

# Regulatory Test - Request for Information

## Emerging Network Limitations in the Gracemere Area

19 December 2013

**Ergon Energy Corporation Limited**

### **Disclaimer**

*While care was taken in preparation of the information in this discussion paper, and it is provided in good faith, Ergon Energy Corporation Limited accepts no responsibility or liability for any loss or damage that may be incurred by any person acting in reliance on this information or assumptions drawn from it. This discussion paper has been prepared for the purpose of inviting information, comment and discussion from interested parties. The document has been prepared using information provided by a number of third parties. It contains assumptions regarding, among other things, economic growth and load forecasts which may or may not prove to be correct. All information should be independently verified to the extent possible before assessing any investment proposals.*

# TABLE OF CONTENTS

<b>EXECUTIVE SUMMARY</b> .....	<b>1</b>
<b>1. INTRODUCTION</b> .....	<b>2</b>
<b>2. BACKGROUND &amp; PURPOSE FOR THIS REQUEST FOR INFORMATION</b> .....	<b>3</b>
2.1. Background.....	3
2.2. Purpose of this “Request for Information”.....	3
<b>3. EXISTING SUPPLY SYSTEM TO THE GRACEMERE AREA</b> .....	<b>4</b>
3.1. Geographic Region.....	4
3.2. Existing Supply System.....	6
<b>4. EMERGING DISTRIBUTION NETWORK LIMITATIONS</b> .....	<b>7</b>
4.1. Load duration.....	7
4.1.1 Profile.....	7
4.2. Distribution Network.....	8
4.3. Timeframes for Taking Corrective Action.....	8
4.4. Known Future Network and Generation Development.....	8
<b>5. INFORMATION ABOUT CRITERIA THAT SOLUTIONS MUST MEET</b> .....	<b>10</b>
5.1. Size.....	10
5.2. Timing.....	11
5.3. Location.....	11
5.4. Quality.....	11
5.5. Reliability.....	11
5.6. Longevity.....	11
<b>6. EVALUATION PROCESS</b> .....	<b>12</b>
6.1. Evaluation Criteria.....	12
6.2. Submissions from Solution Providers.....	12
6.3. Timetable for Submissions.....	13
6.4. Assessment and Decision Timetable.....	14

## EXECUTIVE SUMMARY

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

The study area is presently supplied by the Malchi 66/11kV Substation. This substation is supplied from Egans Hill Bulk Supply. The N-1 rating of Malchi Substation is 12.0 MVA. The 100% transformer capacity rating, or "N" rating, is 22.6MVA.

The load on Malchi 66/11kV substation is already in excess of its N-1 substation capacity. As such, any transformer contingency may result in customer load shedding. The load is also approaching the N capacity of the substation, and is anticipated to exceed this by 2017/18. This will result in unserved customer energy. In addition, the distribution network is expected to reach constraint by 2018/19.

In order to manage the load at risk and maintain security of supply for the Gracemere area Ergon Energy needs an additional minimum of 15 MVA 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 Gracemere 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 25 August 2014 if any option involving significant construction is to be completed by 1 September 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 **20 February 2014** and should be lodged to:

Attention: Network Planning and Strategy

Email: [regulatory.tests@ergon.com.au](mailto:regulatory.tests@ergon.com.au)

Updated information will be provided on our web site:

<https://www.ergon.com.au/community--and--our-network/network-management/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 Gracemere area of Central 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 **20 February 2014** and should be lodged to:

Attention: Network Planning and Strategy

Email: [regulatory.tests@ergon.com.au](mailto:regulatory.tests@ergon.com.au)

A decision is required by 25 August 2014 if the initial stage of any option involving significant construction is to be completed by 1 September 2016.

Updated information will be provided on our web site:

<https://www.ergon.com.au/community--and--our-network/network-management/regulatory-test-consultations>

## 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)<sup>1</sup> to notify affected Registered Participants<sup>2</sup>, AEMO and Interested Parties<sup>3</sup> 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<sup>4</sup>.
- 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<sup>5</sup>.

Ergon Energy is responsible for electricity supply to the Gracemere area (under its Distribution Authority) and has identified emerging limitations in the electricity network supplying Gracemere. 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 Gracemere 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.

---

<sup>1</sup> Clause 5.6.2(f)

<sup>2</sup> As defined in the NER

<sup>3</sup> As defined in the NER

<sup>4</sup> NER, clause 5.6.2(f)

<sup>5</sup> In accordance with the Australian Energy Regulator's Regulatory Test Version 3, November 2007

### 3. EXISTING SUPPLY SYSTEM TO THE GRACEMERE AREA

#### 3.1. Geographic Region

The geographic region covered by this Request for Information is broadly described as the Gracemere area as shown on the map below.

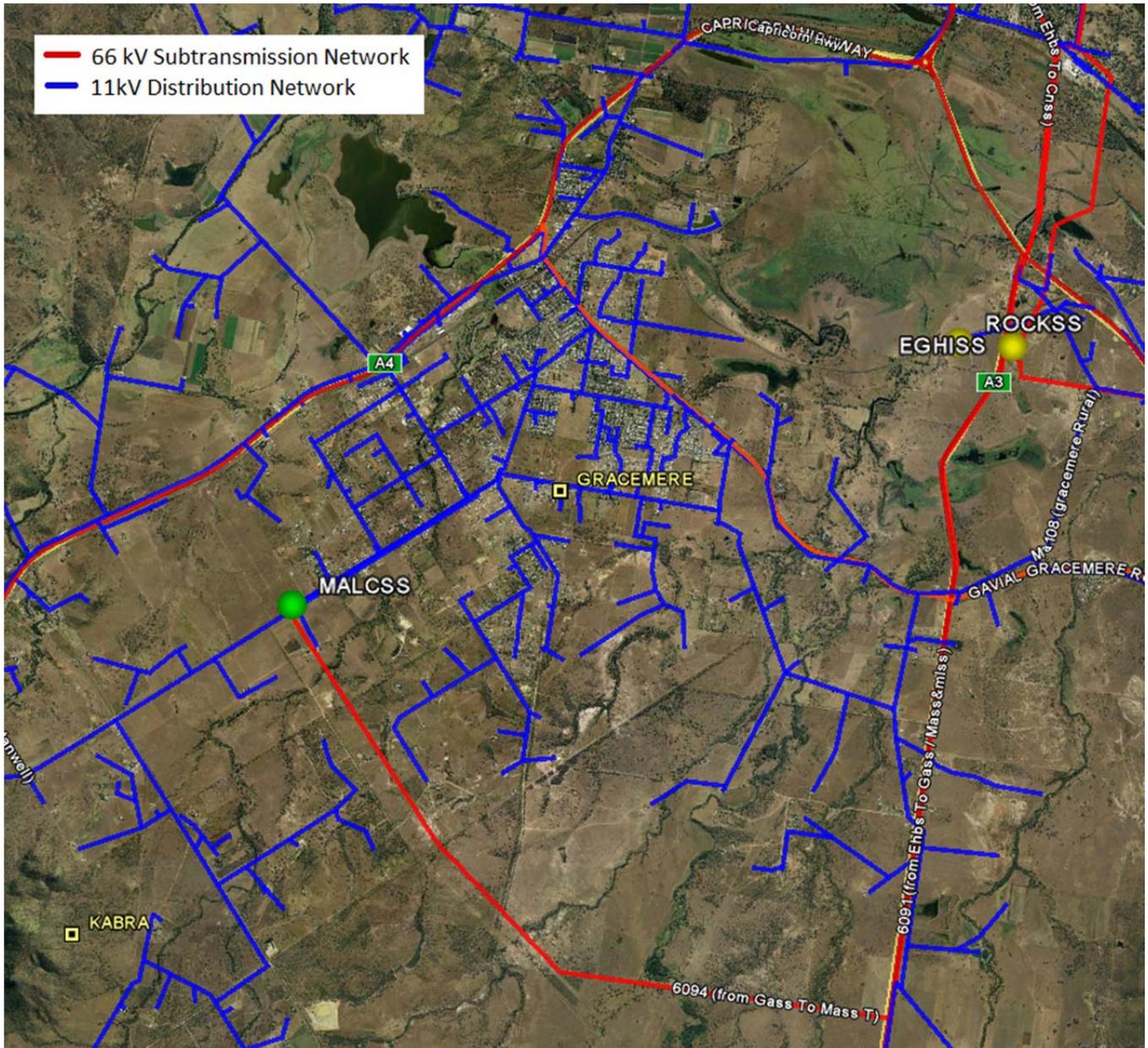


Figure 1- Malchi Supply Area, Gracemere

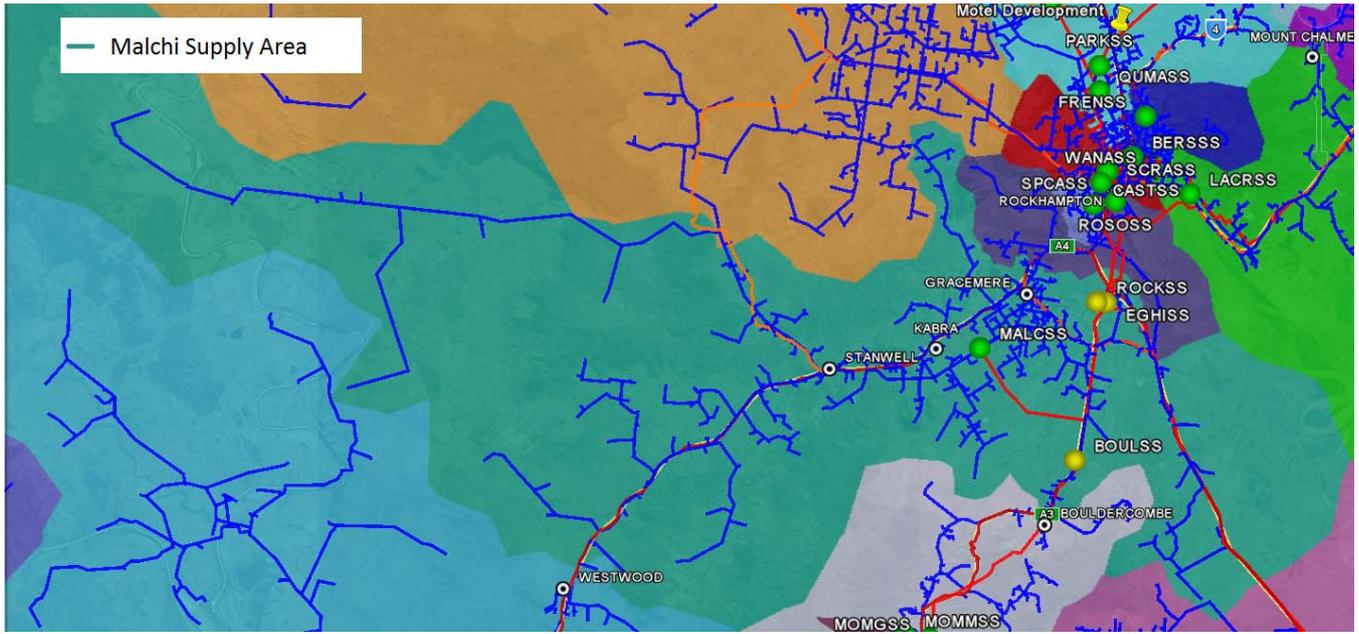


Figure 2- Malchi Substation 11kV supply area, extents

### 3.2. Existing Supply System

Malchi substation has two 66/11kV transformers which supply five distribution feeders.

The load on Malchi 66/11kV substation reached 15.5MVA during summer 2012/13 and is forecast to grow at 7.11% per annum for the next five years, and at 4.67% per annum for the subsequent five years.

The load on Malchi Substation is in excess of its N-1 rating of 12.0MVA. Any transformer contingency during summer evening may result in customer load shedding.

The substation customer load peaked at 15.5 MVA during summer 2012/13 and it is expected that most feeders are presently operating at load levels below 75% of their maximum load ratings. Ergon Energy's planning criteria requires that distribution feeder peak loads should be at or below the feeder 67% rating to allow for '3 into 2' load transfer during feeder outages. It is expected that additional 11kV feeders will be required in the Gracemere area to comply with this criterion after summer 2016/17.

#### 11kV Fault Levels

Malchi Substation

11kV	Normal	Maximum
3 phase (kA)	8.35	8.35
L-G (kA)	9.80	9.80

## 4. EMERGING DISTRIBUTION NETWORK LIMITATIONS

A load history and forecast for the 2012/13 customer load, is shown in Table 2 below.

**TABLE 2 – Malchi – Supply Substation Load History & Forecast – 50% and 10% POE<sup>6</sup>**

<u>Year</u>		12/13 Actual	13/14	14/15	15/16	16/17	17/18	18/19	19/20
<b>MALC</b> Substation Load (MVA) Limitation @ N-1 Capacity is: <b>12MVA</b>	50% POE	15.5	16.5	17.7	19.0	20.3	21.0	22.1	22.8
Limitation @ 90% N capacity is: <b>20.3MVA</b> Limitation @ N capacity is: <b>22.6MVA</b>	10% POE	15.5	18.5	19.9	21.9	23.1	24.1	25.5	26.5

It is clear from the load data in Table 2 that:-

- The load on Malchi substation has exceeded the N-1 capacity of 12.0MVA
- The load on Malchi substation is expected to exceed 90% of the N capacity of 20.3MVA by 2015/16 for a 10% POE day
- The load on Malchi substation is approaching the N capacity of 24MVA, with the expectation that this will be reached by 2017/18 for a 10% POE day
- The Ergon Energy Proposed Safety Net specifies that for loads greater than 15MVA, the urban outage magnitude would be no more than 12 hours

### 4.1. Load duration

Assuming a 10% POE, the duration of exceedance of the 100% total transformer capacity (N) is as follows:

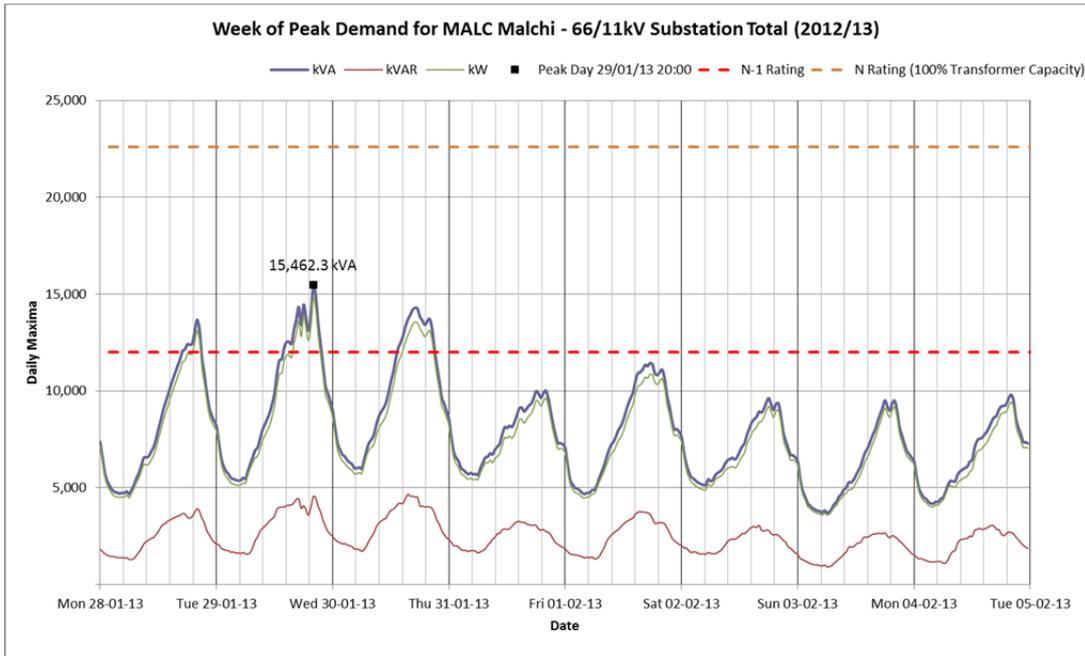
	2016/17	2017/18	2018/19	2019/20	2020/21
Exceedance (kVA)	0.0	2200.5	2889.9	3598.5	4326.9
Minimum Energy (kWh)	0.0	2935	9454	24519	47060
Duration of Exceedance (hours)	0.0	6.0	16.5	28.5	39.0
Days of Exceedance	0.0	5.0	7.0	9.0	10.0
Average Duration of Exceedance (hours)	0.0	0.9	1.7	2.9	3.9

Note- these figures have been calculated using average growth rates rather than the discreet forecast

#### 4.1.1 Profile

Malchi Substation exhibits the following profile during peak times:

<sup>6</sup> Probability of Exceedance



The substation presents a summer evening peak.

#### 4.2. Distribution Network

The loading of the distribution network is as follows:

System Configuration			Feeder Types	Growth Rates						Constraints	Current	Forecast 10 yrs									
				yr 1-5	yr 6-10	Element	Time	Rating (A)	Target Loading Level (A)			OH/UG/PR	2012 / 2013	2013 / 2014	2014 / 2015	2015 / 2016	2016 / 2017	2017 / 2018	2018 / 2019	2019 / 2020	2020 / 2021
MALC Malchi ZS 66/11 kV	MA105	Gracemere Town	Urban	13.91%	4.39%	UG		-	254	OH	172	184	196	297	313	330	346	362	378	393	409
						OH	SD	338													
	MA108	Gracemere Rural	Rural/Urban	3.13%	10.26%	UG		-	254	OH	175	206	237	153	178	204	230	256	281	307	333
						OH	SD	338													
	MA111	Stanwell	Rural	22.24%	0.65%	UG		-	254	OH	61	62	124	138	152	167	168	169	170	171	172
						OH	SD	338													
	MA119	Gracemere CBD	Urban	0.98%	0.88%	UG		320	240	UG	195	197	199	201	203	205	207	208	210	212	214
						OH	SD	551													
	MA123	Gracemere North	Urban	2.90%	2.28%	UG		320	240	UG	214	236	210	232	239	247	254	260	265	271	276
						OH	SD	338													

- \* 48A transferred CBD => Stanwell fdrs in 14/15 (WR791186)
- \* 48A transferred North => CBD fdrs in 14/15 (WR758336)
- \* 89A transferred Rural => Town fdrs in 15/16 (WR814562 & 814621)
- \* 27A transferred Rural => Bouldercombe (Mt. Morgan ZS) fdrs in 15/16 (WR814562 & 814621)

#### 4.3. Timeframes for Taking Corrective Action

In order to ensure that security of supply to customers in the Gracemere area complies with Ergon Energy’s planning and security criteria, corrective action should be completed before summer 2016/17. The earliest achievable completion date for the first stage of major network augmentation programme is September 2016.

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

#### 4.4. 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 Gracemere 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 summer 2016/17 to maintain a reliable electricity supply to the Gracemere area. 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 Gracemere network technical limitations discussed in this Request for Information.

### 5.1. Size

To meet the security of supply criteria for the Gracemere situation, Ergon Energy needs an additional minimum of 15 MVA 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 September 2016.

## **5.3. Location**

Additional 11kV capacity is to be delivered to the approximate load centres of the Gracemere area with capability to extend out to other locations where necessary. Relevant locations are Gracemere, Stanwell, Kabra and Fairy Bower.

## **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 proposed Safety Net criteria specifies limits on outage duration. For loads greater than 15MVA, outages should not be longer than 12 hours.

## **5.6. Longevity**

Options must be capable of providing solutions to the projected limitation in the Gracemere 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<sup>7</sup> and Chapter 5<sup>8</sup> 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.**<sup>9</sup>

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<sup>10</sup>, 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 the providing the solution (if different to the proponent);
- An explanation of the relevance of the proposal and/or options presented;

<sup>7</sup> AER's Regulatory Test Version 3, November 2007.

<sup>8</sup> Clause 5.6.2 (f) and (g)

<sup>9</sup> Emphasis added by Ergon Energy

<sup>10</sup> 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>

- 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 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<sup>11</sup>;
- 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 20 February 2014 and should be lodged to:

Attention: Network Planning and Strategy

Email: [regulatory.tests@ergon.com.au](mailto:regulatory.tests@ergon.com.au)

---

<sup>11</sup> 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. <b>this Request for Information</b> ).	Date Released: <b>19/12/2013</b>
Step 2	Submissions in response to the Request for Information.	Due Date: <b>20/02/2014</b>
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: <b>14/03/2014</b>
Step 4	Release of Ergon Energy's Consultation Paper and Draft Recommendation of solution which satisfies the Regulatory Test.	Anticipated to be released by: <b>14/04/2014</b>
Step 5	Submissions in response to the Consultation Paper & Draft Recommendation.	Due Date: <b>25/06/2014</b>
Step 6	Release of Final Recommendation (including summary of submissions received).	Anticipated to be released by: <b>25/08/2014</b>
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: <https://www.ergon.com.au/community--and--our-network/network-management/regulatory-test-consultations>.

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