Regulatory Test - Request for Information

Emerging Distribution Network Limitations in the Rural Area south-west of Kingaroy

27 November 2013

Ergon Energy Corporation Limited

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EXECUTIVE SUMMARY

Ergon Energy Corporation Limited (Ergon Energy) is responsible (under its Distribution Authority) for electricity supply to the Wide Bay area in southern Queensland. We have identified emerging limitations in the electricity distribution network supplying the rural area south-west of Kingaroy. The loads on Ergon Energy's zone substation and 11kV network in the area south-west of Kingaroy have progressively increased such that augmentation is required if reliable supply is to be maintained.

The area south-west of Kingaroy is presently supplied by the 11kV Kumbia feeder. This feeder is a combination of the original 11kV wood-pole line and a 66kV (presently energised at 11kV) wood-pole line built in 1985 between Kingaroy 66/11kV substation and Kumbia township. The original 11kV line supplies the area between Kingaroy and Kumbia township, and the future 66kV line runs 'cleanskin' to supply Kumbia township and the network beyond Kumbia.

The summer peak load on Kingaroy 66/11kV substation has exceeded its N-1 substation capacity and is forecast to grow at 2.0% per annum during the next five years. The 11kV switchboard is in poor condition and has failed on two occasions, though recent repairs have reduced the likelihood of further failures. There are no other 66/11kV substations anywhere near Kingaroy so 11kV transfer capacity from Kingaroy substation after a contingency is negligible.

To meet the security of supply criteria for the 11kV Kumbia feeder supply area Ergon Energy needs an additional minimum of 2MVA firm capacity at 11kV to be provided to this area. This size has been matched to expected load requirements within Ergon Energy's typical 10 year planning horizon.

In order to ensure that supply to customers in the Kingaroy area complies with Ergon Energy's security of supply criteria, initial corrective action will be required to be completed prior to the summer of 2016/17. A decision about the selected option is required by April 2014 if any option involving significant construction is to be completed by November 2016.

This is a Request for Information where Ergon Energy is seeking information about possible solutions to the emerging limitations which may be able to be provided by parties other than Ergon Energy.

Submissions in writing (electronic preferably) are due by **29 January 2014** and should be lodged to:

Attention: Network Strategy and Planning

Email: regulatory.tests@ergon.com.au

Updated information will be provided on our web site:

http://www.ergon.com.au/community--and--our-network/network-management-and-projects/regulatory-test-consultations

For further information and inquiries please submit to the email address above.

1. INTRODUCTION

Ergon Energy has identified emerging limitations in the electricity distribution network supplying the rural area south-west of Kingaroy in southern Queensland.

This is a Request for Information where Ergon Energy is seeking information about possible solutions to the emerging limitations which may be able to be provided by parties other than Ergon Energy.

Submissions in writing (electronic preferred) are due by **29 January 2014** and should be lodged to:

Attention: Network Strategy and Planning

Email: regulatory.tests@ergon.com.au

A decision is required by April 2014 if the initial stage of any option involving significant construction is to be completed by November 2016.

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2. BACKGROUND & PURPOSE FOR THIS REQUEST FOR INFORMATION

2.1. Background

If technical limits of the distribution system will be exceeded and the rectification options are likely to exceed $10M, Ergon Energy is required under the National Electricity Rules (NER)[1] to notify affected Registered Participants[2], AEMO and Interested Parties[3] within the time required for corrective action and meet the following regulatory requirements:

- Consult with affected Registered Participants, AEMO and Interested Parties regarding possible solutions that may include local generation, demand side management and market network service provider options[4].
- Demonstrate proper consideration of various scenarios, including reasonable forecasts of electricity demand, efficient operating costs, avoidable costs, costs of ancillary services and the ability of alternative options to satisfy emerging network limitations under these scenarios.
- Ensure the recommended solution meets reliability requirements while minimising the present value of costs when compared to alternative solutions[5].

Ergon Energy is responsible for electricity supply to the Wide Bay region (under its Distribution Authority) and has identified emerging limitations in the electricity network supplying the rural area south-west of Kingaroy in southern Queensland. The load on Ergon Energy's 11kV supply network has progressively increased such that augmentation is required if reliable supply is to be maintained.

2.2. Purpose of this "Request for Information"

The purpose of this Request for Information is to:

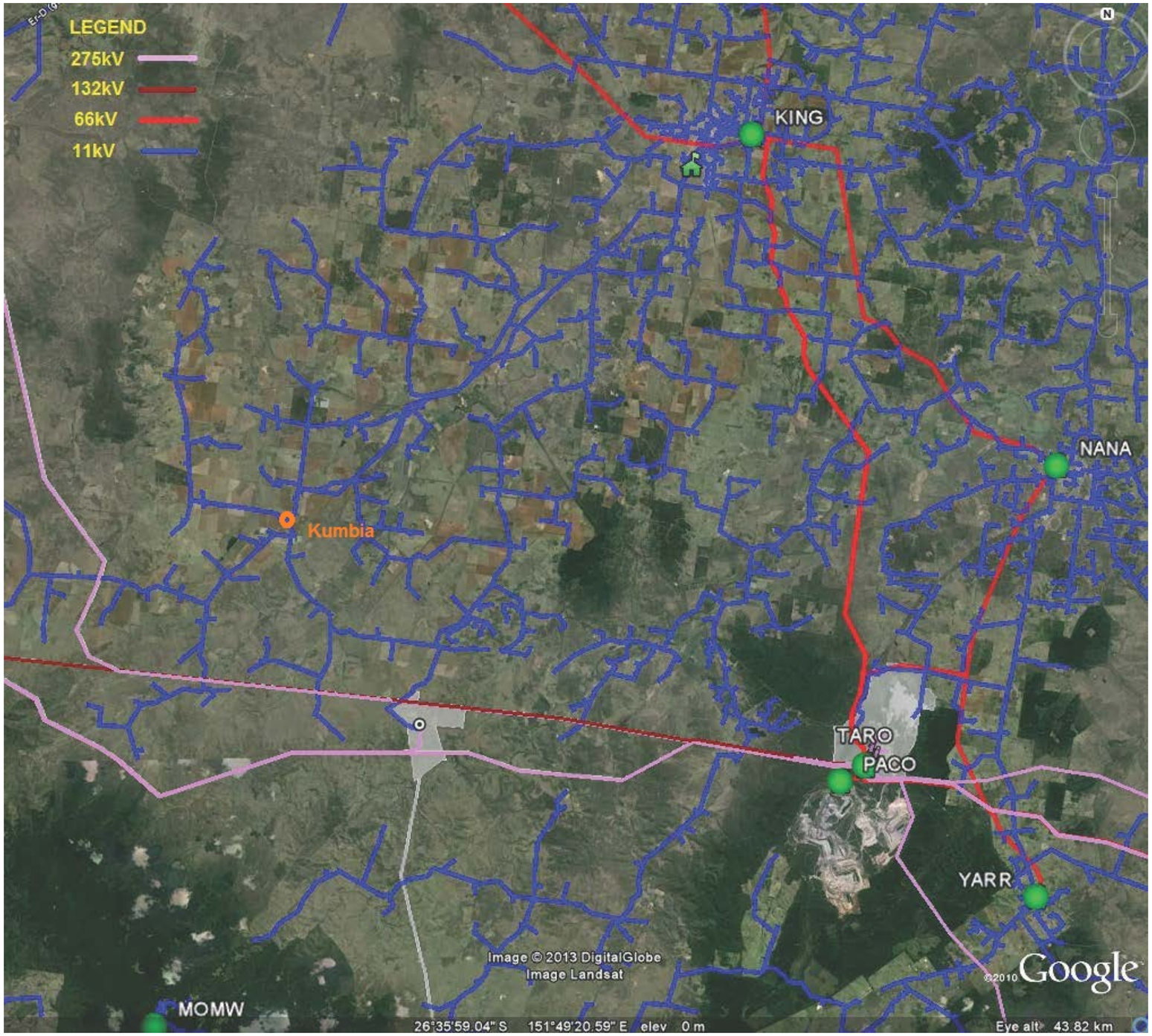
- Provide information about the existing distribution network in the Kingaroy area.
- Provide information about emerging distribution network limitations and the expected time by which action must be taken to maintain the reliability of the distribution system.
- Provide information about the criteria that solutions to be provided by parties other than Ergon Energy must meet.
- Explain the process (including approach and assumptions) to be used to evaluate alternative solutions, including distribution options that are currently being investigated by Ergon Energy.

[1] Clause 5.6.2(f)
[2] As defined in the NER
[3] As defined in the NER
[4] NER, clause 5.6.2(f)
[5] In accordance with the Australian Energy Regulator's Regulatory Test Version 3, November 2007

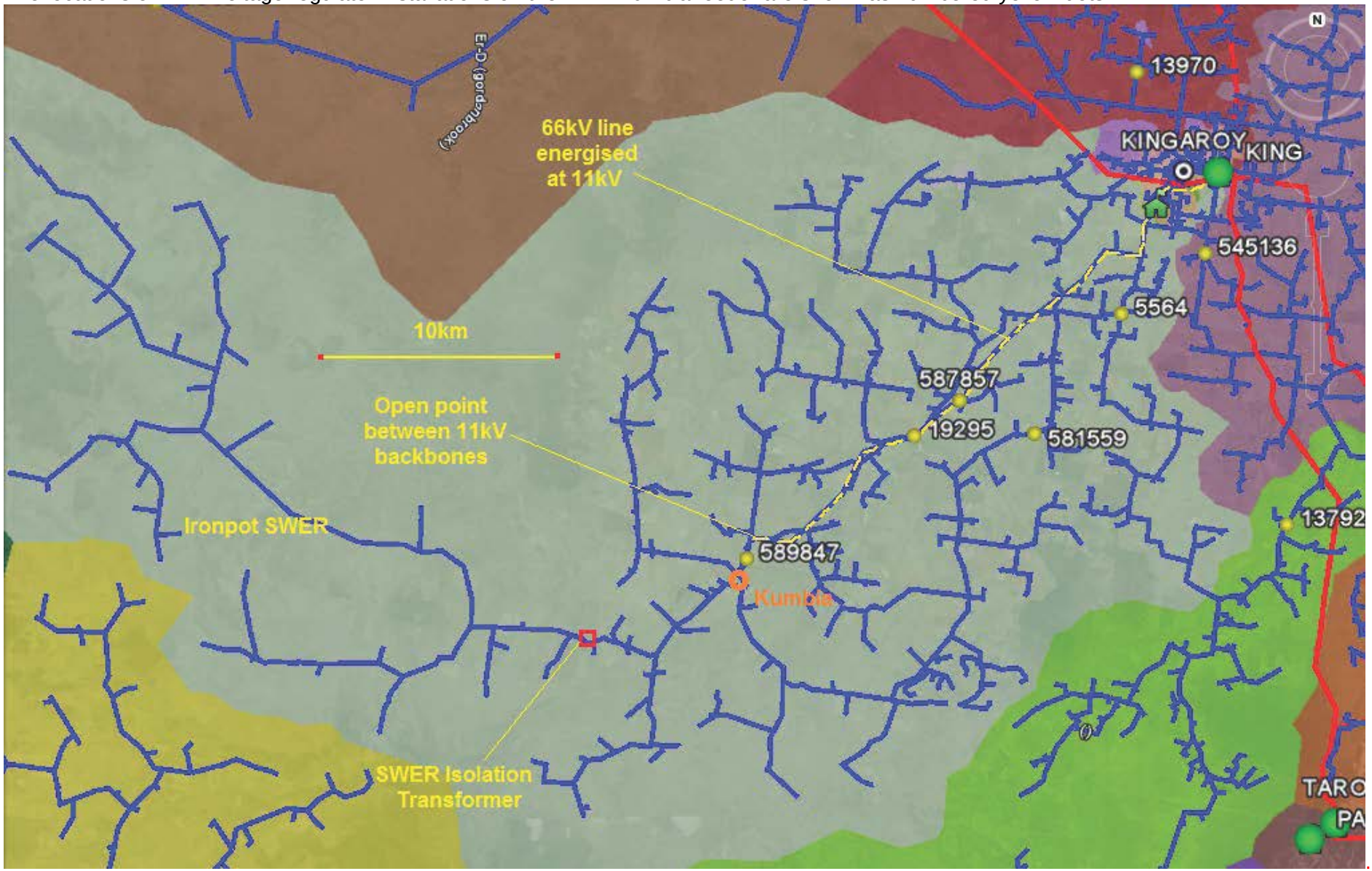
3. EXISTING SUPPLY SYSTEM TO THE AREA SOUTH-WEST OF KINGAROY

3.1. Geographic Region

The geographic region covered by this Request for Information is broadly described as the rural area south-west of Kingaroy as shown on the map below.



The geographic region supplied by the 11kV Kumbia feeder is shown in the map below.
The locations of 11kV voltage regulator installations on the 11kV Kumbia feeder are shown as numbered yellow dots



3.2. Existing Supply System

66kV Network and Kingaroy Substation

The Kingaroy 66/11kV Substation is supplied via two 66kV single circuit feeders from Tarong Power Station. Tarong Energy owns and operates the generators at the power station, and Powerlink Queensland owns and operates the adjacent 275kV switchyard and 275/132kV and 275/66kV transformers. The nearby Pacific Coal mine supplies the power station with fuel.

Kingaroy 66/11kV Substation has two 25MVA transformers in service supplying a load which reached 22.0MVA during summer 2012/13. The 66kV switchyard terminates two incoming feeder from Tarong, and two outgoing feeders to Nanango and Yarraman and to Ellwoods Road, Melrose and Boondooma Dam. The 11kV indoor switchboard is in reasonable condition after repairs following two failures, and is expected to be replaced due to worsening condition during the next ten years. The 11kV switchboard is comprised of six feeder bays, two transformer bays and one bus tie bay.

The load on Kingaroy Substation is forecast to grow steadily at approximately 2.0% per annum for the next five years, dropping to 1.8% per annum for the following five years. The N-1 capacity of Kingaroy Substation is limited to 23.0MVA by the 1200A rating of the 11kV switchboard. The Kingaroy load is forecast to exceed the N-1 capacity during and after summer 2013/14. There are no other 66/11kV substations near Kingaroy, the nearest being at Nanango, and so 11kV load transfer capacity is negligible. Therefore a transformer failure during the annual summer period may require customer load shedding until mobile generation can be deployed or the lost transformers restored to service.

11kV Kumbia Feeder

The 11kV Kumbia feeder is a composite of two backbone lines which diverge just outside the Kingaroy Substation. The original 11kV wood-pole line has multiple conductor types and multiple spur-lines to supply the area between Kingaroy and Kumbia township. The other backbone line was built in 1985 as 66kV wood-pole 6/1/3.75 ACSR BANANA conductor line running ‘cleanskin’ from Kingaroy Substation to a future substation site just outside Kumbia. This new line is energised at 11kV and supplies Kumbia township and the rural area beyond it, including the Ironpot SWER scheme to the west. The two backbone lines are separated by an OPEN air break switch immediately north of Kumbia township.

The old backbone line has three sets of 11kV voltage regulators to maintain acceptable voltages and voltage regulation on its backbone and spur-lines. The new backbone line has two sets of 11kV voltage regulators, with one set just beyond the backbone separation point, but before Kumbia township.

Ergon Energy’s Security of Supply criteria require that 11kV feeder peak loads should be limited so that for the loss of one 11kV feeder the load can be fully restored via transfer to three other 11kV feeders (‘4 into 3’). However, because of the radial nature of lines feeding rural areas, there are limited tie-lines from the 11kV Kumbia feeder to other 11kV feeders which are capable of providing alternative supply. Consequently this criterion cannot be met, and when the Kumbia feeder is faulted most of the 1,520 customers must remain unsupplied until the fault can be repaired.

4. EMERGING DISTRIBUTION NETWORK LIMITATIONS

A load history and forecast for the Kingaroy Substation and 11kV Kumbia feeder load is shown in Table 1 below.

TABLE 1 – Kingaroy Substation & 11kV Kumbia Feeder – Load History & Forecast

Year	**09/10**	**10/11**	**11/12**	**12/13**	***13/14***	***14/15***	***15/16***	***16/17***	***17/18***	***18/19***		***22/23***
Kingaroy Substation Load (MVA) Limitation @ N-1 Capacity is: **23.0MVA**	23.2	21.7	22.3	22.0	*Forecast* *25.2*	*Forecast* *25.9*	*Forecast* *26.6*	*Forecast* *27.3*	*Forecast* *27.8*	*Forecast* *27.8*		*Forecast* *29.8*
11kV Kumbia Feeder Load (MVA)	3.2	2.7	2.9	2.8	*3.1*	*3.1*	*3.2*	*3.2*	*3.3*	*3.4*		*3.7*

It is clear from the load data in Table 1 that The load on Kingaroy 66/11kV substation is expected to exceed the substation N-1 capacity of 23MVA during summer 2013/14. Ergon Energy's Security of Supply criteria require that any customer load greater than 15MVA must have N-1 transformer capacity. However it is expected that this constraint will be managed though deployment of 5MW of mobile generation until the peak load exceeds 28MVA.

4.1. Timeframes for Taking Corrective Action

In order to ensure that security of supply to customers in the rural area south-west of Kingaroy complies with Ergon Energy's planning and security criteria, corrective action should be completed before summer 2016/17

A decision about the selected option is required by April 2014 if any option involving significant construction is to be completed by November 2016.

4.2. Known Future Network and Generation Development

(i.e. projects that have been approved and are firm to proceed)

Ergon Energy is not aware of any other network augmentations or generation developments in the Kumbia area that could relieve the emerging network limitations described in section 4.0 above.

5. INFORMATION ABOUT CRITERIA THAT SOLUTIONS MUST MEET

It is essential that corrective action be taken prior to November 2016 to maintain a reliable electricity supply to the area south-west of Kingaroy. This may involve network augmentation or the implementation of local generation or demand side management options which reduce, delay or remove the need for new network investment.

This Request for Information, and subsequent consultation, provides an opportunity for alternative solutions to be submitted for consideration. The information provided in this document is intended to enable affected Registered Participants, AEMO and Interested Parties to formulate and propose feasible local generation and demand side management solutions.

Ergon Energy has identified the following criteria, to assist solution providers understand the technical and other requirements. These criteria must be satisfied if solutions are to compensate or rectify the emerging technical limitations of the distribution network.

As a distribution network service provider (DNSP), Ergon Energy must comply with technical standards in the NER. In particular, requirements relating to reliability and system security contained in Schedule 5.1 of the NER are relevant to planning for future electricity needs.

Amongst other things, Schedule 5.1 requires that:

- the frequency variations are within the limits described in S5.1.3;
- voltage fluctuations do not exceed limits set out in S5.1.5;
- voltage harmonic & notching distortion do not exceed limits set out in S5.1.6;
- voltage unbalance does not exceed limits set out in S5.1.7;
- the power system can operate in a stable state as defined in S5.1.8;
- faults can be cleared in times specified in S5.1.9;
- load control is in place in accordance with S5.1.10;
- automatic reclosure requirements are met, S5.1.11; and
- AEMO be advised of current ratings as required in S5.1.12. AEMO has a related obligation (4.3.1 (f)) to operate the power system within all plant capabilities.

Schedule 5.1 also includes details of credible contingencies and levels of redundancy to be considered in planning and operating the distribution network, such as:

- 'System Normal': the absolute minimum level of reliability required. Defined as the ability to supply all load with all elements of the electricity system intact (i.e. loss of supply would occur during a single fault or contingency),
- 'N-1': able to meet peak load with the worst *single* credible fault or contingency,
- 'N-2': able to supply all peak load during a *double* contingency.

Ergon Energy has certain obligations to comply with technical standards under the NER and its Distribution Authority (and subsidiary instruments). These obligations must be taken into consideration when choosing a suitable solution for the Kumbia network technical limitations discussed in this Request for Information.

5.1. Size

To meet the security of supply criteria for the 11kV Kumbia feeder situation, Ergon Energy needs an additional minimum of 2MVA firm cyclic capacity at 11kV to be provided to this area. This size has been matched to expected load requirements within Ergon Energy's typical 10 year planning horizon.

5.2. Timing

Commissioning needs to be completed by November 2016.

5.3. Location

Additional 11kV capacity is to be delivered to the approximate load centres of the Kumbia area with capability to extend out to other locations where necessary.

5.4. Quality

Proposed solutions must comply with the relevant standards in the NER and furthermore, must not inhibit Ergon Energy's ability to meet its obligations under the NER and other statutory instruments.

5.5. Reliability

The National Electricity Rules' Schedule 5.1 includes details of credible contingencies and levels of redundancy to be considered in planning and operating the distribution network, such as:

- 'System Normal': the absolute minimum level of reliability required. Defined as the ability to supply all load with all elements of the electricity system intact (i.e. loss of supply would occur during a single fault or contingency),
- 'N-1': able to meet peak load with the worst single credible fault or contingency
- 'N-2': able to supply all peak load during a double contingency.

Ergon Energy's security of supply criteria requires that for a load of the Kingaroy size, N-1 security is required at the 11kV busbars, and "4 into 3" load transfer between 11kV feeders. This level of security implies the parallel operation of critical elements (eg. transformers, generators, circuit breakers) under normal circumstances such that there will be no loss of supply (even momentary) during a single contingency event.

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5.6. Longevity

Options must be capable of providing solutions to the projected limitation in the Kumbia area for a period of at least 10 years. Alternatively solutions must be able to defer additional network investment for a number of years.

6. EVALUATION PROCESS

6.1. Evaluation Criteria

The Australian Energy Regulator's (AER) Regulatory Test[6] and Chapter 5[7] of the NER mandates the evaluation criteria and requires Ergon Energy to consider demand side management, generation and market network service provider options on an equal footing. The Regulatory Test also specifies the assessment methodology to be used:

"An option satisfies the regulatory test if:

> In the event the option is necessitated principally by the inability to meet the service standards linked to the technical requirements of Schedule 5.1 of the NER or in applicable regulatory instruments – **the option minimises the costs of meeting those requirements, compared with alternative option/s in a majority of reasonable scenarios**."[8]

An augmentation proposed to meet minimum network performance requirements of Schedule 5.1 of the NER, or other statutory requirements including the Queensland requirements described in Ergon Energy's Network Management Plan[9], is referred to as a 'reliability augmentation'.

This means that the assessment of solutions will be based on minimising the present value of costs while meeting minimum network performance requirements.

A public process is required which includes disclosure of project costs and comparison of alternatives. It is important that all feasible options proposed are considered in the process.

If a non-network option satisfies technical requirements, and can be implemented for a lower cost than a distribution augmentation in the required timeframe, it will be necessary for Ergon Energy to enter into a network support agreement with the proponents of the alternative project to ensure supply quality and reliability can be maintained.

Since regulated funding (collected via Ergon Energy's network charges) will be required, it is necessary that network support arrangements satisfy the Regulatory Test in terms of both economics and disclosure of relevant costs to the market.

6.2. Submissions from Solution Providers

This is not a tender process. Submissions are requested so that Ergon Energy can meet its regulatory obligations to compare the present value cost of alternatives against options of augmenting a distribution supply system to maintain reliability of supply.

Ergon Energy will not be legally bound in any way or otherwise obligated to any person who may receive this Request for Information or to any person who may submit a proposal. At no time will Ergon Energy be liable for any costs incurred by a proponent in the assessment of this Request for Information, any site visits, obtainment of further information from Ergon Energy or the preparation by a proponent of a proposal to this Request for Information.

Ergon Energy may seek clarification of details from the proponent of a proposed option provided this does not materially alter the proposal.

If you propose a solution, it should contain the following information:

- Details of the party making the submission (or proposing the solution);
- Details of the party responsible for providing the solution (if different to the proponent);

[6] AER's Regulatory Test Version 3, November 2007.

[7] Clause 5.6.2 (f) and (g)

[8] Emphasis added by Ergon Energy

[9] Ergon Energy's Network Management plan is available on its website - http://www.ergon.com.au/community--and--our-network/network-management/network-management-plan

- An explanation of the relevance of the proposal and/or options presented;
- Technical details of the project (capacity, reliability, availability, proposed connection point if relevant etc) to allow an assessment of the likely impact on supply capability;
- If applicable to the solution being offered:
  - the size, type and location of load(s) that can be reduced, shifted, substituted or interrupted
  - the size, type and location of generators that can be installed or utilised if required;
  - the type and location of action or technology proposed to reduce peak demand/provide electricity system support;
- Sufficient information to allow the costs of the solution to be incorporated in a cost effectiveness comparison in accordance with the AER's Regulatory Test;
- Information about the impact on the proposal if electricity demand were to be 25% above/below Ergon Energy's forecasts.
- An assessment of the ability of the proposed solution to meet the technical requirements of the NER;
- Timing for availability of the option, and whether it is a committed project[10];
- The level of payment required to fund the proposal (initial payment, availability payment, dispatch payment etc) in both $s and/or $/kVA;
- Other material that would be relevant in the assessment of the proposed solution.

Submissions to this "Request for Information' will need to be described in the consultation process and will be made public. As such, any commercially sensitive material, or material that the party making the submission does not want to be made public, should be clearly identified.

It should be noted that Ergon Energy is required to publish the outcomes of the Regulatory Test analysis. If solution providers elect not to provide specific project cost data for commercial-in-confidence reasons, Ergon Energy may rely on cost estimates from independent specialist sources.

6.3. Timetable for Submissions

Submissions in writing are due by **29 January 2014** and should be lodged to:

Attention: Network Strategy and Planning

Email: regulatory.tests@ergon.com.au

[10] As defined in the AER's Regulatory Test

6.4. Assessment and Decision Timetable

Ergon Energy intends to carry out the following process to assess what action should be taken to address the identified distribution network limitations:

Step 1	Request for (initial) Information (i.e. **this Request for Information**).	Date Released: **27 November 2013**
Step 2	Submissions in response to the Request for Information.	Due Date: **29 January 2014**
Step 3	Review and analysis by Ergon Energy. This is likely to involve further consultation with proponents and additional data may be requested.	Anticipated to be completed by: **12 February 2014**
Step 4	Release of Ergon Energy's Consultation Paper and Draft Recommendation of solution which satisfies the Regulatory Test.	Anticipated to be released by: **26 February 2014**
Step 5	Submissions in response to the Consultation Paper & Draft Recommendation.	Due Date: **26 March 2014**
Step 6	Release of Final Recommendation (including summary of submissions received).	Anticipated to be released by: **9 April 2014**
Ergon Energy reserves the right to revise this timetable at any time. The revised timetable will be made available on the Ergon Energy website.		

Ergon Energy 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 Ergon Energy. Updated information will be made available on our website: http://www.ergon.com.au/community--and--our-network/network-management-and-projects/regulatory-test-consultations.

The consultation timetable is driven by the need to make a decision by April 2014 if any option involving significant construction is to be in place by November 2016.

At the conclusion of the consultation process, Ergon Energy intends to take steps to progress the recommended solution to ensure system reliability is maintained.