Non-Network Options Report

Kangaroo Island Submarine Cable

12 April 2016

SA Power Networks

www.sapowernetworks.com.au

Disclaimer

This Non-Network Options Report has been prepared in accordance with Clause 5.17.4 of the National Electricity Rules for the purpose of consulting with Registered Participants, Interested Parties, solution providers and customers regarding a specific set of Identified Needs. It is not intended to be used for other purposes, such as making decisions to invest in generation, transmission or distribution capacity.

This document has been prepared using information provided by, and reports prepared by, a number of third parties. It contains assumptions regarding, among other things, economic growth and load forecasts that, by their nature, may or may not prove to be correct. SA Power Networks recommends and advises that anyone proposing to use this information should verify its reliability, accuracy and completeness before committing to any course of action or expenditure.

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1. Report Summary

Kangaroo Island is the third largest island off the coast of Australia, situated in the Southern Ocean approximately 15 kilometres off the tip of Fleurieu Peninsula, across the waters of Backstairs Passage. Kangaroo Island is supplied via a radial (single path) sub-transmission network consisting of approximately 50km of 66kV line between Willunga and Cape Jervis and 90km of 33kV line between Cape Jervis and Kingscote, with a 15km section of 33kV submarine cable installed between Fishery Beach on the mainland and Cuttlefish Bay on Kangaroo Island.

The existing radial 33kV submarine cable is nearing its design life expectancy of 30 years with significant consequences if the cable fails. A catastrophic cable failure will incur substantial cost to repair and run limited generation over a long period which will in turn impact on tourism, business, community and the economic development of Kangaroo Island.

SA Power Networks has identified a potential credible network option to address the network constraint:

Install a new submarine cable from Fishery Beach to Cuttlefish Bay by 2018. The estimated capital cost of this option is approximately $45 Million (+10%, - 50%). SA Power Networks is seeking firm offers for the cable supply and installation in parallel with the Regulatory Investment Test – Distribution, (RIT-D) process.

SA Power Networks is considering non-network options that may address the network constraint and is therefore seeking submissions from non-network providers on potential credible options to address the identified security constraint. Only submissions from registered and interested parties to address the issues described in this Non-Network Options Report (NNOR) received before 15th July 2016 will be accepted.

An electronic copy of this report is available at

www.sapowernetworks.com.au/nnor/index.jsp

2. Information to Proponents

2.1 Introduction

SA Power Networks is South Australia's principal Distribution Network Service Provider (DNSP) and is responsible for the distribution of electricity to all distribution grid connected customers within the State. We are a corporate partnership comprising of CKI Utilities Development Limited, PAI Utilities Development Limited, Spark Infrastructure (No.1) Pty Ltd, Spark Infrastructure (No.2) Pty Ltd and Spark Infrastructure (No.3) Pty Ltd. More information about us can be obtained from our website at:

http://www.sapowernetworks.com.au

We invite submissions from Registered Participants, Interested Parties, organisations and individuals regarding opportunities and options to address the identified need that is described in section 4 of this report.

The security of supply to Kangaroo Island is at risk due to the age of the existing submarine cable supplying the island. SA Power Networks is investigating initiatives to maintain supply to the island through non-network options. The proposed non-network option must be able to supply Kangaroo Island for 25 years without the use of a mainland cable connection.

SA Power Networks will assess proposals identified through this process and consider them alongside traditional network options to determine the most beneficial strategy, as evaluated in accordance with the Regulatory Investment Test – Distribution, (RIT-D) to address the identified need.

This document provides information about the nature of electricity demand in the area, the identified need and how to respond to us with a proposal.

2.2 Proposal submissions

Proposal submissions in response to this report may be submitted either electronically via email and/or by lodging in printed form at our main office. Our preferred submission method is by email or other electronic interface as agreed by SA Power Networks.

All submissions must be received by 16:00 Friday 15th July 2016.

2.2.1 Email Submissions

Submissions may be sent by email to the following address:

requestforproposals@sapowernetworks.com.au

Note:

- SA Power Networks does not guarantee that any email sent will necessarily be received with emails being rejected without notice for a number of reasons including but not limited to identification as wrong address, "Junk", oversized, or containing inappropriate content.
- We may impose a limit on the size of emails that we accept and we may change that limit without notice. The current limit is 10 MB. Where required, proponents may 'split' their proposal into multiple emails, ensuring each email is clearly noted (ie email 1 of 3, email 2 or 3, and so on).

2.2.2 Written Submissions

Written submissions should be posted or lodged at:

SA Power Networks Tender Box,
No. 1 Anzac Highway, Keswick, SA 5035

Between 9.00am and 4.00pm, Monday to Friday or mailed to SA Power Networks at the above address.

Where a submission is lodged in hard copy format, Three (3) copies of the proposal must be submitted in a sealed bag, marked as follows:

"Non-Network Options – Kangaroo Island Submarine Cable"

Proposals sent by mail must arrive before the closing time and be addressed to SA Power Networks Tender Box. Proposals will not be accepted via facsimile.

Table 1: Key dates and milestones

Milestone	Date
Issue of Non-Networks Options Report (NNOR)	Friday 15th April 2016
Information Session (Q & A)	Monday 16th May 2016
Latest date for Final Proposal Submissions to this report	Friday 15th July 2016
Expected date for publication of Draft Project Assessment Report (DPAR)	October 2016
Expected date for publication of Final Project Assessment Report (FPAR)	December 2016

SA Power Networks will use its reasonable endeavours to maintain the consultation program listed above. However, this program may alter due to changing power system conditions or other circumstances beyond the control of SA Power Networks.

2.3 General terms and conditions

1. By issuing this Non-Network Options Report (NNOR), SA Power Networks is under no obligation whatsoever to select any particular proposal, to negotiate with any particular proponent, or to enter into any agreement with a proponent.
2. SA Power Networks will not be legally bound in any way or otherwise obligated to any person who may receive the NNOR or to any person who may submit a Proposal. At no time will SA Power Networks be liable for any costs incurred by a proponent in the assessment of this NNOR, any site visits, obtainment of further information from SA Power Networks or the preparation by a proponent of a proposal to this NNOR.

3. A Disclaimer Agreement Form (please refer to Section 11 Attachment A) needs to be agreed, signed by proponents and submitted with the Proposal.
4. When evaluating any received proposal, SA Power Networks will follow the process and guidelines in the National Electricity Rules (NER), the RIT-D guidelines issued by the AER and our internal processes as described in our Demand Side Engagement Strategy (DSES). The RIT-D Guidelines are available from the AER website and our DSES is available on our website.
5. SA Power Networks may seek clarification of details from the proponent of a proposed option provided this does not materially alter the Proposal.
6. In addition to evaluating proposals or options separately, SA Power Networks may combine separate proposals or options for the purposes of evaluation where this may lead to a more efficient outcome than the separate proposal or option. Proponents should indicate in their proposal whether they wish to have their proposals or options considered in combination with other proposals.
7. SA Power Networks will publicly announce the outcomes of the evaluation process. This announcement will include the total NPV cost to SA Power Networks of the recommended option(s). All details of Proposals including cost information will be treated as public information unless clearly noted otherwise in writing by the proponent.
8. As part of any contractual arrangement or service agreement SA Power Networks enters into for the provision of network support services, SA Power Networks will require the contracting party to indemnify SA Power Networks against any and all liabilities, including claims, losses, actions or proceedings it or a third party may suffer should the contracting party fail to deliver the support services in accordance with SA Power Networks requirements and any applicable laws, including those governing the timeliness and the standard of services.

2.4 Contact Details

Requests for additional information or clarification regarding this NNOR should be directed by e-mail to:

requestforproposals@sapowernetworks.com.au

Note: SA Power Networks will reply to all enquiries raised during the Non-Network Options Report process in writing, with a copy of questions and replies being forwarded to all registered Interested Parties.

Telephone enquiries can be directed to Pat Howard on (08) 8404 5514.

Proponents are encouraged to contact us prior to submission of proposals to discuss the potential non-network solution. A general information session (Q & A) will be held one month after the issue of the NNOR. Please refer to Table 1: Key dates and milestones for more information.

3. Background to Report

3.1 Kangaroo Island Supply Arrangement

Kangaroo Island is the third largest island off the coast of Australia, situated in the Southern Ocean approximately 15 kilometres off the tip of Fleurieu Peninsula, across the waters of Backstairs Passage.

Kangaroo Island is supplied via a radial (single path) sub-transmission network consisting of approximately 50km of 66kV line between Willunga and Cape Jervis and 90km of 33kV line between Cape Jervis and Kingscote, with a 15km section of 33kV submarine cable installed between Fishery Beach on the main land and Cuttlefish Bay on Kangaroo Island. The Cape Jervis to Kingscote 33kV sub-transmission system consists of 6 line sections. The Cape Jervis to Kingscote sub-transmission system supplies the 33/11kV zone substations at Penneshaw, American River, MacGillivray and Kingscote as well as 33/19kV SWERs at Island Beach, Baudin Beach, Brown Beach and Nepean Bay.

The existing 33kV submarine cable provides a single connection to the mainland. A catastrophic cable failure is likely to incur substantial costs to repair and maintain supply via the diesel power station over a sustained period (ie up to one year).

The twenty five (25) year evaluation period for this NNOR is driven by the need to obtain the most cost effective development(s) over a reasonable time frame, allowing for uncertainties associated with future network developments, load and generation patterns. Any proposed non-network solution is to be designed for this period with expectations to meet forecast load and any step load changes in customer demand due to major developments on Kangaroo Island.

The area under consideration is shown on Figure 1.

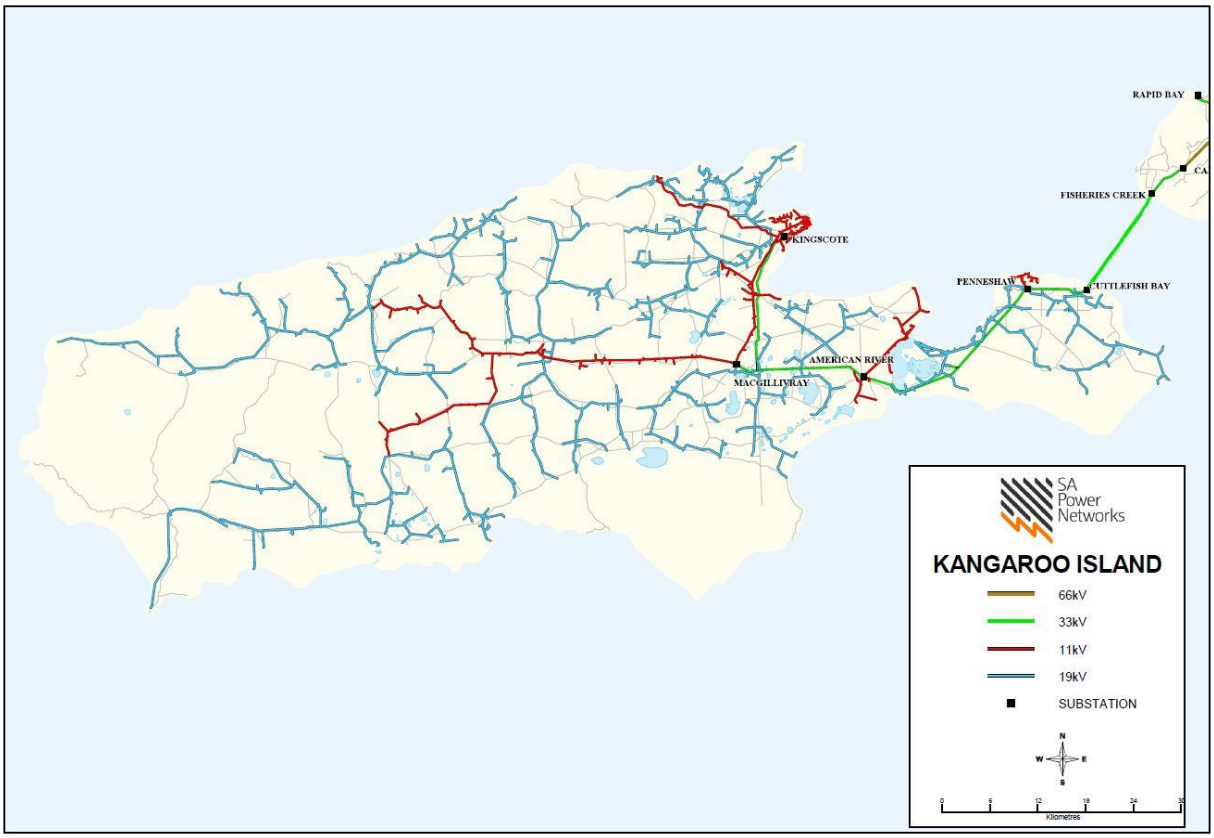

Figure 1: Sub- Transmission Security on Kangaroo Island

3.2 Submarine Cable Background

The existing 33kV submarine cable was installed and first energised in May 1993 with a design life expectancy of 30 years. The 50 mm^2 copper submarine cable has twenty (20) cable joints (approximately every 750m) with a rating of 10MVA at 33kV.

According to the hydrographical survey that was carried out across Backstairs Passage, approximately 2.6km of the cable is laid on the sea bed at a depth of less than 25m (shallow water). The remaining 12km of cable was laid on the sea bed with a depth of more than 25m (deep sea) with a maximum depth of 61.5m. Eighteen (18) of the 20 cable joints in the existing cable (as a known common point of cable failure) are located in deep sea, resulting in a high probability of a deep sea cable failure and consequently long repair time. Approximately 13.9km (95%) of the cable originally installed on the sea bed is now completely buried under the sandy sea floor.

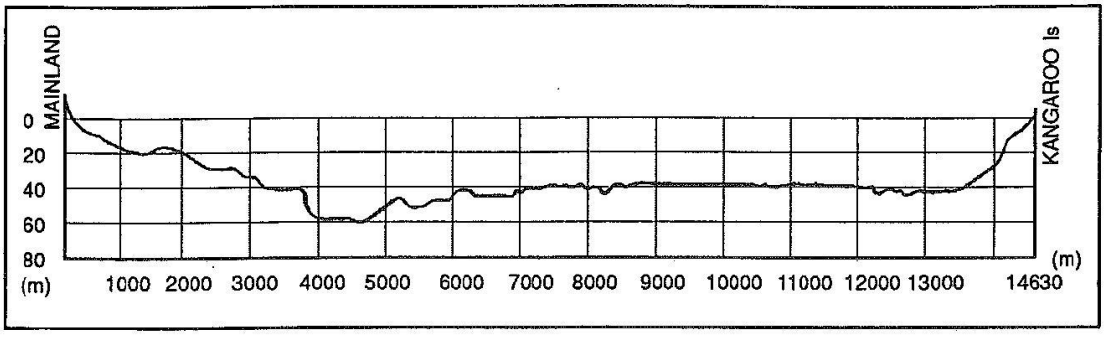

Figure 2: 1991 Hydrographical Survey across Backstairs Passage

3.3 Load Forecasts

The behaviour of the system was assessed for system normal (N) using a 10% Probability of Exceedance (POE) load forecast for Kangaroo Island assuming all equipments are in service on the island.

Table 2 represents the 25-year load forecast for moderate growth on the island (as measured at Cape Jervis Substation) and takes into account diversity between substation loads, sub-transmission losses and an adjustment due to the presence of any embedded generation (including Photovoltaics – PV). Please note that the load forecast contains certain predictions and assumptions that may change from time to time without notice. SA Power Networks accepts no responsibility or liability whatsoever for any reliance that may be placed upon the predictions and assumptions in Table 2 below. Any use of or reliance placed upon such information is at the sole risk of the user.

Year	10% PoE Forecast (MVA)	10% PoE Forecast (MW)	Year	10% PoE Forecast (MVA)	10% PoE Forecast (MW)
2016/17	8.0	7.8	2029/30	10.4	10.1
2017/18	8.1	7.9	2030/31	10.6	10.3
2018/19	8.3	8.0	2031/32	10.9	10.6
2019/20	8.4	8.2	2032/33	11.1	10.8
2020/21	8.6	8.3	2033/34	11.4	11.0
2021/22	8.8	8.5	2034/35	11.6	11.3
2022/23	9.0	8.7	2035/36	11.9	11.6
2023/24	9.2	8.9	2036/37	12.2	11.8
2024/25	9.4	9.1	2037/38	12.4	12.1
2025/26	9.6	9.3	2038/39	12.7	12.4
2026/27	9.8	9.5	2039/40	13.0	12.7
2027/28	10.0	9.7	2040/41	13.4	13.0
2028/29	10.2	9.9			

Table 2: Kangaroo Island Load Forecast

Sensitivity analysis as part of the RIT-D process will consider weak and strong forecast growth and potential step load changes in customer demand on Kangaroo Island.

3.4 Demand Characteristics

This section has been prepared using examples and information that contains certain predictions, estimates and statements that reflect various assumptions that may or may not prove to be correct. SA Power Networks advises that anyone proposing to use this information should verify its reliability, accuracy and completeness before committing to any course of action or expenditure. SA Power Networks accepts no responsibility or liability for any reliance that may be placed upon the predictions, estimates and statements contained below in this Section 3.4. Any use of or reliance placed upon such information is at the sole risk of the user.

An example of the Kangaroo Island annual load profile (leaving Cape Jervis Substation in MW) is shown in Figure 3. This shows that peak electricity demand on Kangaroo Island occurs during the summer and winter months, predominantly as a result of air-conditioning or hot water load. Non-network solutions must be able to support the annual demand loads under any credible single contingency operating condition (ie supply the peak load with a piece of equipment (eg generator) out of service).

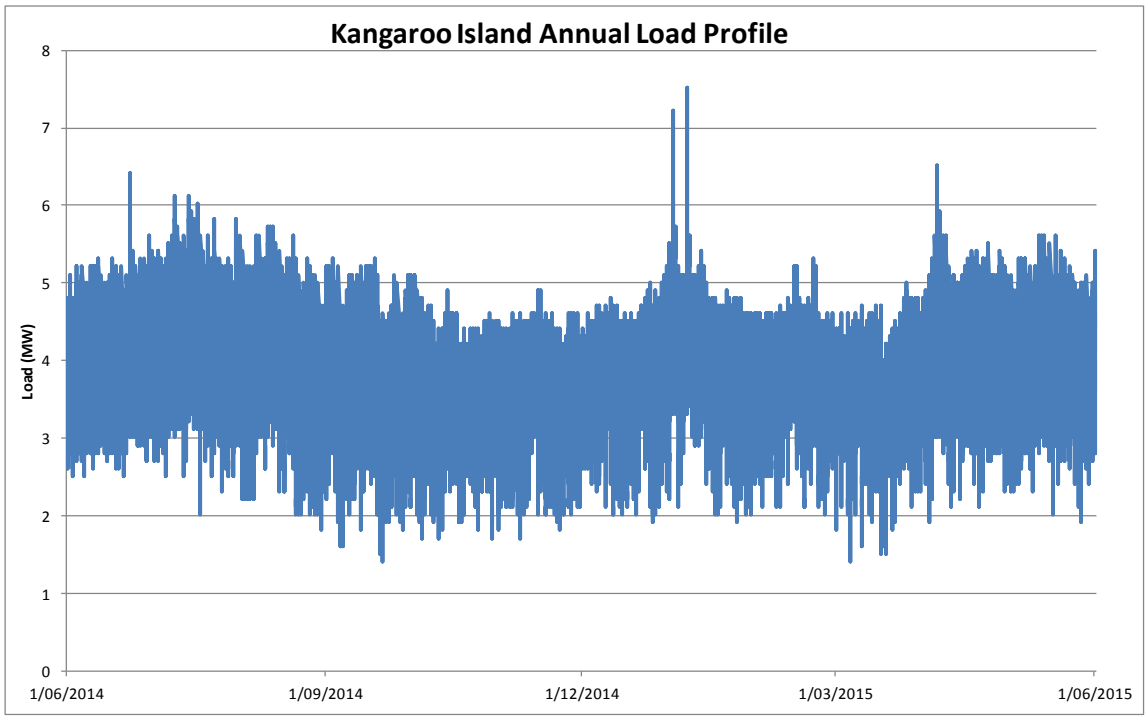

Figure 3: Kangaroo Island Annual Load Profile

The corresponding annual load duration curve (leaving Cape Jervis Substation and including PV impact) is shown in Figure 4. In terms of the annual spread, loads on Kangaroo Island are fairly typical of predominantly residential substations with sharp peaks occurring on a few hot/cold days a year and an average demand for the rest of the time.

The 2014/15 annual electricity consumed in Kangaroo Island was approximately 31GWh with an average daily and hourly consumption of 85MWh and 3.5MWh respectively. During a selected week in July, the average daily consumption increased to approximately 100MWh with an hourly consumption of 4.2MWh. Numerically, the load is in excess of 95% of the peak for approximately 5 hours per annum and in excess of 85% of peak for approximately 12 hours a year. The average load of 3.5MW is approximately 50% of peak.

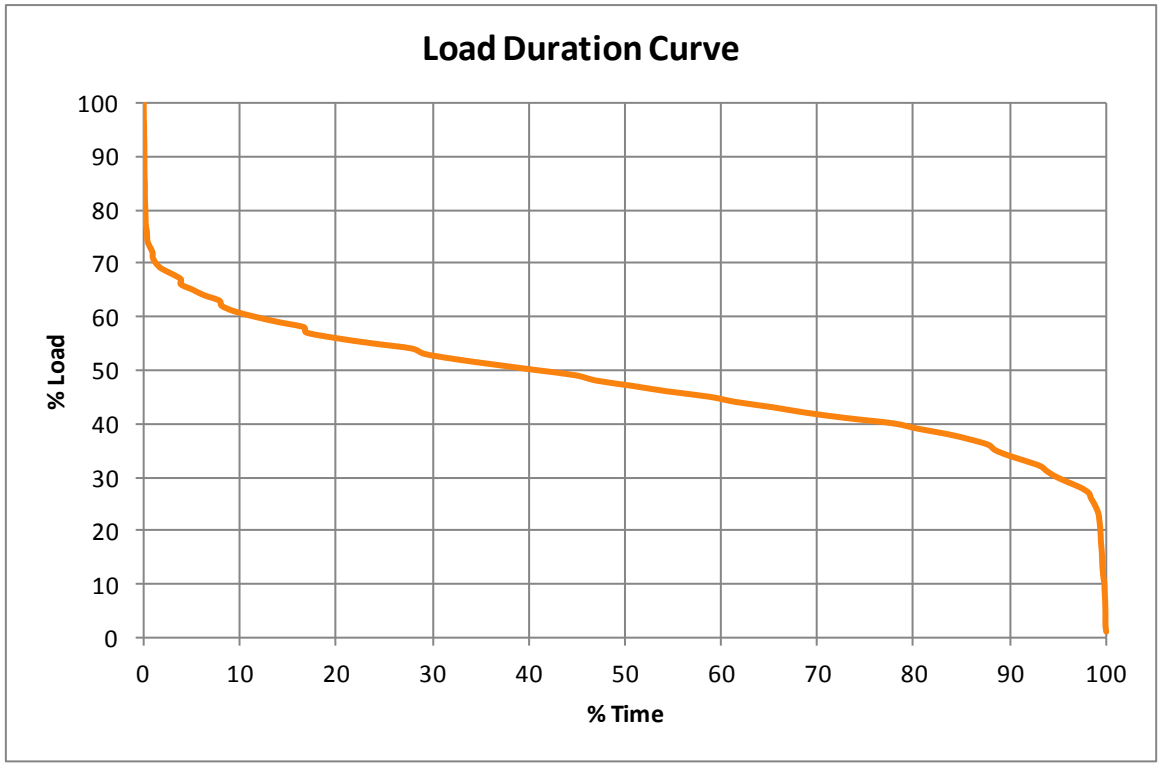

Figure 4: Kangaroo Island Load Duration Curve

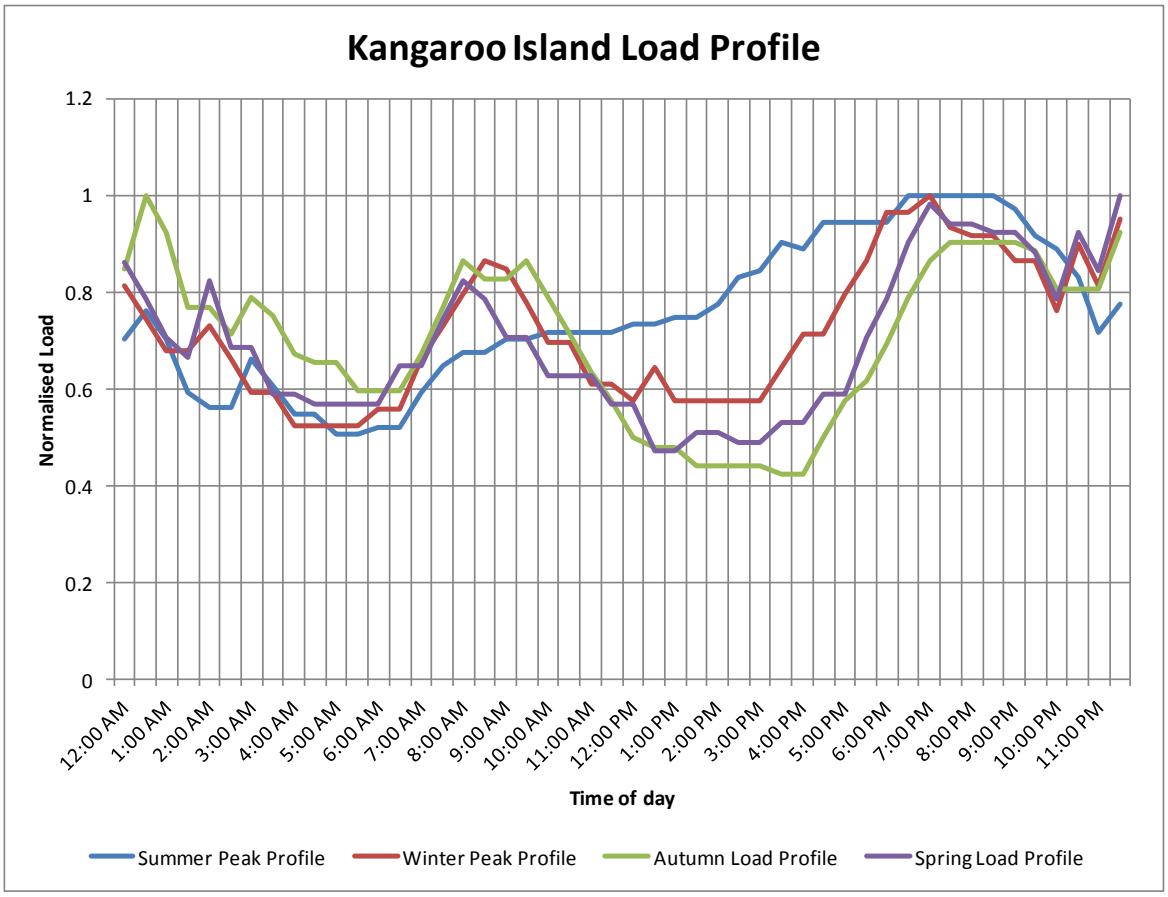

Figure 5: Kangaroo Island Load Profile

Figure 5 shows the typical load profile on Kangaroo Island during peak summer (16th January 2014), peak winter (17 July 2014), average autumn and spring period. The summer load profile indicates some PV penetration with a fairly sharp peak between 15:00 and 20:00 followed by a sharp decline in demand from this time on, possibly caused by the onset of a sea breeze reflecting the sea side locality. The time of peak now occurs at approximately 19:30 hours hence additional PV will have negligible impact on forecast peak demand (ie solar PV output is near zero at 20:00 hours).

The load above 85% of peak occurs between 14:30 and 20:30 and is above 95% of peak between 16:30 and 19:30. The load profiles for winter, autumn and spring have similar load curves with morning peaks followed by evening and hot water peaks.

Figure 6 shows the measured peak load of 7.6MW and estimated native load (with PV generation removed) during the peak load summer day measured in 2014. Consideration of PV impact is included in the forecast information provided in Table 2: Kangaroo Island Load Forecast.

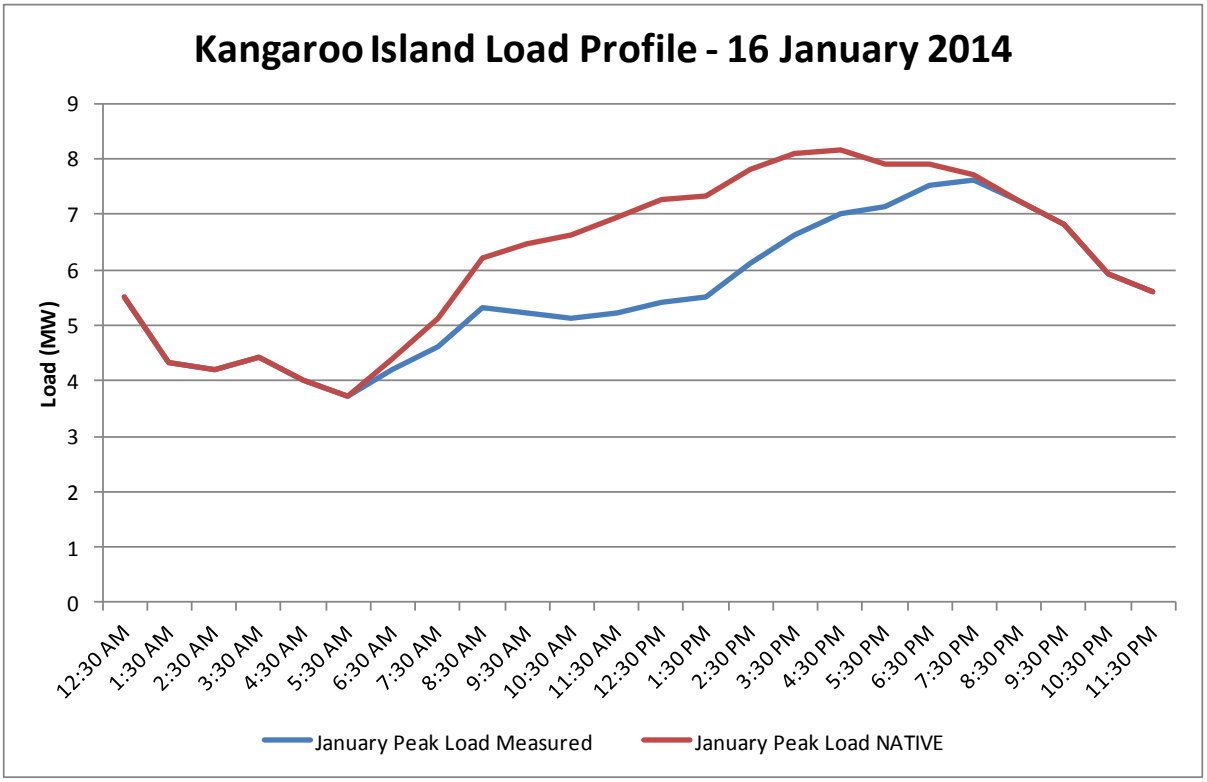

Figure 6: Kangaroo Island January Load Profile

3.5 Committed Augmentations

SA Power Networks is unaware of any committed transmission, sub-transmission or distribution projects within the area that may have an impact on the projected system limitations.

3.6 Existing and Committed Generation

SA Power Networks is unaware of any existing or committed embedded generation other than PV in the area whose operation may potentially influence the identified system limitations. The biggest commercial PV system on Kangaroo Island is the 50kW dual-axis solar array system that was commissioned in 2013 at the Kangaroo Island Kingscote Airport. In addition, a 14kW roof mounted array was installed at the Kangaroo Island's Council Chambers in Kingscote as part of the Kangaroo Island Visible Solar Project.

3.6.1 Kingscote Power Station

SA Power Networks has a standby diesel powered plant installed at Kingscote on Kangaroo Island. The 6.0MW standby Kingscote Power Station has three Caterpillar 3516B HD generating units each rated at 2MW standby capacity with an LV (415V) brushless alternator, each coupled to individual 11/0.4kV 2MVA step-up transformers connected to the Kingscote 11kV substation bus via an 11kV ring main unit.

The generating units' 6.0MW standby capacity is capable of energising the Kangaroo Island 33kV sub-transmission network via the Kingscote Substation's 33/11kV transformers and circuit breaker to supply the existing load on Kangaroo Island via the remaining substations at McGillivray, American River and Penneshaw. The Kingscote Power Station is designed as a standby plant and operates nominally for only a few hours per year, to provide network support in the event of a fault or during operational maintenance and testing of plant on SA Power Networks distribution network.

Installation of an additional 2MW generator is due to be completed by mid 2016 to meet peak load demand and mitigate the risk of long duration load shedding at such times.

3.6.2 Existing Embedded Generation

There are no known significant embedded generation installations permanently connected in Kangaroo Island other than domestic and commercial PV. SA Power Networks is not aware of any existing or committed embedded generation augmentations that could potentially impact on the distribution network serviced in Kangaroo Island.

4. Description of the Identified Need

The existing radial 33kV cable is nearing the end of its design life expectancy of 30 years. An underwater submarine cable inspection of the existing cable was completed in 2012 to assess the condition of the cable. Physical evidence of those portions of the cable that could be visually inspected at the end of 2012 demonstrates that the outer armoured sheath damage has commenced with visible evidence of minor corrosion. This indicates signs of the cable's deterioration.

In the event of a catastrophic cable failure, the expected duration of an outage of the 33kV submarine cable between Cuttlefish Bay and Fishery Beach is three to twelve months (to repair in the event of a deep sea fault). The long lead time for repair is influenced by the difficulty in obtaining a replacement section of cable, limited cable laying and repair ships in Australia, difficulty in locating the fault and adverse weather and sea conditions. The cost associated with repair for a mid ocean cable fault is estimated to be in the order of $11 Million.

If the 33kV submarine cable fails, it may or may not be repairable. In order to ascertain this, it will be necessary to locate the fault (if possible), carefully raise the cable from the sea floor using a suitable ship and/or barge with cranes, cut the cable at the fault location, and raise the two sections of cable to the surface then remove water affected sections. A new section of cable is then required to be jointed to the remaining two sections of cable and to replace the removed water affected section. Care must be taken to avoid bending or stressing the cable, which could result in further damage to the submarine cable.

If the armour of the cable has been damaged or significantly corroded, any attempt to lift the cable without cable armour to facilitate repairs would be likely to transfer additional stress to the cores and damage other sections of the cable. In such a case, the cable would need to be abandoned and an order initiated for the replacement of the damaged cable. General delivery and installation time for a new cable is approximately twenty four (24) months from order placement to allow for design, construction and installation. It should be noted that installation is subject to achieving sea conditions conducive to such an operation and therefore can only be performed at certain times of the year to provide the greatest chance of achieving optimal installation conditions.

In the event of a catastrophic failure of the 33kV cable, the short term electricity demand on Kangaroo Island will solely rely on the reliability of supply of SA Power Networks existing installed back-up diesel power station at Kingscote Substation. However, these generators alone would be insufficient to supply Kangaroo Island in the event of a prolonged outage, as would occur for a failure of the submarine cable.

For every 10 days of continuous operation, each of the existing generating units need to be taken out of service where the outage period is dependant on the service interval to undertake the manufacturer's recommended programmed maintenance inspections. SA Power Networks expects a number of unplanned generator outages during the potential twelve month (12) period due to failure of the generator or control scheme which may result in load shedding/rationing.

To maintain the required generation capacity, at least 2.6MW of temporary mobile generation would need to be installed at Kingscote Power Station including additional operating and maintenance staff to operate the power station and the additional generators. This additional generation capacity would permit any single generating unit of the existing three to be out of service for routine maintenance or repair, whilst still maintaining sufficient generation capacity for

continuity of supply. Considerable logistical and economic issues are also associated with providing an adequate fuel supply and Urea control (required to maintain environmental compliance of the power station) in the event of a prolonged outage.

The operational cost estimate for the ongoing operation of the Kingscote Power Station is higher than would be expected for a similar base (prime power) power station. The total additional cost to maintain supply to Kangaroo Island for 12 months without the use of the submarine cable is estimated to exceed $32 Million with fuel costs being the most significant portion of this cost. In the event of a cable failure, Kangaroo Island is also expected to experience poorer 33kV sub-transmission reliability of supply.

5. Assessment Methodology and Assumptions

5.1 Planning Criteria

As a Distribution Network Service Provider (DNSP) within the National Electricity Market, SA Power Networks must comply with technical standards contained within the National Electricity Rules and in particular to the requirements relating to the reliability and system security contained in Schedule 5.1. In addition, as a licensed distributor in South Australia, SA Power Networks is required to comply with the service obligations imposed by the South Australian Electricity Distribution Code (EDC or Code). We have developed specific planning criteria relating to the rating of equipment, quality of supply and system security to ensure that we meet our obligations under both the NER and EDC. These criteria are described in the Distribution Annual Planning Report (DAPR) available from our website.

5.2 Reliability Standards

Under our Electricity Distribution License we must use our best efforts to maintain feeder category standards for reliability that are defined in the Electricity Distribution Code. For the purposes of the EDC this region is mostly categorised as 'Long Rural' apart from KI31, KI32 and KI57 feeders, which are classified as 'Short Rural'.

Area Supplied	Average Minutes Off Supply per annum (SAIDI)	Average Number of Supply Interruptions per customer per annum (SAIFI)
Long Rural Feeders	300	1.95
Short Rural Feeders	220	1.85

Table 3: Relevant Reliability Standards

Please note that SA Power Networks still needs to report our performance against the previous ESCOSA region of KI, as ESCOSA will still be monitoring our performance against our historical (average) performance, which is 283 SAIDI minutes[1].

Whilst SA Power Networks is permitted to meet its service obligations by means of distribution network augmentation, or by procuring support services from an alternative network service provider, generator, retailer or customer, SA Power Networks is still responsible for meeting the service standards and will incur any liabilities associated in not doing so.

5.3 Value of Customer Reliability

The Value of Customer Reliability (VCR)[2] published in 2015 by AEMO shall be used to reflect how much customers are willing to pay to have secure supply. Locational VCR values may be used when undertaking the assessment of credible options.

5.4 Discount Rate

The allowed rate of return is the forecast of the cost of funds a network business requires to attract investment in the network. The current Weighted Average Cost of Capital of 6.17% will be applied on the lower boundary when undertaking the assessment of credible options.

[1] This reliability measure excludes the impacts of Major Event Days (MEDs), with there being on average three MEDs per annum.
[2] http://www.aemo.com.au/Electricity/Planning/Value-of-Customer-Reliability-review

5.5 Evaluation Test Period

A 25 year evaluation period will be used when undertaking the assessment of credible options.

6. Network Options

6.1 Preferred network option

Install a new submarine cable from Fishery Beach to Cuttlefish Bay by 2018.

SA Power Networks has identified a potential credible network option to address the identified need. The preferred network option is to install a new submarine cable from Fishery Beach to Cuttlefish Bay before the existing cable fails. Should this be implemented, it is planned to be commissioned prior to the summer of 2018/19.

This option will address the security of supply issue facing Kangaroo Island by mitigating the risk of failure of the existing cable. This option also supports the SA Government's strategic plans for Kangaroo Island.

The estimated capital cost of this option is approximately $45 Million (+10%, - 50%). Firm contract prices for the supply and installation of the cable are being sought from third parties (under a tender process) in parallel with this non-network report to allow accurate cost comparison.

6.2 Other network alternatives considered

Other network alternatives to the replacement of the existing submarine cable have been considered by SA Power Networks and will be included in the Regulatory Test analysis such as running the cable to failure, alternative cable routes and storage of replacement cable. However, these have been shown in a preliminary Regulatory Test not to be viable compared to the preferred network solution.

7. Non-Network Options Analysis

SA Power Networks is considering non-network options that may assist in addressing the identified need. SA Power Networks welcomes all proposals from non-network service providers to address the issues described in Section 4 to deliver a solution which provides the highest market benefit to all energy consumers. Challenges that are likely to occur and criteria for solutions to be deemed credible are described under Section 7.3.

The remainder of this section provides information to assist non-network service providers in responding to this Non-Network Options Report.

7.1 Customer Analysis

Based on data in the 2011 Australian Bureau of Statistics (ABS) Census for Kangaroo Island, the four major industry sectors were: (1) agriculture, forestry and fishing, (2) accommodation and food services, (3) retail trade and (4) health care and social assistance.

Voluntary load reduction is not considered a viable standalone non-network option as it must be able to support the Kangaroo Island total demand once the Kangaroo Island cable has failed.

7.2 Market and other Network Impacts

Market Participants are to consider the following when developing alternative solutions:

- Any new local embedded generation option by itself or in combination with other options will be required to operate twenty four (24) hours a day, seven (7) days a week under contract with SA Power Networks. This will be essential for reliability purposes, and such operation will be required regardless of the pool price at the time; noting that the National Electricity Rules prevents a generator that is providing network support from setting the market price.
- Such a non-network solution must be able to support total demand when the existing cable fails (ie islanded solution), there after for the whole evaluation period of 25 years.

7.3 Criteria for Solutions

To assist solution providers in understanding the technical and other requirements, the following criteria must be satisfied if proposals are to meet the identified need.

Size and Security

Feasible options must be large enough, individually or collectively, to meet the total demand on Kangaroo Island as described under Section 3.3. Options must be able to supply peak electricity demand on Kangaroo Island with adequate redundancy, frequency and voltage control and be expandable to cater for any unforeseen customer demand increases.

Operating profile

The demand characteristics, including operating profile, that any non-network solution is expected or forecast to meet is specified in Section 3.4. All viable options must be able to support the peak summer and winter loads under any credible single contingency operating condition (ie supply the peak load with a piece of equipment out of service (eg generator)).

Location

Non-network options should consider the impact of the proposed supply location as network augmentation may be required to supply the Kangaroo Island load.

Timeframe
All options must be capable of being operational by 1st December 2018.

Fault levels & fault energy for time of clearance of network faults
Connection of an embedded generator may cause prospective fault levels to exceed SA Power Networks safe operating levels or provide insufficient fault energy to detect and clear network faults. SA Power Networks may undertake detailed analysis of the network to assess the impact on fault levels of any third party proponents to ensure its technical viability.

Reliability
Non-network options must be capable of reliably delivering electricity under a range of operating conditions at a level of quality of supply and reliability that is similar to that provided by the preferred network option. Any generator option must meet all relevant EDC and NER requirements related to grid connection, including if required under the NER, AEMO registration and ESCOSA licensing. In particular, for a system limitation occurring under 'N' conditions, a generator solution must provide some single contingency capacity to be considered a credible alternative to a network solution.

Generation
Large embedded generator installations, connected to operate in parallel with the SA Power Networks distribution network, must be assessed by us for suitability for connection and compliance in all respects with SA Power Networks technical standards. The management of islanded generation sources and operating cost must also be taken into consideration. Generation guidelines and technical standards that have been prepared by SA Power Networks are available from our website:

http://www.sapowernetworks.com.au/centric/customers/embedded_generation.jsp

Certainty
Options must use proven technology and have adequate funding, project management and track record to deliver the proposal within the required timeframe. Corrective action is critical to the reliability of the electricity supply system; it is not considered appropriate to rely on high risk developments that may or may not proceed.

Longevity
Non-network options must be capable of providing solutions to the identified need for a period of at least 25 years. Alternatively solutions must be able to defer additional network investment for a number of years whilst delivering the highest network market benefit without increasing SA Power Networks liability or risk.

Islanded Solution
If a non-network islanded solution is proposed for Kangaroo Island (Off Grid), the National Electricity Law and National Energy Retail Law may no longer apply. An islanded solution would require considerable stakeholder consultation (SA Government, KI Council, AER, ESCOSA etc) to determine the form of regulation and who would oversee that regulation. The finalisation of the regulatory framework that would apply under an islanded solution would take considerable time.

Evaluation
The evaluation period for this NNOR is driven by the need to obtain the most cost effective development(s) over a reasonable time frame, allowing for uncertainties associated with future

network developments and load and generation patterns. Therefore, a 25 year evaluation period will be used for this NNOR.

7.4 Evaluation of non-network options

For a non-network solution to be considered credible it must:

- resolve all of the identified network constraints;
- provide equal security performance (availability) to the proposed network solution (2nd cable);
- be commercially feasible (cost effective);
- be technically feasible in that it is possible that sufficient supply will be available by the option to meaningfully defer the preferred network option; and
- be achievable within the required timeframe to resolve the identified need.

We will assess all received proposals individually and in combination using the same criteria and assumptions as we apply to our preferred network option, provided the minimum level of required information is provided with the proposal, refer to Section 8.

8. Contents of a Proposal

The following section summarises the minimum contents of a submission and how SA Power Networks will evaluate any submission received.

For more details and background information please refer to our published "Demand Side Engagement Strategy" that can be found on our website at:

www.sapowernetworks.com.au/dsed/index.jsp

8.1 Contents of a proposal

Solution providers are invited to submit proposals that address the identified need. In order to be compliant in responding to this NNOR, a proposal must as a minimum contain the following information:

1. Disclaimer Agreement Form to be signed (please refer to Section 11 Attachment A);
2. Name, address and contact details of the proponent making the proposal;
3. Details about the proponent including evidence that demonstrates the ability of the proponent to undertake the proposed solution;
4. Technical details of the solution being offered including an explanation of how the proposal addresses the forecast system limitation(s) and for how long. This should be in sufficient detail for SA Power Networks to be able to assess the credibility of the proposal. A technical description should include but not limited to:
   a. size and location;
   b. contribution to network security, network fault levels, load flows or frequency and voltage stability studies;
   c. operating profile, type of equipment and electrical layout schematics;
   d. operating life or longevity of the asset;
   e. capacity and expansion capability to handle rate of change in demand;
   f. redundancy capability;
   g. planning and development application information if applicable;
   h. environmental approval/ compliance information if applicable;
   i. salvage or removal costs; and
   j. evaluation of potential risks associated with the proposal and any actions to mitigate these risks.
5. The amount of network system support being offered initially in terms of MW's / MVAr's and any step changes in the offer.
6. The costs to be incurred by SA Power Networks under the proposal (eg indication of connection services that the proponent would require).
7. An estimate of the expected reliability and availability of the option offered including the required notice time required for an option to start if it is not always permanently on.
8. Required milestone dates or lead time for the proponent to implement the proposed solution.
9. An indicative estimate of the payment levels, payment structure and duration of contract required by the proponent. SA Power Networks accepts that a firm price will be dependent on the success of commercial negotiations, including agreement on the level of risk to be carried by each party.
10. Any other issues or information considered relevant by the proponent.

8.2 Proposal Evaluation

SA Power Networks will evaluate all options, including proposals from external parties, under the RIT-D rules that came into force on 1st January 2014. The AER has published a guideline to this process, which can be found on the AER website at:

www.aer.gov.au

As part of this evaluation process SA Power Networks may:

- Seek clarification of details from the proponent of a proposed option provided this does not materially alter the Proposal.
- Combine proposals to form a credible alternative. In doing so we will first discuss this with the relevant proponents. Please indicate in your proposal if you are willing for this to happen where this may lead to a more economic outcome.

A general information session (Q & A) will be held one month after the issue of the NNOR. This session will be held on Monday, 16th May 2016 (2pm – 3pm) at SA Power Networks head office; 1 Anzac Highway, Keswick, South Australia 5035. Tele-conference facilities are not available for this information session.

Prospective proponents are encouraged to discuss their potential non-network solution with us prior to submission of proposal.

If a non-network option becomes the preferred option as determined by the RIT-D process, then SA Power Networks propose to enter into commercial negotiations with the successful proponent to agree a contract for the provision of the required network support services, subject to a satisfactory resolution of the form of regulation to apply.

Details of the evaluation process including how we take into account market benefits are available in our Demand Side Engagement Strategy document available from our website at:

www.sapowernetworks.com.au/DSED/index.jsp

9. Compliance Statement

This Non-Network Options Report complies with the requirements of NER Section 5.17.4. (e) as demonstrated below.

Table 4: Regulation compliance cross reference

Requirement	Report Section
(1) a description of the identified need;	4
(2) the assumptions used in identifying the identified need (including, in the case of proposed reliability corrective action, why the RIT-D proponent considers reliability corrective action is necessary);	5
(3) if available, the relevant annual deferred *augmentation* charge associated with the identified need;	Not available
(4) the technical characteristics of the identified need that a non-network option would be required to deliver, such as: (i) the size of *load* reduction or additional *supply*; (ii) location; (iii) contribution to *power system security* or *reliability*; (iv) contribution to *power system* fault levels as determined under clause 4.6.1; and (v) the operating profile;	3.3 & 3.4
(5) a summary of potential credible options to address the identified need, as identified by the RIT-D proponent, including network options and non-network options.	6.1 & 6.2
(6) for each potential credible option, the RIT-D proponent must provide information, to the extent practicable, on: (i) a technical definition or characteristics of the option; (ii) the estimated construction timetable and commissioning date (where relevant); and (iii) the total indicative cost (including capital and operating costs); and	6.1
(7) information to assist non-network providers wishing to present alternative potential credible options including details of how to submit a non-*network* proposal for consideration by the RIT-D proponent.	2

10. Definitions and Contractions

Words and phrases within this document should be read with the meaning given to them within the National Electricity Rules.

Term	Meaning
AEMC	Australian Energy Market Commission. The body responsible for making changes to the National Electricity Rules that controls the transmission and distribution of electricity in South Australia and the other eastern states.
AEMO	Australian Energy Market Operator. The body responsible for the day to day management of the National Electricity Market. (NEM)
AER	Australian Energy Regulator. The federal body that is effectively responsible for the regulation of the distribution of electricity in the eastern states including South Australia and Tasmania.
Base Case	The case considered most likely to be realistic when undertaking the Regulatory Test which is used as the reference case when considering alternative plausible market scenarios
Contingency Capacity or Contingency Rating	With respect to a Substation, will be taken to mean the N-1 capacity of the Substation plus any load which can be transferred to adjacent Substations via Feeder transfers (excluding those Substations where Feeder transfers are not to be considered according to SA Power Networks planning criteria e.g. CBD). The typical time to implement Feeder transfers is 4 hours. With respect to sub transmission lines, this will be taken to be the capacity of the Network when the first line becomes overloaded within a region during a Contingency Condition.
Contingency Condition (N-1)	Our network with one element out of service, sometimes referred to as N-1.
DAPR	Distribution Annual Planning Report. A report published each year that describes our network, forecasts loads and constraints on the network and describes both projects completed in the previous 12 months and those planned to occur within the next 5 years. Its content is subject to schedule 5.8 in the NER. This report is a replacement for the ESDP and DMCR reports that were published in the years up to 2013.
Demand Management (DM)	Demand Management is the management of the level or pattern of energy use on the transmission / distribution network, so as to minimise the supply cost to customers whilst maintaining or enhancing customer service levels. Supply costs include costs of projects associated with the augmentation of, or extension to, the transmission or distribution network, and include network losses.
Distribution Code	Electricity Distribution Code (EDC) – as issued by ESCOSA

Term	Meaning
DNSP	Distribution Network Service Provider
DM	Demand Management
DUOS	Distribution Use Of System charge. A charge paid to us to cover the costs of distributing electricity over our network.
EDC	Electricity Distribution Code. Rules published by ESCOSA that we must meet to retain our distribution licence. A copy of the code is available on the ESCOSA website.
Emergency Capacity	The short-term emergency capacity of the Line, Feeder or Substation with all plant in service. If the peak load exceeds this rating the Line, Feeder or Substation assets may be permanently damaged, or fail.
ESCOSA	Essential Services Commission of South Australia established under the Essential Services Commission Act 2002
Firm Rating	Under the NER the firm rating of a substation is the rating of the substation with one element taken out of service.
Identified Need	The objective or purpose of a proposed network investment.
Interested Party	Individuals or organisations registered with SA Power Networks in accordance with the NER that have an interest in our long term planning, Demand Management initiatives, addressing a particular constraint, or more generally in addressing Demand Management issues.
KI31	Kingscote 11kV feeder
KI32	Brownlow 11kV feeder
KI57	Emu Bay 19kV SWER feeder
Mobile Substation	A trailer mounted, 3.8MVA or 10MVA Substation, with a primary voltage of 66kV and/or 33kV, and either a dual secondary voltage of 7.6kV / 11kV in the case of the 3.8MVA unit or 11kV in the case of the 10MVA unit, for use within 66/11kV, 33/11kV and 33/7.6kV Substations in the event of a single transformer failure at a Substation.
MPL	Market Price Limit. The maximum bid price in the NEM. This is reviewed periodically by AEMO and is currently $12,500 per MWh (2013).
NEM	National Electricity Market. The term given to the interconnected transmission network covering most of Queensland, New South Wales, Victoria, Tasmania, South Australia and the ACT.
NER	National Electricity Rules. The regulations that control the transmission and distribution of electricity in eastern Australia including Tasmania and South Australia.

Term	Meaning
	A copy of these can be obtained from http://www.aemc.gov.au/Electricity/National-Electricity-Rules/Current-Rules.html
NNOR	Request for Proposals
Normal (n) Capacity	The cyclic capacity of the Line, Feeder or Substation with all plant and equipment in service. The design life of the Line and Substation assets (typically 30 years) will be reduced if the peak cyclic load exceeds this value.
NPV	Net Present Value
O&M	Operating and Maintenance
OLTC	On Load Tap Changer – a device used to control the output voltage of a transformer
PoE	Probability of Exceedance. The probability that, in any one year, peak demand will exceed the forecast value. For instance demand is expected to exceed a 50% PoE forecast 1 year in 2.
PV	Photovoltaic
QOS	Quality of Supply
Q & A	Question and Answer
RDP	Regional Development Plan
Registered Participant	A person who is registered with AEMO as a Network Service Provider, a System Operator, a Network Operator, a Special Participant, a Generator, a Customer or a Market Participant
Regulatory Test	The test promulgated by the AER, which all major network investment must comply with. Version 3 is in force until 31st December 2013 when it will be replaced by the RIT-D.
RIT-D	Regulatory Investment Test – Distribution. The version of the regulatory test for distribution and sub transmission projects that comes into force from 1st January 2014. Details of the test can be found on the AER website
Rules	National Electricity Rules (NER)
SA Power Networks	SA Power Networks is South Australia's principal Distribution Network Service Provider (DNSP), and is responsible for the distribution of electricity to all distribution grid connected customers within the State under a regulatory framework. SA Power Networks is a partnership comprising of CKI Utilities Development Limited, PAI Utilities Development Limited and Spark Infrastructure.
SAIDI	System Average Interruption Duration Index. This is a measure of the average number

Term	Meaning
	of minutes each customer is without supply in a given year.
SAIFI	System Average Interruption Frequency Index. This is a measure of the average number of interruptions each customer experiences in a given year
SATC	South Australian Transmission Code
Screening Test	As defined in section 5.17.4 (d) of the NER. This test identifies whether or not a non-network option is potentially viable.
SWER	Single Wire Earth Return. A system consisting of a single wire to convey electricity to customers utilising the earth to act as the return current path. SA Power Networks SWER systems operate at 19kV and 6.35kV.
VCR	Value of Customer Reliability. This is defined as the average cost to the customer of losing supply and is measured in $/MWh of unsupplied energy. It is a statistical measure that assumes a certain frequency and duration of outages and a certain mix of economic activity. It is different to how much a customer is willing to pay for an improvement in network reliability (Willingness To Pay).
WACC	Weighted Average Cost of Capital

11. Attachment A – Disclaimer Agreement Form

The Participant shall complete and sign the mandatory Disclaimer Agreement Form below and return it with the Participant's Non- Network Proposal.

I,……of…….....
(**Participant**) acknowledge and agree on behalf of……that:

1. The issuing by SA Power Networks of the Non-Network Options Report does not in any way place SA Power Networks under any obligation to select the Participant's Non-Network Proposal or a proposal of any other participant or to negotiate with the Participant or to enter into any contractual arrangement or agreement with the Participant;

2. SA Power Networks gives no warranty in relation to the Non-Network Options Report or any of the information contained within the Non-Network Options Report and accepts no responsibility or liability whatsoever for any loss and damage incurred by the Participant or any Related Body Corporate* of the Participant in reliance upon the Non-Network Options Report or any of the information contained within the Non-Network Options Report. Any use of or reliance upon the Non-Network Options Report or any of the information contained within the Non-Network Options Report is at the sole and entire risk of the Participant or any Related Body Corporate of the Participant;

3. The Non-Network Options Report has been prepared using information provided by, and reports prepared by, a number of third parties. It contains assumptions regarding, among other things, economic growth and load forecasts that, by their nature, may or may not prove to be correct. SA Power Networks recommends and advises that anyone proposing to use this Non-Network Options Report and any information contained within the Non-Network Options Report should verify its reliability, accuracy and completeness with an independent expert before committing to any course of action or expenditure;

4. The Participant or any Related Body Corporate of the Participant (where applicable) is responsible for and liable for all costs, claims, losses and expenses they incur arising out of or in any way connected with the preparation, submission or negotiations (including post submission negotiations) in relation to the Participant's Non-Network Proposal, including, without limitation, all costs, claims, losses and expenses associated with site visits, seeking of additional information, internal labour, materials, overheads, contractors, subcontractors, consultants, suppliers, agents or third parties;

5. The Non-Network Options Report is protected by copyright. SA Power Networks retains copyright in the Non-Network Options Report and any information contained within the Non-Network Options Report. The Non-Network Options Report and any information contained within the Non-Network Options Report must not be reproduced without the prior written approval of SA Power Networks;

6. The Participant or any Related Body Corporate of the Participant (where applicable) releases SA Power Networks from any and all claims, losses, demands, actions, costs (including legal costs), suits, proceedings and any other liabilities that the Participant or any Related Body Corporate of the Participant may have now or would be entitled to bring against SA Power Networks at any time in the future (whether known or unknown), caused by, arising from or in any way connected with the production of or reliance on the Non-Network Options Report or any information contained within the Non-Network Options Report;

7. The Non-Network Options Report and the information contained within the Non-Network Options Report is provided to the Participant for the purpose of consulting with the Participant in relation to the Participant's Non- Network Proposal (**Permitted Purpose**). Any use of the Non-Network Options Report or any of the information contained within the Non-Network Options Report by the Participant or any Related Body Corporate of the Participant for any other purpose or reason will constitute a breach of these conditions and will entitle SA Power Networks to recover from the Participant or any Related Body Corporate of the Participant (where applicable) any loss and damage (including legal costs on a full indemnity basis) that it may suffer as a result of such breach;

8. In the event that SA Power Networks enters into any contractual arrangement or service agreement with the Participant or any Related Body Corporate of the Participant in connection with the Participant's Non-Network Proposal, including, without limitation, for the provision of network support services, SA Power Networks will require the contracting party to indemnify SA Power Networks against any and all liabilities, including claims, losses, costs (including legal costs), actions or proceedings it or a third party may suffer should the contracting party fail to deliver the services in accordance with SA Power Networks' requirements and any applicable laws, including those governing the timeliness and the standard of services.

**As that term is defined in the Corporations Act, 2001 (Cth)*

Please confirm your acceptance of the above by signing in the space provided below:

I, ,Director of the Participant agree to the terms and conditions set out above.

Signature Date

I, ,Director/Company Secretary of the Participant agree to the terms and conditions set out above.

Signature Date

OR

I, ,a duly authorised representative of the Participant agree to the terms and conditions set out above.

Signature Date