulator is exceeding its meter capacity. The Lorimer Street is

currently underutilised due to the absence of SCADA control. The regulator is part of the South Melbourne SCADA network which is currently a variable control network.

Keysborough Network

In 2018, Multinet proposes to upgrade the Church Road regulator to variable control due to the continuous growth in the network. The Church Road regulator supplies a standalone network. Multinet says that its 2017 winter testing program will determine whether to incorporate the Church Road regulator network into its Keysborough network. In any case, due to the load growth and the surrounding networks being on variable control, Multinet considers that upgrading the Church Road regulator to variable control is the most optimum solution.

Work Program

A summary of the expenditure is shown in the table below. Multinet says that the estimated cost was based on historical expenditure.

Table 50: High Pressure Variable Control ($000, 2017, Real)

Project Name		2017	2018	2019	2020	2021	2022	Total
Variable Network Control –High Pressure	Units	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Costs	130	33	-	-	-	-	163

(Source: MG_13.14.2.1_SCADA Strategy –CY2017-CY2022-MG-SP-0002-20161219)

8.3.1.1 Conclusion

Zincara notes that notwithstanding the limited information provided for the above projects, the underlying issue that the upgrade of the regulators to variable control is to have more effective control on the networks due to the load increase. As such, Zincara concurs with the proposals and considers that the upgrades to be prudent.

In addition, given that the costs are derived from historical expenditures, Zincara considers the cost to be efficient.

8.3.2 Control on Eastern Medium Pressure Network

Multinet says that its MP network is a monitored network and not all the regulators supplying into the MP have monitoring capabilities. The Eastern MP network is Multinet's largest interconnected MP network comprising of [redacted] regulators. [redacted] of the [redacted] regulators are not SCADA monitored.

Multinet says that due to the density of the eastern suburbs and the amount of LP being supported by the Eastern MP network, it is not feasible to abandon or upgrade sections to HP in the forecast period. As such, it has become critical to place the network on control. Multinet says that the advantages are quote[23]:

[23] Source: MG_13.14.2.1_SCADA Strategy –CY2017-CY2022-MG-SP-0002-20161219 pg 26

" equal to those described in the HP program above, with an additional benefit that control on the network will allow us to reduce the volume of gas leaking from the ageing assets still in service on the network".

The scale of the project is such that Multinet proposes to carry out the work over the five years period with priority been given to the following regulators:

- Do not have any form of SCADA infrastructure;
- Are already responding to an established fringe point;
- Have most impact on bad pressure fringe areas; and
- Regulators most likely to be upgraded to HP first in the future.

A summary of the work program is shown in the table below. Multinet says that the costs were based on historical expenditure.

Table 51: Medium Pressure Step Control ($000, 2017, Real)

Project Name		2017	2018	2019	2020	2021	2022	Total
Step Control –Medium Pressure (not monitored)	Units	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Costs	-	324	324	-	-	-	648
Step Control – Medium Pressure (monitored)	Units	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Costs	98	-	-	244	244	195	781

(Source: MG_13.14.2.1_SCADA Strategy –CY2017-CY2022-MG-SP-0002-20161219)

8.3.2.1 Conclusion

Zincara notes that Multinet says that the justifications for the project are that there is no proposal to upgrade the network in the forecast period (i.e. 2018-2022) and that the benefits are outlined in the HP section of the SCADA Strategy document and reduces gas leaks in the ageing assets.

From the table above, this project is going to be carried out over the forecast period. If the issue is related to the MP system not being upgraded in the forecast period, it should be carried out now and not over the forecast period.

The Eastern MP network would have been operating in its current mode for a considerably long time. There has not been any indication that there are problems operating the network under this mode nor are there any indications that there is a material increase in demand that requires the total upgrade of the regulators to step control.

In addition, the HP network has a different pressure range to the MP network. The wider pressure range in the HP network gives it more flexibility to manage the network pressures. The Strategy document has not demonstrated that the same benefits can be translated to the MP network. In relation to the increasing gas leaks, Zincara understands that most of the gas leaks are in the LP system. Upgrading the MP system to step control will not reduce the gas leaks in the LP supported by the Eastern MP network.

Zincara therefore does not consider the project to be prudent.

8.3.3 Control on Low Pressure Areas

Multinet says that there are certain LP networks that are not expected to be abandoned or replaced within the next 5 to 10 years. Due to the almost total interconnectivity of the LP network, it is essential that there be some form of control especially in areas where the leak volumes are high.

Multinet proposes that [redacted] of the 140 LP regulators be upgraded to step control in the forecast period. The sites will be determined annually for the following year through the winter testing program that aims to model the impact and flow of gas as the mains replacement program on the LP network continues. A result of the LP replacement program is that there will be smaller manageable pockets of network that can be assigned control. The sites will be selected in the following order:

- Regulators hat have most impact on the LP fringe areas; and
- Regulators most likely to be upgraded to HP fist in the future.

A summary of the work program is shown in the table below.

Table 52: Low pressure control ($000, 2017, Real)

Project Name		2017	2018	2019	2020	2021	2022	Total
Step control – LP	Units	-	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Costs	-	244	244	244	244	244	1,220

(Source: MG_13.14.2.1_SCADA Strategy –CY2017-CY2022-MG-SP-0002-20161219)

8.3.3.1 Conclusion

Multinet says that the sites for upgrading for the year is dependent on the winter testing program for the previous year and the impact of the LP replacement program on the LP network. Given that where and the number of sites that can be upgraded to step control in that year is dependent on the winter testing program, it is unclear how Multinet has been able to estimate the number of sites that it is proposing to upgrade.

In addition, Multinet says[24] that the district regulator sites have scheduled pressure changes visits depending on the seasonal demand. Given the limited pressure range in the LP network, Zincara is not convinced that there can be many more adjustments in the regulators that would justify installing step control on the district regulators.

Zincara therefore does not consider this project to be prudent.

8.4 RTU RELOCATION/INSTALLATION

A RTU is installed at a point in the network that has the lowest pressure. This RTU is called a fringe RTU. The fringe RTU communicates with the control centre and passes on information on the pressure in the network. The control centre uses the information to monitor the performance of the network or adjust the supply regulators to maintain the required minimum pressure.

[24] MG_13.14.2.1_SCADA Strategy –CY2017-CY2022-MG-SP-0002-20161219 pg 18

Over time, due to uneven growth in the network, the fringe RTU may no longer be located at the minimum pressure point in the network. At that stage, the fringe RTU is relocated to the new minimum pressure point.

Muliinet through its winter testing program has determined that there are five fringe RTUs that have to relocated to their new minimum pressure points. The location of the fringe RTUs that have to relocated are shown in the table below.

Table 53: List of Fringe Locations

Year	Location
2018	[redacted]
2019	[redacted]
2021	[redacted]
2022	[redacted]

(Source: MG_13.14.2.1_SCADA Strategy –CY2017-CY2022-MG-SP-0002-20161219)

Multinet proposes to relocate the fringe RTUs in the forecast period as shown in the table below. Multinet advised that it had based its estimates on historical costs.

Table 54: RTU/Installation Expenditure ($000, 2017, Real)

Project Name		2017	2018	2019	2020	2021	2022	Total
RTU Installation/Relocation	Units	-	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Costs	-	16	32	-	16	16	80

(Source: MG_13.14.2.1_SCADA Strategy –CY2017-CY2022-MG-SP-0002-20161219)

8.4.1 Conclusion

Zincara is aware that gas demand in the network does not necessarily grow evenly throughout the network. As such, over time, the initial minimum pressure point in the network could shift. To ensure that the control room is monitoring the minimum pressure point in the network, it is important that the fringe RTU is installed at the minimum pressure point. As such, Zincara concurs with Multinet's proposal to relocate the fringe RTUs to the minimum pressure points. Zincara therefore considers the project to be prudent.

Given that the estimates have been based on historical costs, Zincara considers the costs to be efficient.

8.5 JORDAN ACTUATOR CONTROL

Multinet advised that a number of field regulators are controlled using "Jordan Control" rotary actuators. These actuators were installed between 1980 and 2000 and do not have IEC EX or AUS EX Certification. Current industry standard requires that the actuators conform with the AS/NZS 60079.10.1:2009.

Multinet has actually already commenced upgrading sites which have these actuators. Multinet proposes to upgrade the remaining [redacted] sites across Multinet's network in 2017.

The expenditure for the replacement is shown in the table below.

Table 55: Jordan Actuator Replacement Expenditure ($000, 2017, Real)

Project Name		2017	2018	2019	2020	2021	2022	Total
Jordan Actuator Replacement	Units	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Costs	641	-	-	-	-	-	641

(Source: MG_13.14.2.1_SCADA Strategy –CY2017-CY2022-MG-SP-0002-20161219)

8.5.1 Conclusion

Zincara recognises the need to ensure that field equipment conforms to the required standard. As the Jordan actuators do not conform to the Australian Standard, AS/NZS 60079.10.1:2009, Zincara concurs with the need to upgrade them to the actuators which conform with the standard.

As the forecast estimate is based on historical costs, Zincara considers the costs to be efficient.

8.6 AGED ROSEMOUNT TRANSMITTERS

The pressure and temperature transmitters (Rosemount 1141 and 1151) are no longer supported and as such spare parts are no longer available. These transmitters were installed in 1983/4 with an expected life expectancy of 15 years. In 2014, Multinet commenced replacing these transmitters with [redacted] transmitters and expects to replace the remaining [redacted] sites by the end of 2017.

Multinet's work program for 2017 is shown in the table below.

Table 56: Transmitter Replacement Expenditure ($000, 2017, Real)

Project Name		2017	2018	2019	2020	2021	2022	Total
Aged Rosemount Transmitter	Units	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Costs	354	-	-	-	-	-	354

(Source: MG_13.14.2.1_SCADA Strategy –CY2017-CY2022-MG-SP-0002-20161219)

8.6.1 Conclusion

Zincara acknowledges that it is not sustainable having equipment in the field that are no longer supported and spare parts are no longer available. Zincara therefore considers this project to be prudent.

As the forecast estimate is based on historical costs, Zincara considers the costs to be efficient.

8.7 HAZARDOUS NON-COMPLIANT SITES/SUBSTANDARD INSTALLATION RECTIFICATION

Multinet says that it had a number of SCADA installations that it had identified as non-compliant with the Hazardous Zone Regulations for electrical equipment. It therefore proposes to remediate these sites including relocation of the RTU cabinets and antennas. Multinet also says that some of the work might be already carried out during the Jordan replacement program and the Rosemount transmitter replacement program but its SCADA information system do not have sufficient information for Multinet to be able to quantify the extent of work required accurately. Multinet has therefore estimated the extent of refurbishment required for the [redacted] sites. The scope of work includes:

- Auxiliary pipework in the field regulators will be updated to meet MG Standards;
- Solenoids that are non-compliant with MG standards will be replaced where applicable;
- Switches that are non-compliant with MG standards will be replaced where applicable;
- All sites will have RTU Failsafe code updated to the new standardised Failsafe Diagnostic Code;
- All site specific drawings, and stranded drawings will be updated to reflect changes;
- All out of date SAP information will be updated to reflect current conditions; and
- All site specific Hazardous Area Dossier will be updated to reflect changes.

Based on the above work, Multinet has estimated the cost as shown in the table below.

Table 57: Non-compliant equipment/sites rectification ($000, 2017, Real)

Project Name		2017	2018	2019	2020	2021	2022	Total
Aged Rosemount Transmitter	Units	-	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Costs	-	177	177	167	167	167	885

(Source: MG_13.14.2.1_SCADA Strategy –CY2017-CY2022-MG-SP-0002-20161219)

8.7.1 Conclusion

Zincara acknowledges that it is essential that the sites comply with the Hazardous Zone Regulations. Zincara therefore considers the project to be prudent.

From the information provided, the estimated cost per site is in the order of [redacted]. Multinet has indicated that its estimate is based on historical costs. Given the scope of work, Zincara does not consider the unit cost to be sufficiently material to seek any additional information. Zincara therefore recommends accepting the cost as efficient.

8.8 KINGFISHER RTU REPLACEMENT

Multinet has [redacted] Kingfisher RTUs in its networks. Multinet says that the effective life of a RTU is 10 years. Currently 89% of the RTUs have exceeded its effective life.

The Kingfisher RTU used in the network is the Kingfisher Plus+ RTU. This RTU was previously known as the Kingfisher Series II RTU. This modular type RTU comprises backpanes and various modules. Many of these backpanes have exceeded their useful life and are causing multiple issues. In addition, the supplier of the RTUs, CSE Sermaphore has advised that the Kingfisher Series 11 PC1 modules have ceased production and there is only very minimal support for the product.

As such, Multinet is proposing to progressively replace its RTUs at a rate of [redacted] per annum. The parts from the old RTU will be used to maintain the field equipment until such time that all the RTUs are replaced. Multinet also believes that the modern RTUs are also more efficient in terms of programing the units.

The costs of the replacement program for up to 2022 are shown in the table below.

Table 58: Kingfisher Replacement Program ($000, 2017, Real)

Project Name		2017	2018	2019	2020	2021	2022	Total
Kingfisher RTU Replacement	Units	-	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Costs	-	209	209	209	209	209	1,045

(Source: MG_13.14.2.1_SCADA Strategy –CY2017-CY2022-MG-SP-0002-20161219)

8.8.1 Conclusion

Zincara accepts that it is not sustainable to have equipment in the field that are not supported by the supplier. In addition, given that 89% of the RTUs have exceeded their effective life, Zincara believes that it is reasonable to initiate a program to progressively replace all the RTU. Zincara therefore considers the program to be prudent.

In relation to the cost, Multinet says that the replacement cost was from the supplier's advice. Given this, Zincara considers the cost to be efficient.

8.9 TRIO RADIO REPLACEMENT AND STREAMLINING

Multinet's SCADA system has a number of radios for communication between the field RTU and the control room. These radios have an effective life of seven years. In the current AA period, Multinet progressively replaced the D series radio with the E series radio. With the

seven years effective life, Multinet would have to replace the E series radio in the forecast period whilst it was still replacing the old D series radio.

Multinet therefore, engaged a consultant, 37 South, to investigate a cheaper and more reliable communication option. 37 South was also engaged to advise on the separation of the communication system which Multinet currently shares with United Energy.

37 South advised that it was possible to separate the communication system and the options for the radios. Multinet is currently trialling the two radio options, Schneider QR-460 and 4RF SR+ to decide on which radio is more effective given the new communication configuration.

The cost of the work program is shown in the table below.

Table 59: TRIO Radio Replacement ($000, 2017, Real)

Project Name	2017	2018	2019	2020	2021	2022	Total
TRIO Radio Replacement	182	541	340	-	-	-	1,063

(Source: MG_13.14.2.1_SCADA Strategy –CY2017-CY2022-MG-SP-0002-20161219)

8.9.1 Conclusion

Zincara accepts that the radio communication system needs to be reliable and as such the radios need to be operating within their effective life. Zincara notes that Multinet's solution for replacing the radios is based on the independent advice from 37 South. As such, Zincara considers the project to be prudent.

Multinet's cost is based on the estimates prepared by the external consultant. Zincara has accepted it on that basis and therefore recommends that the cost is efficient.

8.10 DATA-LOGGER IMPLEMENTATION

Multinet has a fleet of data-loggers that have reached the end of their useful life. In 2015, the units underwent a field life extension program and as such are still being used in the field. The data-loggers communicate through Vodafone 2G networks which Multinet expects will be shut down consistent with the Telstra and Optus 2G networks.

These data-loggers are being used for the winter testing program and for the cathodic protection units.

Multinet has decided on its preferred replacement data-logger and as such proposes to replace the obsolete units commencing from 2017. Multinet's costs for the project are shown on the table below.

Table 60: Data-logger Implementation ($000, 2017, Real)

Project Name		2017	2018	2019	2020	2021	2022	Total
Cathodic Protection Data Logger	Units	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Costs	102	102	102	102	102	81	591
Network Pressure Loggers	Units	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Costs	84	84	84	84	84	84	

(Source: MG_13.14.2.1_SCADA Strategy –CY2017-CY2022-MG-SP-0002-20161219)

8.10.1 Conclusion

Zincara accepts that the data loggers have reached their useful life and it is likely that the Vodafone 2G network will be closed down, consistent with that of Telstra and Optus. Given that, Zincara considers the project to replace the data-loggers to be prudent.

In relation to the cost, Multinet advised that it had used advice from the manufacturer for the purchase of the data-loggers and site installation. Zincara accepts this approach and considers the cost to be efficient.

8.11 GAS DETECTION INSTALLATION

Multinet has been installing gas detection equipment in its pits and proposes to continue with the installation of the gas detectors for this forecast period. The gas detector will provide an alarm at the control room in situations where there is a gas leak in the pit. Priority for the installation will be given to the sites which are close to dense urban areas.

The costs of the project are shown in the table below.

Table 61: Gas Detector installation ($000, 2017, Real)

Project Name		2017	2018	2019	2020	2021	2022	Total
Gas detector installation	Units	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Costs	52	52	52	52	37	37	282

(Source: MG_13.14.2.1_SCADA Strategy –CY2017-CY2022-MG-SP-0002-20161219)

8.11.1 Conclusion

Zincara accepts the important of installing gas detectors in pits to provide early warning for gas leaks. Zincara also notes that this is an ongoing program from the current AA period. Zincara therefore considers the project to be prudent.

The cost of the project is based on the historical cost and as such, Zincara has accepted the cost as efficient.

8.12 VORTEX FLOWMETER INSTALLATION

Multinet says that the flow meters are required for the following reasons:

- Understand the consumption of gas at certain injection points on the network which assist in planning works that will mitigate the risk of supply loss due to below standard pressure on the respective networks.

- Understand the seasonal behaviour of the network and alter network boundaries to utilise gas from other injection points.

- Accurately determine if a regulating station is close to meeting its capacity allowing Multinet to undergo pre-emptive maintenance works before a regulator failure should occur or in emergency situations.

- Alows Multinet Gas Network Planning to calibrate its distribution models to accurately determine the most cost efficient capital expenditure to maintain the network.

Multinet therefore proposes to install the vortex flowmeter into four sites:

- Vermont outstation;
- Lilydale city gate;
- Leongatha city gate; and
- Korumburra city gate.

The costs of the program are shown in the table below.

Table 62: Vortex Flowmeter ($000, 2017, Real)

Project Name		2017	2018	2019	2020	2021	2022	Total
Vortex Flowmeter	Units	1	1	1	1	-	-	4
	Costs	22	22	22	22	-	-	88

(Source: MG_13.14.2.1_SCADA Strategy –CY2017-CY2022-MG-SP-0002-20161219)

8.12.1 Conclusion

Zincara acknowledges that there are benefits to having flow meters installed in certain critical sites. It will give Multinet the ability to assess when the field regulator is approaching its capacity and also provide additional information for network planning purposes. Zincara therefore considers the project to be prudent.

In relation to the cost, Multinet has based its cost on quotations from the distributors, AMS Instrumentation and Calibration Specialist. Zincara has accepted the costs as efficient on that basis.

8.13 SUMMARY

Installation of Variable and Step Control

Multinet proposed to install variable controls on the three field regulators in the Vermont HP system. The reason for the installation is to have more effective control on the network and also to harmonise all the controls in the Vermont HP system and the Knox HP system. The Vermont HP system supplies the Knox HP system which is already on variable control.

As such, Zincara considers this project to be prudent. As the costs have been derived from previous projects, Zincara has accepted the costs as efficient.

Multinet also proposed to install step control in the Eastern MP networks and the LP networks. The justification for the project is that these areas are not going to be upgraded in the forecast period.

Zincara does not consider the projects to be prudent as there are no indications that these areas have had material increase in load that requires further control then currently exists. In addition, unlike the HP system that has a large pressure range, the MP and LP system do not and as such, there is limited benefits for installing such controls on the MP and LP systems.

RTU Relocation

The RTUs relocating project is related to the shifting of the fringe RTUs to different locations. This is due to uneven growth in the network resulting in the current RTU locations no longer reflecting the minimum pressure points in the network.

Zincara considers that this project to be prudent as it is important for the effective control of the network to monitor the actual minimum pressure point in the network. Zincara also considers this project to be efficient due to the costs been derived from historical projects.

Replacement of Control and Associated Equipment

There are six projects that are related to the replacement of various equipment due to obsolesce or equipment not complying with current Australian Standards. Zincara considers that it is reasonable to ensure that all equipment are currently supported by the suppliers, not exceeded their useful life and comply with the relevant Australian Standards. Zincara therefore considers the projects to be prudent. The costs of the projects have been derived from historical projects or advice from the suppliers. Zincara therefore considers the costs to be efficient.

Installation of gas detectors and flow meters

The last two projects consist of installing gas detectors in pits and meters to measure the gas flows into the networks. Zincara considers both projects to be prudent for safety reasons and also for effective network management. The costs again have been derived from historical projects and advice from the supplier. Zincara therefore considers the costs to be efficient.

9. IT PROJECTS

9.1 INTRODUCTION

The IT projects that are related to gas that Zincara have reviewed are shown in the table below.

Table 63: IT Gas Specific Projects ($000, 2017, Real)

Project Ref	Project Name	2018	2019	2020	2021	2022	Total
IT01	Asset Data Quality Program	105	415	311	-	-	830
IT03	GIS Gas Transmission Pipelines	-	-	2,069	-	-	2,069
IT07	Network Monitoring Capability	27	79	-	-	-	106
IT08	Mobility Integration	3,693	922	-	-	-	4,614
IT09	Digital Meters IT Support	591	-	-	-	-	5901
IT38	Customer Experience Improvements Program	1,641	-	-	-	-	1,641
IT40	Business Intelligence	230	230	231	230	230	1,151
	Total	**6287**	**1646**	**2611**	**230**	**230**	**16312**

(Source: MG_13.13.1.1_MG IT Capital Plan Cost Model 2018 -2022)
Note: Totals may not add up due to rounding error.

In its response to the AER, Multinet advised[25] that it wishes to withdraw its Mobility Integration project (IT08). Multinet indicated that parallel to Multinet's submission to the AER, United Energy was carrying out a similar "Work Planning and Scheduling" project. This project had taken Multinet's requirements into account and forecast the IT capital cost will reduce to $1.91 million which has been offset by opex savings. The project is therefore self-funding. As a result, Zincara has not reviewed this project further.

Zincara's analysis and conclusions of the various projects are detailed in the Sections below.

9.2 ASSET DATA QUALITY PROJECT IT01

In the 2013-2017 period, Multinet (MG) implemented a replacement of its core SAP ERP asset management system and upgraded its Geographical Information System. These new systems provided an IT foundation to support MG's asset and works management system. MG has, however, identified improvement opportunities in data capture and data management capabilities of the system. For example[26]:

- Some classes of assets are not recorded in the core systems but continue to be managed in aging, stand-alone 'add-on' systems which lack the data validation and management capabilities of the core systems; and

[25] IR#11 Capex Information Technology Response – Final
[26] Project Overview IT01 pg 1

- Data categories, hierarchies and linkages are incomplete. As a result, data elements may be difficult to find and duplicate entries may be made.

During the 2018 to 2022 period, MG proposes an ongoing program of IT enhancements to address outstanding and unresolved data asset issues in relevant systems. The program will:

- Improve the capability of core systems to link and categorise data so that staff can more easily find and update records. This will decrease the likelihood of the creation of duplicate and inconsistent data elements;

- Enhance and maintain the core asset management systems so that they can capture additional data about equipment and devices in the gas distribution network that are currently not adequately recorded and tracked;

- Improve the data validation capabilities of core systems to maintain the accuracy of data; and

- Improve synchronisation of data held in different systems.

The major cost for this work is the labour cost of software development commencing on the quarter 1 Oct 2018.

The cost is shown in the table below.

Table 64: Asset Data Quality Cost ($000, 2017, Real)

Activity	Cost
Labour	[redacted]
Software	[redacted]
Hardware	[redacted]
Security	[redacted]
Project Management	[redacted]
Total	**830**

(Source: MG_13.13.1.1_MG IT Capital Plan Cost Model 2018 -2022)

In its response to the AER, Multinet advised[27] that the scopes of the activities are:

- Enhance the core asset management systems (SAP ERP and GIS) to capture additional data about equipment and devices in the gas distribution network that are currently not adequately recorded and tracked.

- Improve validation and consolidation of data across multiple disparate systems (primarily GIS, SAP ISU and SAP ERP – although there are a number of smaller applications that provide a range of asset and network performance data)

[27] IR#11 Capex Information Technology Response – Final

- Implement improved integration between GIS and SAP. Some asset data is currently manually entered into both SAP and GIS this leads to inconsistent data in the two systems.

- Develop a number of reports and analytical queries using MG's existing Information Hub.

Multinet also advised that the replacement of the core systems was due to a decision to withdraw from the outsourced systems model to one that is still outsourced but Multinet owning the system. To reduce the implementation risk, Multinet decided not to implement any improvement/functionality which resulted in a successful project conclusion.

Multinet provided a list of examples of data not recorded in the core systems. They include:

- Domestic consumer supply regulators;
- Sub equipment classes for telemetry and pressure reduction station equipment;
- Custody transfer meters;
- Consumer service valving; and
- Complex meter room as function locations.

9.2.1 Conclusion

Zincara acknowledges that the successful implementation of any large IT project is to minimise any changes to the system and as such concurs with Multinet's approach of not introducing any improvements in the first instant. Zincara also recognises that list of data that are not recorded in the core systems are key to the functioning of the distribution system.

Given the above, Zincara considers that it is prudent to implement the changes to improve Multinet's asset data.

In regard to the cost, Multinet says[28] that it had as much as possible based the cost on previous projects. Multinet's estimate uses the daily rates of the resources multiplied by the time allocated. Zincara has reviewed the daily rates[29] of the resources for the project. They include: IT Manager, Solution Architect, Development Manager and Senior IT Consultant. Zincara considers the daily rate would be what is expected in the IT industry. In relation to the time allocated for the work, it is difficult to estimate the time without a full understanding of the scope of works and the complexity of the system.

Zincara believes the approach used by Multinet is transparent and has used the cost of previous projects. In addition, as Zincara considers the daily rates of the resources as reasonable, Zincara recommends accepting the cost as efficient.

[28] MG_13.13.1_MG Capital Expenditure Overivew-ICT_20161021
[29] MG_13.13.1.1_MG IT Capital Plan Cost Model 2018 -2022 Parameter Tab

9.3 GIS GAS TRANSMISSION PIPELINE (IT03)

The objective of this project is to extend the functionality of the GIS system allowing additional data (including new data type and sources) for transmission pipelines to be sourced, stored, analysed and maintained such that it is readily available for maintenance, emergency and augmentation projects.

MG considered 3 options[30]:

1. Do nothing
2. Built increased function into the existing GIS Data model
3. Implement the pre-configured and pre-integrated Smallworld Global Transmission Office Suite (GTO).

Multinet says that Option 3 above be adopted as it meets the requirements of and gives the most cost effective solution with an acceptable degree of implementation risks.

The cost is shown in the table below.

Table 65: GIS Gas Transmission Pipeline Cost ($000, 2017, Real)

Activity	Cost
Labour	[redacted]
Software	[redacted]
Hardware	[redacted]
Security	[redacted]
Project Management	[redacted]
Total	**2,069**

(Source: MG_13.13.1.1_MG IT Capital Plan Cost Model 2018 -2022)

In its response to the AER, Multinet advised that it was meeting its obligations under AS2885. However, the data for the transmission pipelines currently resides in legacy applications and spreadsheets. Any additional data required often has to be sourced from the files and re-validated as and when required. It was getting difficult to continuously rely on these systems.

Multinet also advised that improvements in technology and software have allowed organisations to better capture, manage and maintain data, particularly unstructured data (e.g. field notes), GPS data and digital images.

9.3.1 Conclusion

Zincara is aware that the gas industry is moving towards evidence based system in that a business should be able to prove that it has designed and constructed the pipelines to the relevant standards. In addition a business is also required to demonstrate that it is

[30] Project Justification IT03 – GIS Transmission Pipelines

operating and maintain the pipelines safely. As such, accurate and reliable data is important to be able to prove that the pipelines have been constructed and operated safely. Zincara therefore believes that disparate systems for storing data are not sustainable in the long term. As such, Zincara considers the project to be prudent.

In regard to the cost, Multinet says[31] that it had as much as possible based the cost on previous projects. Multinet's estimate uses the daily rates of the resources multiplied by the time allocated. Multinet also indicated[32] that the resources required for the project were determined by an initial assessment by IT technical staff and Multinet's subject matter experts. It then compared the labour cost with similar projects which resulted in a reduction of the initial estimate of $2.5 million to approximately $1.6 million. The software cost is based on an indicative vendor's quote.

Zincara has reviewed the daily rates[33] of the resources for the project. They include: IT Manager, Solution Architect, Development Manager and Senior IT Consultant. Zincara considers the daily rate would be what is expected in the IT industry. In relation to the time allocated for the work, Zincara believes using subject matter experts and IT resources followed by a reality check by comparing the cost with similar projects to be a reasonable approach.

Based on the above discussion, Zincara believes Multinet's estimate to be reasonable and Zincara recommends accepting the cost as efficient.

9.4 NETWORK MONITORING CAPABILITY (IT07)

Multinet says that its current fleet of pressure chart recorders that monitors the status of the network are now approaching the end of their life. These pressure chart recorders communicate with a head end system[34] via the 2G network. These chart recorders are locked to the Vodafone 2G and are not able to be upgraded to the 3G or 4G networks. When the Vodafone network is shut down, these devices will no longer be able to operate.

The chart recorders are being replaced in the period 2018 – 2022 with the next generation of logging devices. In addition, Multinet is also proposing to install new corrosion protection equipment, which will also be able to communicate with the head end system. Multinet estimates that by 2022 it will have 400 new technology devices as compared to 100 old units in 2016.

As such, Multinet needs to replace its head end system and associated monitoring software.

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

[31] MG_13.13.1_MG Capital Expenditure Overivew-ICT_20161021
[32] IR#11 Capex Information Technology Response – Final
[33] MG_13.13.1.1_MG IT Capital Plan Cost Model 2018 -2022 Parameter Tab
[34] Head end system is a software and hardware system that receives a stream of data from the field devices (e.g pressure, meter data etc). The system sometimes validates the data before pushing the data onto other systems.

Table 66: Network Monitoring Cost ($000, 2017, Real)

Activities	Costs
Labour	[redacted]
Software	[redacted]
Hardware	[redacted]
Security	[redacted]
Project Management	[redacted]
Total	**106**

(Source: MG_13.13.1.1_MG IT Capital Plan Cost Model 2018 -2022)

9.4.1 Conclusion

Data loggers are essentially to network planning and ongoing monitoring of the performance of the network. Zincara is aware that the data loggers are reaching the end of their useful life and needs to be upgraded to ensure that the distribution businesses are able to monitor the network pressures.

In regard to the cost, as in the above projects, Multinet says[35] that it had as much as possible based the cost on previous projects. Multinet's estimate uses the daily rates of the resources multiplied by the time allocated. Zincara has reviewed the daily rates of the resources and considered them reasonable. Zincara has also assessed the type of resources that have been allocated to the project and also considered them to be reasonable.

Based on the above, Zincara considers the cost to be efficient.

9.5 DIGITAL METERS IT SUPPORT (IT09)

MG is operating a small trial of remotely-read digital gas meters in its distribution area. In the next regulatory period, MG plans to increase the size of the trial to 10,000 meters. The objective of the trial is to better understand the potential costs and benefits of the widespread deployment of digital meters.

With this trail of 10,000 meters, MG is proposing to have an IT capability for the following[36]:

- Meter and communications network management;
- Meter data management;
- Customer configuration management; and
- Analytics and reporting.

MG therefore proposes to go into an arrangement with UE to utilise its IT applications in place for the Advance Metering Infrastructure (AMI) project. The modifications required are:

[35] Project Overview – IT09-Digital Meters IT Support-20160930
[36] Project Overview – IT09-Digital Meters IT Support-20160930

- Add a new meter type in the customer management system (SAP ISU);
- Ensure that the trial of digital meters does not impact the transactions sent to retailers and/or the market operator;
- Allow interception of service order requests for reconnections and disconnections so that they can be manually processed via the meter and network management system;
- Allow interception of special read requests so that they can be processed manually; and
- Extract, transform and load meter reading and event information.

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

Table 67: Digital Meters IT Support Cost ($000, 2017, Real)

Activities	Costs
Labour	[redacted]
Software	[redacted]
Hardware	[redacted]
Security	[redacted]
Project Management	[redacted]
Total	**591**

(Source: MG_13.13.1.1_MG IT Capital Plan Cost Model 2018 -2022)

In response to AER, Multinet says[37] that the current trial is completely standalone with no integration to existing system. The initial trial was to test the field deployment of digital meters and the ability to remotely read these meters in the distribution system.

The larger trial of 10,000 meters will require integration into Multinet's backend systems.

9.5.1 Conclusion

This project is predicated on the metering trial going ahead. As Zincara is not recommending the trial to proceed, it is also not recommending the development of the digital meters IT support project.

9.6 CUSTOMER EXPERIENCE IMPROVEMENTS IT38

MG proposes[38] to provide a customer portal to enable customers to register for digital communications and track the status of their supply and provide an improved customer

[37] IR#11 Capex Information Technology Response – Final
[38] Project justification – IT38- Customer Experience Improvements -20160125

transfer process. MG says that the system would avoid additional staff to manage an increasing volume of customer interactions.

The project will provide:

- An efficient on-line method for customers to request and track services and obtain information about the status of their service.

- Reducing errors and delays in transfers to new retailers by introducing a standard for address data used when customers switch retailers.

- Information to enable retailers to promptly resolve erroneous customer transfers.

The options considered are:

1. Do nothing
2. Increase staff
3. Modify existing system
4. Implement new system

The analysis carried out by MG showed that the least cost option was to modify the existing system (option 3). MG proposes to leverage of the portal capability developed by United Energy to provide the capabilities required to meet the MG gas project.

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

Table 68: Customer Experience Improvement Cost ($000, 2017, Real)

Activities	Costs
Labour	[redacted]
Software	[redacted]
Hardware	[redacted]
Security	[redacted]
Project Management	[redacted]
Total	**1,641**

(Source: MG_13.13.1.1_MG IT Capital Plan Cost Model 2018 -2022)

In its response to the AER, Multinet says[39] that between 2012 and 2014, there has been a total of approximately 119,000 inquiries per annum. Since 2014, with limited growth in customer numbers, there has been a 1% and 4% increase in inquiries and Multinet expects the trend to continue.

Multinet also says that it was not having difficulty answering customers' inquiries but it was looking to improve the service being offered to customers and enhance customers' experience.

[39] IR#11 Capex Information Technology Response – Final

Multinet expects that with the increasing drive for energy customers (electricity and gas) to compare retail prices and change retailers, it expects that there will be a higher rate of churn. It also indicated that the AEMC in February 2017 had improvements were required for data validation by distributors.

Multinet has also indicated that it had not prepared a business case for the project and any trade-off between capex and opex would be considered at the time of preparing the business case.

In relation to the cost, Multinet says the forecast methodology is outlined in its submission[40]. It has used its financial model to carry out an estimate of the project cost and compared it with similar projects.

9.6.1 Conclusion

AEMC in its review[41] on gas switching says that the switch rate for gas is less than that for electricity. Customer and retailer surveys suggest that some customers who prefer dual fuel offers may switch gas plans when they switch electricity. Gas is therefore a secondary consideration for most customers. In its 2016 report, AEMC also indicated that the rate of customer churn for gas has actually decreased.

Whilst there has been a marginal increase in the number of inquiries, Zincara does not believe that 1%-4% increase since 2014 is sufficient justification for a project of this nature. In addition, whilst the AEMC may be concern of the data validation by distributors, Multinet had not indicated that it has a validation problem or provided any quantitative data to support its argument.

As such, Zincara does not consider this project to be prudent.

9.7 BUSINESS INTELLIGENCE IT40

This project consists of a number of small Business Intelligence (BI) initiatives to leverage existing data and BI tools to meet a wide range of business requirements.

The scope of the project is:

- Consolidate existing disparate data source and analytics to provide a coherent, reliable, accurate and valid data source.

- Leverage the capabilities from the current BI tools to provide a range of critical improvements to existing data analysis, reporting processes and compliance requirements.

- Allow the business to address increased regulatory compliance requirements.

- Deliver operational capabilities and improved data integrity.

[40] MG_13.13.1_MG Capital Expenditure Overivew-ICT_20160121
[41] AMC Retail Competition Review 2015 and 2016.

- Improve regulatory and business compliance capabilities.

- Deliver better customer service through better data quality, improved access to information and timely responses.

The options considered are:

1. Do nothing;
2. Modify existing systems; and
3. Implement new systems.

The analysis showed that the most cost effective solution was to leverage existing system. MG proposes to utilise UE's BI platform for this project.

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

Table 69: Business Intelligence Costs ($000, 2017, Real)

Activities	Costs
Labour	[redacted]
Software	[redacted]
Hardware	[redacted]
Security	[redacted]
Project Management	[redacted]
Total	**1,151**

(Source: MG_13.13.1.1_MG IT Capital Plan Cost Model 2018 -2022)

In respond to the AER, Multinet says[42] that whilst it is meeting its regulatory and customer service requirements. The area of concern is the discrepancies between different reports. The issues are due to:

- Data quality issues as described in the Asset Data Quality project (IT01);

- Discrepancies between data occurring in both the GIS and SAP systems (e.g. length of main may have different values in each system); and

- BI reports using different sources of data e.g. one report using SAP and another report using GIS.

Multinet also says that the proposed HANA solution would replace the existing COGNOS based BI solution. The system would allow users to produce their own reports without the need of a technical BI developer. Multinet is also concern that with imminent retirement of its key staff that it would loss the intellectual property to identify and solve problems that has been identified in the BI report.

[42] IR#11 Capex Information Technology Response – Final

9.7.1 Conclusion

The project is based on developing analytical tools for carrying out business intelligence. Whilst the business case is written round improved analysis, the issue seems to be the data issues in the various systems. In addition, Multinet had not quantified the number of issues that it had experience or the impact of the issues on its asset management. In fact, Multinet says that it was meeting its regulatory and customer services obligations.

Given the above, Zincara does not consider the project prudent.

9.8 SUMMARY

Asset Data Quality Program
Multinet has identified improvement opportunities after replacing its core SAP ERP asset management system and its geographical information system in the current AA period. Multinet says that it had not included the improvements when replacing the core systems to limit the risk of cost and timing overruns.

Zincara has reviewed the enhancement and considers this project to be prudent.

GIS Gas Transmission Pipeline Project
The project is related to extending the functionality of the GIS for transmission pipeline to store data for maintenance, emergency response and augmentation of the pipelines. Zincara is aware of the need to ensure that all pipeline data are stored in easily retrieval system and as such, considers this project to be prudent.

Multinet had says that the costs have been derived from previous projects. Zincara has accepted the cost as efficient.

Network Monitoring Capability
This project is related to replacing the pressure chart recorders that are approaching its end of useful life. Zincara considers this project to be prudent. Similarly, Zincara has accepted the costs as efficient as it has been derived from historical projects.

Digital Meters IT Support
This project is related to the trail of installing remotely-read digital meters. Zincara has not recommended this project as prudent (refer 1.5) and as such do not consider this project to be prudent as well.

Customer Experience Improvement
Multinet proposes to provide a customer portal to enable customers to register for digital communications and track the status of their supply and provide an improved customer transfer process. Multinet says that the system would avoid additional staff to manage an increasing volume of customer interactions.

The AEMC says that the rate of customer churn in gas has decreased and as such, the marginal increase in customer inquiries would not just this project. Zincara therefore does not consider this project to be prudent.

Business Intelligence

The project is based on developing analytical tools for carrying out business intelligence. Whilst the business case is written round improved analysis, the issue seems to be the data issues in the various systems. In addition, Multinet had not quantified the number of issues that it had experience or the impact of the issues on its asset management. In fact, Multinet says that it was meeting its regulatory and customer services obligations.

Given the above, Zincara does not consider the project prudent.

Appendix E

References

Access Arrangement Information
Capital Growth Plan (MG-PL-0002)
Capital Expenditure Overview: Augmentation
Capital Expenditure Overview: Mains Replacement
Capital Expenditure Overview: Metering
Capital Expenditure Overview: Residential and Commercial and Industrial Connections
Capital Expenditure Overview: Other Capital Expenditure
Capex model
Distribution Mains Strategy
Distribution Services Strategy
Supply Regulators Strategy
Large Consumer Regulators Strategy
Distribution Valves Strategy
Equipment Enclosures Strategy
Small Meter Strategy
Large Meter Strategy
Digital Gas Metering Pilot Study
Network Performance Reports
Independent Estimates Report (Advisian)
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NIEIR Growth Forecasts
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