Attachment G.4

SAPN_Metered mains_ supporting evidence

03 July, 2015

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1. Executive summary

1.1 Purpose

The metered mains project is part of SA Power Network's bushfire mitigation strategy. Its purpose is to prevent potential fire starts caused by failed metered mains in bushfire risk areas. This will allow SA Power Networks to achieve ongoing compliance with our safety related regulatory obligations.

This business case recommends, Option 2 – Repair and remediate to required standards, for a capital investment of $10.1M.

1.2 Rationale and reason for the project

The Black Saturday (2009) event in Victoria heightened our bushfire awareness, leading us to examine similar national events that caused major and catastrophic bushfires. The Parkerville (2014) bushfire in Western Australia triggered SA Power Networks to undertake an investigation into our practices with regards to metered mains. The findings of our investigations were that there are a significant number of non-complying metered mains supplying our rural customers. This exposes the community to fire and electrocution risks.

Metered mains are essentially customer service lines with the metering point located near the boundary of the property to facilitate easier meter reading. The location of the meter is different from a typical point of supply. With a typical point of supply the meter will be located at or near the point of supply. The point of supply defines the outer limit of our scope of responsibility. With a metered main the point of supply is unclear because the ownership of the line from the meter to the relevant premises is often unclear (ie it is unclear whether SA Power Networks or the customer is the owner of this line).

The unclear ownership of these metered mains has resulted in a significant number of these assets not being inspected or maintained. The current condition of metered mains ranges from those that met our standards at the time of construction to those that do not currently meet our Safety and Technical Standards or the Australian Standards. This non-compliance with power line Standards has resulted in us determining that there is a high risk that metered mains may result in a fire start that could potentially become a significant bushfire.

This exposes SA Power Networks to liability risks because if one of these metered mains fails and leads to a significant fire event or public injury, it is likely that any person who suffers a loss due to that failure will seek to recover that loss from SA Power Networks even if the exact ownership of the metered main is unclear (for example, the person may seek to argue that SA Power Networks has a duty of care in relation to electrical assets that are connected to, and are immediately adjacent to, SA Power Networks distribution system).

Given these concerns and the scope of the regulatory obligations requirements under section 60(1) of the *Electricity Act 1996* (SA) (**Electricity Act**), the National Electricity Rules (**NER**) and the *Work Health and Safety Act 2012* (SA) (**WHS Act**) and the concerns of our customers in relation to community safety, we have formed the view that the current unclear ownership and condition of metered mains is an identifiable risk and we should take all reasonable steps to address that risk.

1.3 Key options considered

The options identified in this business case to address the fire, health and safety risks posed by the current condition of metered mains are summarised in Table 1 below.

Table 1: Options considered ($2015)

Options	Description	Estimated Cost
Option 1: Base case – Do nothing **NOT RECOMMENDED**	No capital works will be undertaken on metered mains lines. We will continue business as usual.	BAU
Option 2: Repair and remediate to required standards **RECOMMENDED**	We will repair and remediate metered mains from the meter to the main buildings being supplied. Meters remain in their current location.	10.1
Option 3: Cost sharing repair and remediate **NOT RECOMMENDED**	The property owner repairs and remediates metered mains from the meter to the main building being supplied, under a cost share arrangement where SA Power Networks contributes 50% of the repair and remediation costs. After remediation, the property formally takes ownership and the associated responsibility for the metered main from that date onward. Because of the large capital cost associated with remediating long metered mains, this option is only feasible for properties where dwelling/buildings are only two spans or less from the connection point/meter.	1.6
Option 4: Repair, remediate, and relocate customer service point **NOT RECOMMENDED**	Metered mains from the meter to the main building being supplied are repaired and remediated to the required standard. Where the ownership is unclear, the meter is relocated to the traditional location (ie the building supplied). SA Power Networks takes responsibility for the metered main.	16.2

1.4 Recommended option

Each option was evaluated against business criteria (contained in section 3.3.2 of this business case) and the estimated improvement in bushfire risk (in terms of fire starts).

Based upon this evaluation method, Option 2 (Repair and remediate to required standards) is the highest ranked option, and as such, is the preferred option to address the fire, health and safety risks of metered mains. It is estimated this option will bring the fire start risk back in-line with our LV distribution assets.

The other options which were considered, but are not recommended, were:

- **Option 1 - Do nothing**
  This would not allow us to comply with our safety related regulatory obligations.

- **Option 3 - Cost sharing repair and remediate**
  This would require SA Power Networks to undertake capital expenditure for physical assets which we will not own - that is, works that will include the customers' reticulation. This option requires 50% of the remediation costs to be borne by the customer who may reject this offer and the metered main will remain unsafe. This option provides only a small reduction in fire start risk (15%) because less metered mains will be remediated.

  It is also likely to take many months if not years to reach agreement concerning the correct ownership of these assets.

- **Option 4 – Repair, remediate, and relocate customer service point**
  This would require SA Power Networks to make a significant capital investment and will require the customers metered mains to be gifted to SA Power Networks. This is not a prudent and efficient approach. This option provides a similar reduction in fire risk to Option 2, but at a poorer cost-benefit ratio due to the additional costs to relocate the meters.

2. Introduction and Project Rationale

2.1 Purpose

The metered mains program forms part of our bushfire mitigation strategy. Its primary purpose is to mitigate potential fire starts caused by failed metered mains that could result in a major bushfire event or public injury.

2.2 Background

The Black Saturday event in Victoria heightened our bushfire awareness, leading us to examine similar national events that caused major and catastrophic bushfires. The Powerline Bushfire Safety Taskforce (**PBST**), which was convened to investigate some of the recommendations of the Victorian Bushfire Royal Commission, recognised that private overhead power lines have been implicated in many bushfires.

Subsequently, the 2014 Parkerville bushfire event in Western Australia resulted from a pole failure on a private service line. This was a significant bushfire that destroyed more than 50 properties. The occurrence of that bushfire led us to undertake a review of similar assets known as metered mains.

Metered mains were installed to facilitate the reading of electricity consumption at multiple installations, particularly on South Australia's rural properties. Power lines were installed from those installations and terminated at one location. These lines are referred to as 'metered mains'. However, the presence of these metered mains resulted in confusion over who was responsible for their maintenance (ie SA Power Networks or the customer).

This lack of clarity of responsibility for metered mains has always been a concern of ours. These assets were designed and constructed in accordance with various standards by local councils or others and deemed suitable at the time. They were installed (generally) on Stobie poles close or adjacent to a road to aid efficient and easy reading of meters. Metered mains are typically supplied from SWER lines in rural areas, usually where multiple buildings and/or bore pumps are owned by a single customer, either supplied from a single meter or multiple meters (if there are multiple tariffs).

Prior to the privatisation of ETSA Utilities (now SA Power Networks), there were various agreements between the government owned ETSA corporation and councils for the transfer of electricity undertakings - from as far back as the 1940s. These agreements contained broad and general description of the (then) council's electricity distribution system, with no apparent distinction of metered mains and its demarcation of ownership (and relevant responsibilities and obligations) between the distribution network and the customer - consequently a number of these assets have either not been inspected and/or maintained.

The PBST has recognised that private overhead power lines have been implicated in fire starts in the past, such as the Parkerville event in WA. Should one of these metered mains fail and lead to a significant fire or public injury event, it is likely that any person who suffers a loss due to that failure will seek to recover that loss from SA Power Networks even if the exact ownership of the metered main is unclear (for example, the person may seek to argue that SA Power Networks has a duty of care in relation to electrical assets that are connected to, and are immediately adjacent to, SA Power Networks distribution system).

Given these issues and the scope of the regulatory obligations requirements under section 60(1) of the Electricity Act, the NER[1] and the WHS Act, and the concerns of consumers in relation to bushfire safety, the current circumstances and condition of Metered Mains is an identifiable risk and our current practices would not be considered an appropriate practice moving forward, if reasonable alternatives that exist were not actioned.

2.3 Issue, risk and Opportunity

Continuing with the current situation does not address the fire and electrocution safety concerns of customers and the broader community, furthermore the current situation also imposes the following additional risks on SA Power Networks:

- a fire start or electrocution event leading to us being found non-compliant with our safety obligations; and
- in the event of a failure contributing to a catastrophic bushfire event, our liability could be very high.

Table 2 below shows our estimated[2] fire start performance for metered mains. In this table we provide a measure of fire starts for a 30-year period. The 30-year period provides a more meaningful measure of the magnitude of the fire risk across a period that is typical of catastrophic bushfire events. This analysis is explained further in Appendix A.4.

Table 2: Current metered mains fire start performance

	Fire starts	
Fire start conditions	**Per 30-year period**	**Ave per annum**
Fire danger season	56.5	1.9
Total fire ban days	8.8	0.3
Typical switch off conditions	1.7	0.1

This analysis indicates that the population of metered mains in South Australia has the potential to start a significant number of fires. Moreover, a material number of these fires could be started under extreme bushfire conditions. Importantly, these assets are old and therefore the risks could increase significantly with their continued ageing.

2.4 Strategic alignment

The project forms part of our bushfire mitigation strategy for the 2015-20 regulatory control period (**RCP**).

[1] Clause 5.2.1(a) of the NER.
[2] We have limited fire start data on metered mains, which is partly due to the lack of clarity on responsibilities. Therefore we have made a number of assumptions to estimate the fire start performance of these assets. These assumptions are explained in Appendix A.4 of this business case.

SA Power Networks has a responsibility to reduce the fire start risk of our network where the cost is not grossly disproportionate to risk reduction. This ongoing issue with metered mains has the potential to cause a major bushfire and therefore options to address non-compliant metered mains are required to comply with our regulatory obligations and align with our resultant our bushfire mitigation strategy.

Remediation of metered mains constitutes a reasonable step to ensure that our distribution system is safe and safely operated, in line with good electricity industry practice.

3. Options identification and analysis

3.1 Consideration in assessing the different options

The options for addressing the risks associated with metered mains are assessed in accordance with the following 3 steps:

Step 1: Identify and analyse options

Step 2: Evaluate options

Step 3: Provide a recommended option

3.2 Options identification and analysis

Table 3 outlines the options considered and the estimated cost for each option.

Table 3: Options considered ($2015)

Options	Description	Estimated Cost
Option 1: Base case – Do nothing **NOT RECOMMENDED**	No capital works will be undertaken on metered mains lines. We will continue business as usual.	Business as usual
Option 2: Repair and remediate to required standards **RECOMMENDED**	We will repair and remediate metered mains from the meter to the main buildings being supplied. Meters remain in their current location.	10.1
Option 3: Cost sharing repair and remediate **NOT RECOMMENDED**	The property owner repairs and remediates metered mains from the meter to the main building being supplied, under a cost share arrangement where SA Power Networks contributes 50% of the repair and remediation costs. After remediation, the property formally takes ownership and the associated responsibility for the metered main from that date onward. Because of the large capital cost associated with remediating long metered mains, this option is only feasible for properties where dwelling/buildings are only two spans or less from the connection point/meter.	1.6
Option 4: Repair, remediate, and relocate customer service point	Metered mains from the meter to the main building being supplied are repaired and remediated to the required standard. Where the ownership is unclear,	16.2

Options	Description	Estimated Cost
NOT RECOMMENDED	the meter is relocated to the traditional location (ie the building supplied). SA Power Networks takes responsibility for the metered main.	

3.3 Options evaluation

The options analysis has involved:

- analysis and quantification of the improvement in fire risk provided by each option; and
- assessment of each option against our business evaluation criteria.

3.3.1 Analysis of fire risk improvement

We have estimated the reduction in fire starts (from those shown in Section 2.3 of this business case) that each option will provide, refer to Table 4.

Table 4: Bushfire risk reduction of each option

Option	Cost ($ millions)	Risk reduction (events per 30 years)		
		Fire danger season	Total fire ban	Switch off
Option 1 (business as usual)	0.0	0.0	0.0	0.0
Option 2	10.1	28.3	4.4	0.8
Option 3	1.6	8.7	1.4	0.3
Option 4	16.2	28.3	4.4	0.8

Based upon this analysis, Option 2 (repair and remediate to required standards) ranks the highest of the four options considered:

- Options 2 and 4 have the same fire risk improvement (because they are both remediating the same quantity of spans), but Option 4 has a poorer cost-benefit ratio (because of the additional cost to relocate meters, which has negligible impact on improving the fire risk); and
- Options 2 and 3 have the same cost-benefit ratio (because they have an equivalent cost per span remediated), but Option 3 has a much lower improvement in the fire risk (because it is remediating far fewer spans).

Further details of this risk analysis are provided in Appendix A.4.

3.3.2 Analysis of business evaluation criteria

We have evaluated each option against the following six business criteria:

1. **Health, Safety and Environment**
    - Fire prevention
    - Preventing our assets from harming members of the public
2. **Technical functionality**
    - Comply with standards
3. **Maintain reliability**
    - Enables us to supply customers with the same reliability level as in the past
4. **Alignment to SA Power Networks long-term objectives and strategies**
    - Aligns to our bushfire mitigation strategy
    - Strengthens customer relationships
    - Focuses' on safety
5. **Financial impact/risks**
    - Prevents financial consequences from being imposed on us as a result of a significant event
    - Level of capital investment required
6. **Corporate Reputation**
    - Customer complaints to us, the ombudsman, or the regulator
    - Adverse media coverage/campaigns

Table 5 below outlines the scoring framework applied to assess these options:

Table 5: Scoring framework for option evaluation

Mostly Negative Impacts	Some Negative Impacts	Neutral Impact	Some Positive Impacts	Mostly Positive Impacts
1-2	3-4	5	6-8	9-10

Table 6 below summarises the scoring for each criteria that we have calculated for the four options:

Table 6: Option evaluation results

	WHS&E	Functionality	Maintain Reliability	Alignment	Financial Impact	Corporate Reputation	Total
Option 1 – Do Nothing	1	3	3	1	1	1	10
Option 2 – Repair and remediate to required standards	10	10	10	10	4	10	54
Option 3 – Cost sharing repair and remediate	6	6	6	6	4	3	31
Option 4 – Repair, remediate and relocate customer service point	10	10	10	10	1	10	51

Following a detailed assessment, Option 2 – Repair and remediate to required standards, was ranked most highly, scoring 54.

The following summarises the scoring applied to each option.

Option 1 – Do Nothing:

Option 1 is the lowest cost option, but it ranks the lowest of the four options with a score of only 10. With regard to specific criteria:

- **WHS&E**: does not address the risk of metered mains starting a fire or harming members of the public and would not meet our regulatory obligations.
- **Functionality**: does not address non-compliant metered mains.
- **Maintain Reliability**: non-compliant and ageing metered mains will increase the number of outages experienced by customers supplied by these power lines.
- **Alignment**: there is no alignment to the bushfire mitigation strategy. Unsafe metered mains will remain in service.

- **Financial Impact**: if metered mains cause a significant event, we could be held liable and face major financial consequences.

- **Corporate Reputation**: given we are aware of the risk level metered mains pose to the public, doing nothing to mitigate this risk would be considered “poor practice”.

This option is not preferred, because it will leave non-compliant power lines of uncertain ownership operating adjacent to and in conjunction with the distribution system.

Option 2 – Repair and remediate to required standards:

This is the third highest cost option, but ranks the highest of the four options with a score of 54. It addresses the majority of the existing issues and risk associated with metered mains. Most notably:

- **WHS&E**: the risk of metered mains starting a fire or harming members of the public will be mitigated significantly.

- **Functionality**: metered mains will be compliant to required standards.

- **Maintain Reliability**: there will be a reduction in the likelihood of metered mains causing outages.

- **Alignment**: there will be alignment to the bushfire mitigation strategy and a clear boundary of ownership will be established between us, and the customer.

- **Financial Impact**: this option ensures metered mains are unlikely to cause a significant event. A clear boundary of ownership between us, and the customer will be established which will make it easier to defend a claim that is related to the customer owned reticulation system.

- **Corporate Reputation**: there will be reduced customer complaints and adverse media coverage/campaigns when the clarity of ownership is established between us and the customer.

Option 3 – Cost sharing repair and remediation:

Option 3 is a low cost option, but it ranks second worst of the four options with a score of 31. With regard to specific criteria:

- **WHS&E**: some metered mains will be mitigated from starting a fire or harming members of the public, but it is likely a large portion (by length of line) will not be remediated and so still have an increased likelihood of starting a fire. Significant delays may occur arising from time to agree cost sharing with customers.

- **Functionality**: some metered mains will be compliant to current standards, but a large number will not.

- **Maintain Reliability**: some metered mains will have a reduction of the likelihood of causing an outage.

- **Alignment**: some metered mains will align to the bushfire mitigation strategy and have a clear boundary of ownership between us, and the customer.

- **Financial Impact**: liability for failure will continue to be unclear if ownership is unclear.

- **Corporate Reputation**: customers may be unwilling to share repair and remediation costs with us.

This option is not preferred because it requires the property owner to accept responsibility and for us to undertake capital spend for physical assets that we will not own, and is likely to only provide a small reduction in the current issues and risks.

Option 4 – Repair, remediate and relocate customer service point:

This is the highest cost option, and ranks second of the four options with a score of 51. With regard to specific criteria:

- **WHS&E**: the risk of metered mains starting a fire or harming members of the public will be mitigated.

- **Functionality**: metered mains will be compliant to current standards.

- **Maintain Reliability**: there will be a reduction in the likelihood of metered mains causing outages.

- **Alignment**: there will be alignment to the bushfire mitigation strategy and a clear boundary of ownership between us, and the customer.

- **Financial Impact**: significant capital investment is required including works on and gifting of the customer's reticulation and will increase operating costs for meter reading.

- **Corporate Reputation**: there will be no customer complaints or adverse media coverage/campaigns when we establish the clarity of ownership between us and the customer.

This option is not our preferred option because it is more costly than option 2, but provides little additional benefits in addressing the existing issues and risks.

3.4 Recommendation

Following a detailed analysis, Option 2 (Repair and remediate to required standards) is the highest ranked option in both our fire risk analysis and against our business criteria. Therefore, this option is the preferred option. Importantly, this option should:

- prudently and efficiently mitigate the current fire start risk associated with metered mains, and is therefore aligned with our bushfire mitigation strategy and our regulatory obligations to take all reasonable steps to keep our distribution system safe and safely.

- ensures ongoing compliance with our safety obligations, and reduces the risk that we will be found non-compliant in the future if a metered main faulted.

- addresses the current issue we have with regard to the ownership and hence the responsible party for the respective metered mains.

Financially, the cost of this option is not grossly disproportional to the risk being addressed.

The other three options are not recommended because:

- **Option 1 - Do Nothing**. This option does not address any of our concerns associated with metered mains. Importantly, given the current condition and standard of the identified non-compliant metered mains, the risks associated with metered mains are likely to continue to deteriorate significantly moving forward.

- **Option 3 - Cost sharing repair and remediation**. This option requires us to undertake capital investment for physical assets that we will not own and is likely to take a significant time to implement. In addition, not all of the identified non-compliant metered mains will be remediated because some property owners are unlikely to be willing to contribute to the metered main remediation due to the significant costs involved.

- **Option 4 - Repair, remediate, and relocate customer service point**. This option will address the issues and risks to a similar level of our preferred option, but it requires a higher additional capital investment. There are little additional benefits associated with this additional work to relocate meters, and as such, we do not consider that it would be prudent and efficient to undertake this option.

Based on this option evaluation, coupled with the detailed financial analysis set out in Section 4, this business case seeks approval for the recommended Option 2 – Repair and remediate to required standards, for a capital investment of $10.1 million.

4. Financial analysis and estimate

4.1 Methodology – Unit Cost and Volumes

4.1.1 Key assumptions

The unit costs are based on the following key assumptions:

- The pole footings are in good condition;
- The metering assets are in good condition;
- The majority of support structure types are Stobie Pole; and
- The majority of remediation work involves conductor replacement.

4.1.2 Unit Cost

The unit cost to remediate a single span of metered mains was determined from historical costs. Repairing and upgrading a metered main span will require a combination of pole plating/replacement, and conductor repair.

The volume of required pole interventions and conductor repairs is unknown, and therefore the beta distribution method[3] has been used to determine a unit cost per span. The unit cost was determined by excluding overheads from the historic costs. The overheads were assumed to be 20%.

Table 7: Unit Cost Scenarios

	Remediation	Historical Cost
Lowest Cost	Pole Plating	$650
Expected Cost	Metered Mains Conductor Replacement	$1,500
Highest Cost	Pole Replacement	$7,600

Unit Cost: *($650 + 4 x $1500 + $7,600)/(6 x 1.2) = $2000 per span*

4.1.3 Volumes

The initial volume was determined from a desktop analysis based on the following assumptions:

- There are 5,000 metered mains in the network;
- The unit cost was based on historical costs;

[3] The beta distribution method is a three point estimation technique that uses the most likely, optimistic, and pessimistic costs. This method was used to determine the unit cost because we cannot quantify the total number of platings, pole replacements and conductor repairs required for the entire volume.

- 20% of metered mains require no remediation;
- 40% of metered mains have two spans;
- 30% of metered mains have five spans; and
- 10% of metered mains have ten spans.

In the Original Proposal, the estimated capital cost to remediate metered mains was $33 million. Since that time, we determined that there are 4840 customers supplied by metered mains. Meter readers visited these properties to count the number of spans located between the meter and connection point. The volumes are detailed below.

Table 8: Total Spans Identified by Meter Readers

Metered Mains Span Length	Number of Customers Supplied
0-1	3026
2	538
3	274
4	107
5	36
6	12
7	5
8	3
10	30
Unknown	809 *(See Below)*

For the 809 unknown Metered Mains spans, the following assumptions have been made:

- 40% of Metered Mains are underground or 1 span: 0.4 x 809 = 324;
- 30% of Metered Mains average 2 spans: 0.3 x 809 = 243;
- 20% of Metered Mains average 5 spans 0.2 x 809 = 161; and
- 10% of Metered Mains average 10 spans 0.1 x 809 = 81

4.2 Project estimation

No remediation will be undertaken on metered mains that are underground or a single span because they present minimal fire start, and health and safety risks.

Table 9: Total cost to remediate Metered Mains

Metered Mains Spans	Number of Customers Supplied	Total Spans to Repair	Cost
0-1	3350	0	$0
2	781	1562	$3.12M
3	274	822	$1.64M
4	107	428	$0.86M
5	197	985	$1.97M
6	12	72	$0.14M
7	5	35	$0.07M
8	3	24	$0.05M
10	111	1110	$2.22M
		Total Cost:	**$10.1M**

4.3 Forecast expenditure

The forecast capital expenditure for the metered mains program in the 2015-20 RCP is shown in Table 10.

Table 10: Capital Forecast (June 2015, $ million)

Capital forecast	2015/16	2016/17	2017/18	2018/19	2019/20	Total
Metered mains	1.2	2.5	2.5	2.6	1.3	**10.1**

5. Implementation (high level)

5.1 Implementation and procurement strategy

As part of the project, a deliverable will be an inspection procedure that provides instructions to line inspectors for establishing the location of the connection point.

For each Metered Main, the line inspectors will record asset data such as the location of the meter, the distance and number of overhead line spans. The asset data will be recorded with a geospatial based data capturing tool, that is installed and configured on the mobile tough books.

The inspection results will be used to issue work packages to Field Services, outlining the scope for rectification.

5.2 High level schedule and milestone

An indicative high-level schedule is set out in Table 11 below.

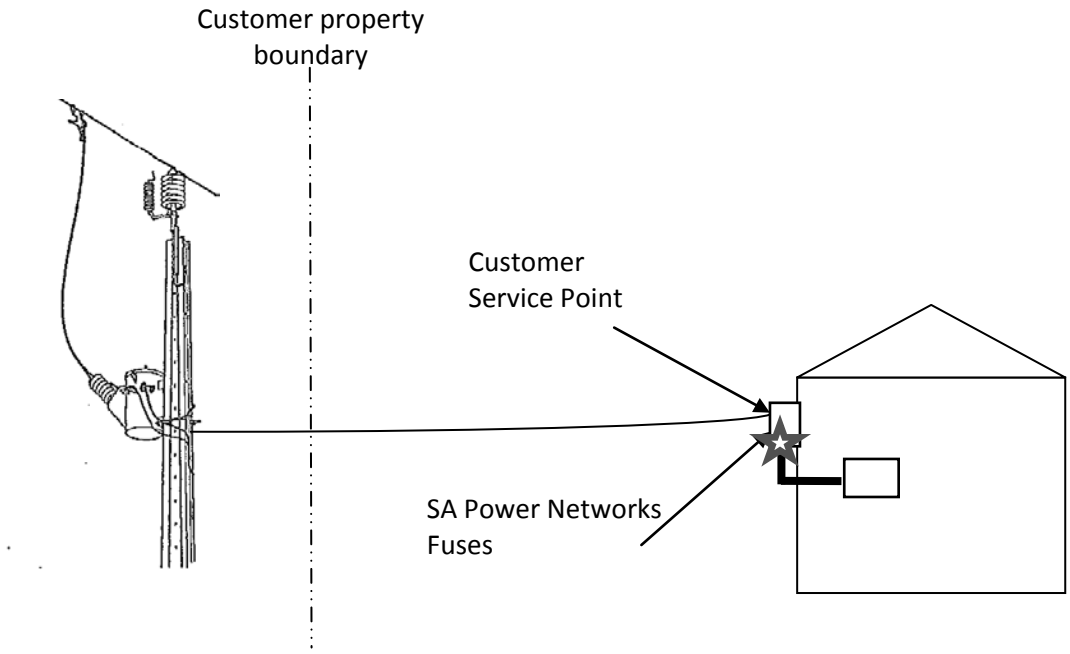
Table 11: Indicative key dates

Item	Milestone / activity	Indicative date
1	Desktop analysis completed	Complete
2	Confirmation of total spans by meter readers	Complete
3	Project scope baselined	Complete
4	Inspection procedure baselined	1/07/2015
5	Inspection tool commissioned	15/07/2015
6	All Metered Mains are mapped	31/09/2015
7	All Metered Mains are remediated	31/12/2019

Appendices

A.1 Connection Types

Example 1 – Standard Service Connection

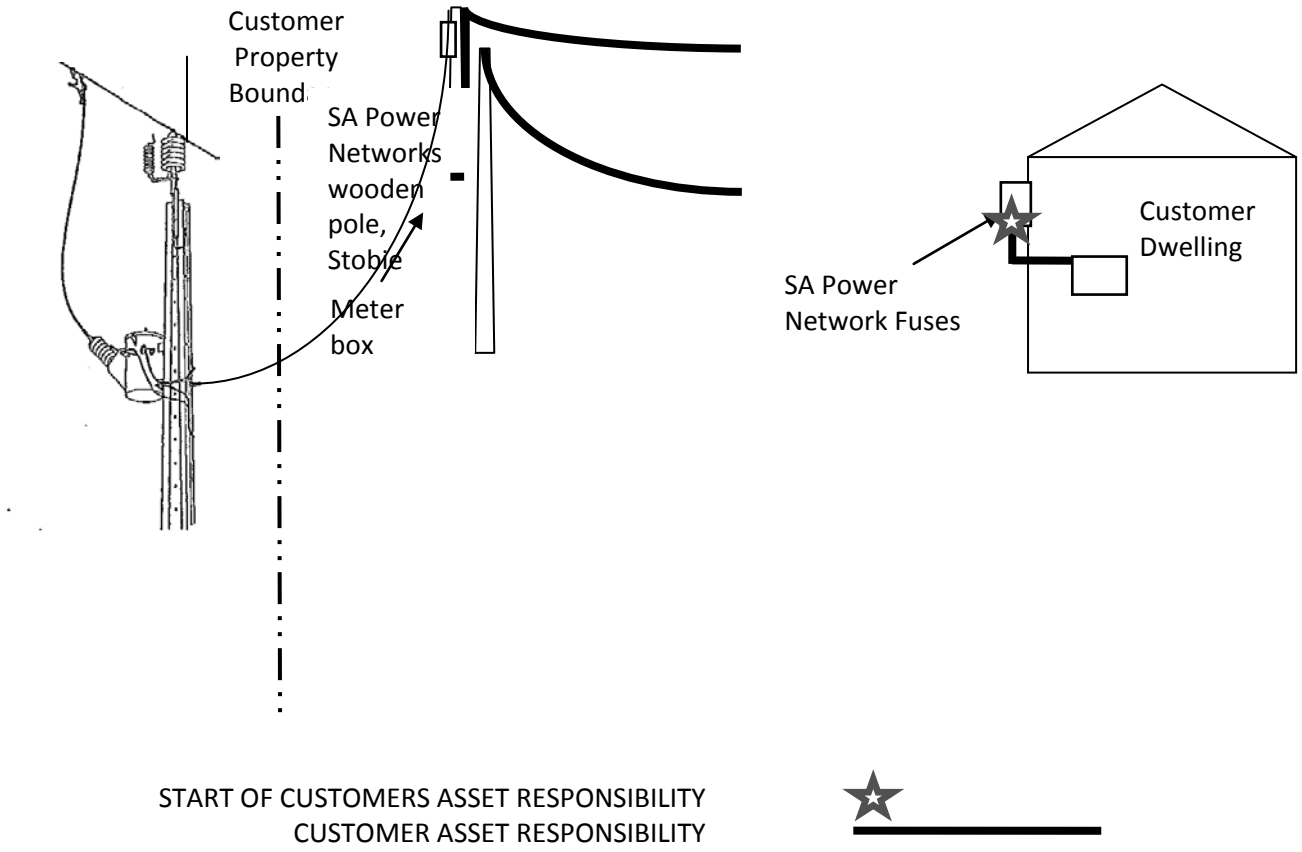


START OF CUSTOMERS ASSET RESPONSIBILITY
CUSTOMER ASSET RESPONSIBILITY

NOTES:

1. Customer asset responsibility starts after the Customer Service Point.
2. Beyond the Customer Service Point the customer is responsible for ownership and maintenance of all assets and the installation in the customer's building.

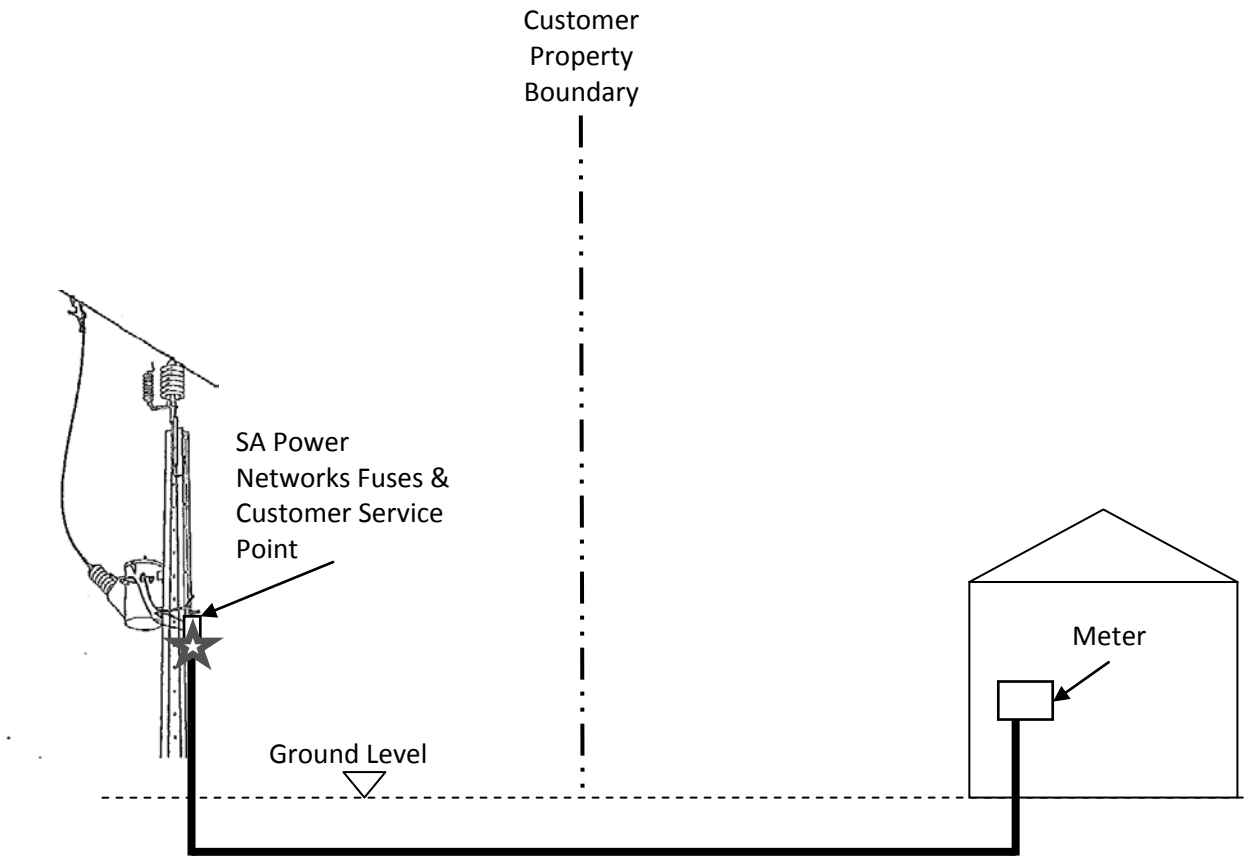
Example 2 – Metered Mains



NOTES:

1. Customer asset responsibility starts after the Customer Service Point.
2. Beyond the Customer Service Point the customer is responsible for ownership and maintenance of all assets and the installation in the customer's building.

Underground Service Connection



START OF CUSTOMERS ASSET RESPONSIBILITY
CUSTOMER ASSET RESPONSIBILITY

NOTES:

1. Customer asset responsibility starts after the Customer Service Point.
2. Customer Service Point on Stobie pole contains fuse(s) and therefore from this point onward is the customers responsibility
3. Beyond the Customer Service Point the customer is responsible for ownership and maintenance of all assets and the installation in the customer's building.

A.2 The Electricity Act 1996

The Electricity Act 1996 contains the following definitions for electrical installation, electricity infrastructure, private powerline and public powerline. It does not contain a definition for a customer connection point.

Part 1, clause 4 (1) "In this Act, unless the contrary intention appears—

electrical installation means a set of wires and associated fittings, equipment and accessories installed in a place for the conveyance, control, measurement or use of electricity that is, or is to be, or has been, supplied for consumption in the place, including anything declared by regulation to be or form part of an electrical installation, but does not include—

(a) electricity infrastructure owned or operated by an electricity entity; or

(b) any wires, fittings, equipment or accessories connected to and beyond any electrical outlet at which fixed wiring terminates (other than any such outlet used to connect sections of fixed wiring); or

(c) anything declared by regulation not to be or form part of an electrical installation;

electricity infrastructure means—

(a) electricity generating plant; and

(b) powerlines; and

(c) substations for converting, transforming or controlling electricity; and

(d) equipment for metering, monitoring or controlling electricity; and

(e) any wires, equipment or other things (including tunnels and cavities) used for, or in connection with, the generation, transmission, distribution or supply of electricity; and

(f) anything declared by regulation to form part of electricity infrastructure, but does not include anything declared by regulation not to form part of electricity infrastructure;

private powerline means a powerline—

(a) designed to convey electricity at a prescribed voltage or less; and

(b) situated on, above or under private land for the purpose only of supplying electricity to some point on that land*;*

public powerline means any powerline except a private powerline;

Part 6
60 – Responsibility of owner or operator of infrastructure or installation

(1) a person who owns or operates electricity infrastructure or an electrical installation must take reasonable steps to ensure that—

(a) the infrastructure or installation complies with, and is operated in accordance with, technical and safety requirements imposed under the regulations; and

(b) the infrastructure or installation is safe and safely operated.

The Act also has provisions which give the power to the Regulator to require rectification in relation to infrastructure, installations or equipment.

62—Power to require rectification etc in relation to infrastructure, installations or equipment

1) If electricity infrastructure, an electrical installation or electrical equipment is unsafe, or does not comply with this Act, the Technical Regulator may give a direction requiring—

(a) rectification of the infrastructure, installation or equipment to the Technical Regulator's satisfaction;

(b) if appropriate, the temporary disconnection of the electricity supply while the rectification work is carried out;

(c) the disconnection and removal of the infrastructure, installation or equipment

2) Subject to this section, a direction under this section must be given—

(a) in relation to infrastructure—to the electricity entity that operates the infrastructure;

(b) in relation to an installation or equipment—to the person in charge of the installation or equipment or the occupier of the place in which the installation or equipment is situated.

3) A direction may be given by written notice or, if the Technical Regulator is of the opinion that immediate action is required, orally (but if the direction is given orally it must be confirmed in writing).

4) A person to whom a direction is given under this section must comply with the direction. Maximum penalty: $50 000.

5) If a person does not comply with a direction, the Technical Regulator may take the action that is reasonable and necessary to have the direction carried out.

6) A person, authorised in writing by the Technical Regulator, may do what is reasonable and necessary to carry out the direction.

7) The costs incurred in carrying out the direction are recoverable as a debt due to the Crown

A.3 National Electricity Rules – Clause 5.2.1

5.2.1 Obligations of Registered Participants

(a) All *Registered Participants* must maintain and operate (or ensure their authorised *representatives* maintain and operate) all equipment that is part of their *facilities* in accordance with:

(1) relevant laws;

(2) the requirements of the Rules; and

(3) *good electricity industry practice* and relevant *Australian Standards*.

A.4 Fire risk analysis

This appendix sets out the analysis we have undertake to estimate:

- the current fire start risk due to the population of non-compliant metered mains; and
- the reduction in fire start risk due to the remediation options considered in this business case.

Basis for estimating fire risk

The fire start risk in this analysis is quantified in terms of the estimated fire starts per year due to metered mains. Fire starts are estimated in three categories that define an escalating level of fire risk. Those categories are:

- fire starts over the bushfire season;
- fire starts on total fire ban days; and
- fire starts during the time and conditions when we may use our authority to switch off supply.

These categories of fire risk are used rather than an economic value because:

- it is difficult to accurately quantify fire start risk as an annualised economic value, due to the significant uncertainty in the probability of rare, but catastrophic, bushfire events;
- evaluating the reduction in potential fire starts via these types of measures, is more in accordance with our safety obligations in these circumstances, which require us to assess whether costs would be grossly disproportionate to the reduction in risk.

We have limited fire start data on metered mains primarily due to the uncertainty of ownership. Therefore we have made the following assumptions to estimate the fire start performance of these assets:

- the fire start performance of our LV lines is used as the starting point for estimating fire risks. This assumption is considered reasonable because metered mains are typically constructed using material and methods similar to LV lines;
- the current fire start performance of our metered mains are two times worse than our LV lines. This assumption is considered reasonable because:
    - metered mains have been found to be constructed to a standard below our construction standards at that time; and
    - metered mains have been found to be in poorer condition than our LV lines (owing to the lack of routine inspection and maintenance); and
- remediation of a meter main (span) to current Safety and Technical Standards will return the fire start performance in line with the current performance of our LV lines.

Current metered mains fire risk

Table 12 below shows our estimate (based on the assumptions above), of the current fire start performance for our metered mains. In this table we provide a fire start measure over a 30-year period. The 30-year period provides a more meaningful measure of the magnitude of the fire start risk across a period that is likely to experience a catastrophic bushfire event.

It is important to stress however that this is a measure of current performance only. It is not a prediction of the performance over the next 30 years (assuming business-as-usual). We would expect a measure that allowed for future ageing of assets and therefore the fire start risk would be significantly worse than presented here, as the lines significantly degrade in performance over the next 30 years.

Table 12: Current metered mains fire start performance

Measure	Fire starts	
Fire start conditions	per 30-year period	per annum
Fire danger season	56.5	1.9
Total fire ban days	8.8	0.3
Typical switch off conditions	1.7	0.1

The fire start figures above have been calculated from records in our fire start database over 2013 and 2014, as follows:

- LV fire start performance:
    - we have recorded 35 fire starts over the bushfire season in bushfire risk areas that have been linked to failures of our LV network, which equates to on-average 17.5 fire starts per year over the bushfire season; and
    - we have 6,250 km of LV line, which equates to 2.8 fire starts per 1000 km of line per year.
- Inferred metered mains fire start performance:
    - we have 336.6 km of metered mains in bushfire risk areas, which (using the assumptions above) equates to 1.9 fire starts per fire danger season.
- total fire ban and switch off proportions:
    - across our network, 15.6% of our fire starts occur on total fire ban days and 2.2% of our fire starts occur during times we are using our authority to switch off supply; and
    - these factors are used to apportion metered mains fire starts to these fire start conditions.

Fire risk improvement

Based upon the analysis and assumptions discussed above, we have estimated the improvement in the current fire start performance of metered mains that will be provided by the four options considered in this business case (see Table 13). We have also assessed the cost-benefit ratio of each option, in terms of the reduction in fire start per million dollars invested (see Table 14).

Table 13: Fire risk reduction of each option

option	cost ($ millions)	risk reduction (events per 30 years)		
		fire danger season	total fire ban	switch off
Option 1 (business as usual)	$0.0	0.0	0.0	0.0
Option 2	$10.1	28.3	4.4	0.8
Option 3	$1.6	8.7	1.4	0.3
Option 4	$16.2	28.3	4.4	0.8

Table 14: Cost-benefit ratio of each option

Option	Cost-benefit ratio (fire start reduction per $ millions)		
	Fire danger season	Total fire ban	Switch off
Option 1 (business as usual)	NA	NA	NA
Option 2	2.30	0.36	0.07
Option 3	2.30	0.36	0.07
Option 4	1.44	0.22	0.04

Key findings

The key finding from this analysis is that Option 2 ranks the highest in terms of fire risk improvement and cost-benefit ratio; most notably:

- Options 2 and 4 have the same fire risk improvement (because they are both remediating the same quantity of spans), but Option 4 has a poorer cost-benefit ratio (because of the additional cost to relocate meters, which has negligible impact on improving the fire risk); and
- Options 2 and 3 have the same cost-benefit ratio (because they have an equivalent cost per span remediated), but Option 3 has a much lower improvement in the fire risk (because it is remediating far fewer spans).