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 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.

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1. EXECUTIVE SUMMARY

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

The Maryborough area is presently supplied by a 66kV ring-feed out of T59 Maryborough Substation. The Rocky Street and Maryborough City substations in Maryborough supply approximately 13,200 customers, while the Owanyilla and Tuan zone substations south of Maryborough supply a further 5,300 customers.

The loads on Rocky Street and Maryborough City zone substations are forecast to exceed the firm substation capacities within the next four years, after which any transformer contingency will result in customer load shedding. The ongoing load growth in Maryborough over the next ten years will also burden the 11kV feeder network resulting in low voltage situations at feeder extremities.

To meet the security of supply criteria for the Maryborough area Ergon Energy needs an additional minimum of 13.4MVA 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 Maryborough area complies with Ergon Energy's security of supply criteria, initial corrective action will be required to be completed prior to the summer of 2013/14. A decision about the selected option is required by May 2010 if any option involving significant construction is to be completed by June 2013.

Ergon Energy published a Request for Information relating to this emerging network constraint on 27 January 2010. No submissions were received by the closing date of 24 February 2010.

Two feasible solutions to the emerging network constraint have been identified:

Option 1	Establish a Maryborough North Substation in 2013
Option 2	Redevelop Maryborough City Substation in 2013

This is now a Consultation and Draft Recommendation where Ergon Energy provides both economic and technical information about possible solutions, and our recommended solution, being Option 1, to establish Maryborough North Substation by June 2013.

Submissions in writing (electronic preferably) are due by **25 March 2010** and should be lodged to:

Ergon Energy Corporation Limited

P O Box 15107

City East QLD 4002

Attention: System Development

Email: Glenys.Davies@ergon.com.au

Updated information will be provided on our web site:

http://www.ergon.com.au/network_info/consultations/default.asp

For further information, please contact:

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2. INTRODUCTION

Ergon Energy Corporation Limited (Ergon Energy) has identified emerging limitations in the electricity distribution network supplying the Maryborough area.

When a distribution network service provider proposes to establish a new large distribution network asset to address such limitations, it is required under the National Electricity Rules (the "Rules") clause 5.6.2(f) to consult with affected Rules Participants, AEMO and Interested Parties on possible options to address the limitations. These options may include but are not limited to demand side options, generation options, and market network service provider options.

Under clause 5.6.2(g) of the Rules the consultation must include an economic cost effectiveness analysis of possible options to identify options that satisfy the ACCC's Regulatory Test, while meeting the technical requirements of Schedule 5.1 of the Rules.

The Consultation and Draft Recommendation in this Paper is based on:

- the assessment that a reliable power supply is not able to be maintained in the Maryborough area.
- the Request for Information consultation undertaken by Ergon Energy to identify potential solutions to address the emerging distribution network limitations; and
- an analysis of feasible options in accordance with the ACCC's Regulatory Test.

Submissions in writing (electronic preferably) are due by **25 March 2010** and should be lodged to:

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3. BACKGROUND & REASONS AUGMENTATION IS REQUIRED

3.1. 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[1] to notify Rules Participants[2] and Interested Parties[3] within the time required for corrective action and meet the following regulatory requirements:

- Consult with Rules Participants 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 Maryborough area (under its Distribution Authority) and has identified emerging limitations in the electricity distribution network supplying Maryborough. Augmentation to the electricity distribution network supplying this area is required if reliable supply is to be restored.

3.2. Purpose of this "Consultation and Draft Recommendation"

The purpose of this Consultation and Draft Recommendation is to:

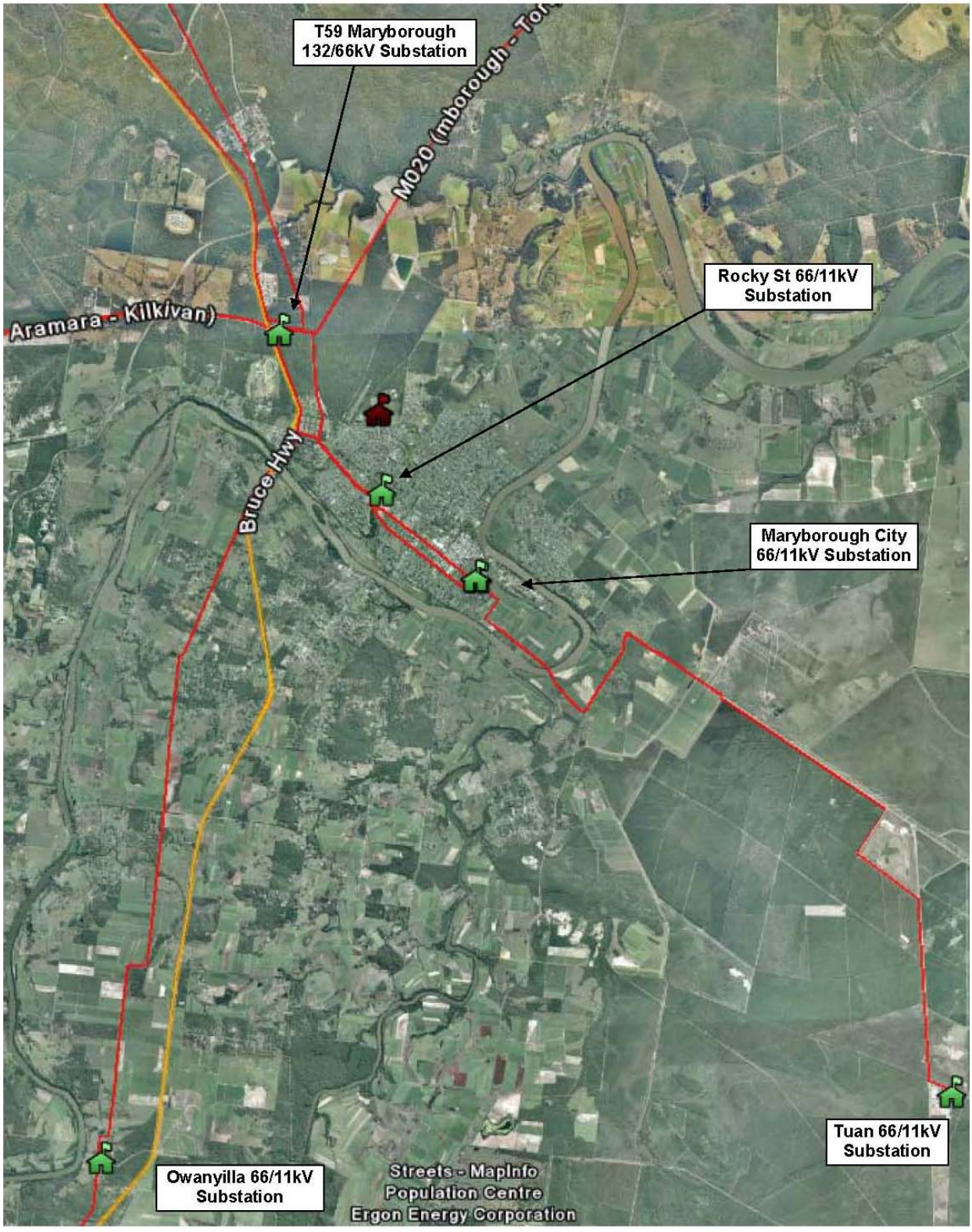
- Provide information about the existing distribution network in the Maryborough area.
- Provide information about emerging distribution network limitations and the expected time by which action must be taken to maintain the reliability of the distribution system.
- Provide information about options identified and considered.
- Explain the process (including approach and assumptions) and the ACCC's Regulatory Test used to evaluate alternative solutions, including distribution options.
- Recommend Ergon Energy's preferred solution.

[1] Section 5.6.2(f)
[2] As defined in the National Electricity Law and the National Electricity Rules and including AEMO.
[3] As defined in the National Electricity Rules.
[4] National Electricity Rules section 5.6.2(f)
[5] In accordance with the ACCC's Regulatory Test Version 2.

4. EXISTING SUPPLY SYSTEM TO THE MARYBOROUGH AREA

4.1. Geographic Region

The geographic region covered by this Consultation and Draft Recommendation is broadly described as the Maryborough area as shown on the map below.



4.2. Existing Supply System

Substations and 66kV Network

The Maryborough residential and commercial area is presently supplied by two zone substations.

The Rocky Street zone substation has two 25MVA 66/11kV transformers and supplied a peak 2008/09 load of 22.9MVA. Rocky Street substation presently supplies six 11kV feeders. Its 11kV switchboard has eight 11kV feeder bays, two of which are presently spare, and two 11kV capacitor bank bays.

The Maryborough City zone substation has two 16MVA transformers and supplied a peak 2008/09 load of 20.7MVA. Maryborough City substation presently supplies six 11kV feeders. Its 11kV switchboard has six 11kV feeder bays each with one feeder connected, and two 11kV capacitor banks are 'piggybacked' on two of the 11kV feeder bays. There is no spare space within the control building to install additional 11kV feeder bays, so no additional 11kV feeders can be supplied from the existing substation.

The peak loads on the Rocky Street and Maryborough City zone substations are approaching or have exceeded the firm capacities of the substations.

The Owanyilla zone substation has one 7.5MVA and one 10MVA transformers and supplies the surrounding rural area and some residential customers in the southern extremity of Maryborough. The Tuan zone substation has one 10MVA transformer and supplies the Tuan sawmill and some nearby rural customers.

The zone substations in the Maryborough area are supplied via a 66kV network from the T59 Maryborough 132/66kV substation. The 66kV network includes of a 66kV ring-feed which runs T59 Maryborough to Rocky Street to Maryborough City and back to T59 Maryborough. Tuan zone substation is supplied by a radial 66kV line from Maryborough City zone substation. Owanyilla zone substation is supplied by a 66kV line between T59 Maryborough substation and T12 Kilkivan substation to the south, with three zone substations (Owanyilla, Gootchie and Woolooga) teed along its 89.5km length.

11kV Network

The 11kV network fed from the Rocky Street and Maryborough City zone substations comprises a total of twelve 11kV feeders. These feeders supply customers including shopping centres, Walkers Foundry, commercial and industrial customers, as well as the surrounding residential customers. Many of these feeders are exceeding their 67% rating.

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. Therefore additional 11kV feeders in the Maryborough area are required to comply with this criterion.

- There is not sufficient physical space at Maryborough City zone substation to install additional 11kV feeder bays for the required new 11kV feeders.
- There are spare 11kV bays at Rocky Street zone substation to allow development of four additional 11kV feeders.
- The distance from the Rocky Street zone substation to its northern supply extremity, and from Maryborough City zone substation to its southern supply extremity, means that unacceptably low voltages are becoming a problem in the outlying residential areas of Maryborough.

5. EMERGING NETWORK LIMITATIONS

During summer 2008/09 the daytime peak load supplied by the Maryborough 66kV ring-feed reached 51.6MVA. The capacity of an overhead power line is dependant upon the surrounding ambient temperature, and therefore worst case line capacities occur during summer daytime. The firm summer day capacity of the Maryborough 66kV ring-feed will be approximately 73MVA when a 3.2km section is reconductored during 2010.

Maryborough is supplied from Rocky Street and Maryborough City zone substations, with some of the southern load supplied from Owanyilla zone substation which mainly supplies rural and irrigation loads.

All these substations experience both summer and winter peak loads, and exhibit a "commercial" load shape with peak load occurring during daylight hours. The Maryborough maximum demand load is forecast to increase at up to 3.5% per annum for the next five years.

A load forecast is shown in Table 1 below.

TABLE 1 – Maryborough Area – Supply Substations Load History & Forecast

Year	06/07	07/08	08/09	*09/10*	*10/11*	*11/12*	*12/13*		*18/19*
Rocky St Substation Load (MVA) Limitation @ N-1 Capacity is: **26.0MVA**	21.7	21.5	22.9	*Forecast* *22.9*	*Forecast* *25.4*	*Forecast* *25.9*	*Forecast* *26.5*		*Forecast* *30.2*
Maryborough City Substation Load (MVA) Limitation @ N-1 Capacity is: **16.0MVA**	22.1	19.6	20.7	*Forecast* *21.1*	*Forecast* *21.8*	*Forecast* *22.5*	*Forecast* *22.9*		*Forecast* *25.2*
Owanyilla Substation Load (MVA) Limitation @ N-1 Capacity is: **8.0MVA***	7.5	6.5	5.8	*Forecast* *8.2*	*Forecast* *8.4*	*Forecast* *8.5*	*Forecast* *8.7*		*Forecast* *9.5*
Maryborough 66kV Ring-Feed Aggregate Load (MVA)	55.0	46.3	51.6	*Forecast* *52.8*	*Forecast* *54.4*	*Forecast* *56.0*	*Forecast* *57.7*		*Forecast* *68.9*

It is clear from the load data in Table 1 that:-

- The firm capacity of Rocky Street zone substation will be exceeded within the next four years.
- The firm capacity of Maryborough City zone substation has already been exceeded.

The zone substations supply the commercial centre of Maryborough as well as the surrounding residential areas. Commercial and light industrial developments are in progress or planned for Maryborough and this is driving the load growth on Rocky Street and Maryborough zone substations.

The loads on eleven out of twelve 11kV distribution feeders in the area have exceeded their preferred load capacities and the load levels on ten of these feeders have exceeded their maximum ratings.

5.1. Timeframes for Taking Corrective Action

In order to ensure that security of supply to customers in the Maryborough area complies with Ergon Energy's planning and security criteria, corrective action should be completed before summer 2012/13. However the earliest achievable completion date for the first stage of major network augmentation programme is mid-2013.

A decision about the selected option is required by May 2010 if any option involving significant construction is to be completed by June 2013.

5.2. 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 Maryborough area that could relieve the emerging network limitations described in section 5.0 above.

6. OPTIONS CONSIDERED

6.1. Consultation Summary

During its planning process, Ergon Energy identified that action would be required to address an anticipated distribution network limitation related to supply to the Maryborough area.

On 27 January 2010 Ergon Energy released a Request for Information providing details on the emerging network limitations in the Maryborough area. That paper sought information from Rules Participants, AEMO and Interested Parties regarding potential solutions to address the anticipated limitations.

Ergon Energy did not receive any submissions by 24 February 2010, being the closing date for submissions to the Request for Information paper.

6.2. Non-Distribution Options Identified

No non-distribution options have been identified.

6.3. Distribution Options Identified

In addition to the consultation process to identify possible non-network solutions, Ergon Energy carried out studies to determine the most appropriate distribution network solutions. It was considered that a “do nothing” approach was unacceptable. Two feasible corrective solutions were identified, details of which are contained in the following Section 7.

7. FEASIBLE SOLUTIONS

This section provides an overview of the feasible solutions identified, with full details of the financial analysis contained in Section 8.

7.1. Option 1 – Establish Maryborough North Substation in 2013

Option 1 – Establish Maryborough North Substation		
Date Req'd	*Augmentation*	*Capital Cost*
2013	Establish Maryborough North substation and associated works	$16.5M
2019	Redevelop Maryborough City substation	$25.2M

This option involves:-

- Establishment of a new 66/11kV substation approximately 0.5km east of T20 Bundaberg 132/66kV substation by mid-2013. An existing 66kV line runs past the site of the proposed new Maryborough North substation.
- Connection of the proposed Maryborough North substation to the existing 66kV and 11kV networks in the north Maryborough area.

The Option 1 programme of works as proposed will have the following benefits:

- The proposed new Maryborough North substation will take load from the existing Rocky Street substation, which can then take load from the existing Maryborough City substation. This approach is expected to maintain the load on Maryborough City and Rocky Street substations below their N-1 capacities until 2019.
- This option will provide new transformer capacity and 11kV feeder capacity to supply the present and future loads in the developing Maryborough area.
- This option will provide a high reliability, high quality supply to Maryborough customers.
- This option will provide increased network operational capability.
- This option will reduce network losses.

Disadvantages of this option are:

- Nil

7.2. Option 2 – Redevelop Maryborough City Substation in 2013

Option 2 – Establish Five New Substations starting with Nikenbah		
Date Req'd	*Augmentation*	*Capital Cost*
2013	Redevelop Maryborough City substation	$25.2M
2013	Develop new 11kV feeders into the North Maryborough area	$1.1M
2023	Establish Maryborough North substation and associated works	$16.5M

This option involves the redevelopment of the existing Maryborough City substation by mid-2013 including the following work:-

- Replacement of the existing 16MVA 66/11kV transformers with new 32MVA transformers.
- Replacement of the 11kV switchboard to provide a rating to match the new transformers, and to provide additional 11kV feeder bays.
- Replacement of the 11kV capacitor banks with higher rated units to reduce MVAr load on the transformers and on the Maryborough 66kV network.

If this option is adopted it is expected that by 2023 the loads on Rocky Street and Maryborough City substations will have grown until the establishment a new substation in the north Maryborough area will become essential

The Option 2 programme of works as proposed will have the following benefits:

- This option will provide new transformer capacity and 11kV feeder bays for new 11kV feeders to supply the present and future loads in the developing Maryborough area.
- This option will provide a high reliability, high quality supply to Maryborough customers.
- This option will provide increased network operational capability.
- This option will reduce network losses.

Disadvantages of this option are:

- This option has a significantly higher cost for the initial projects than that for Option 1.
- This option involves the redevelopment of a substation that must remain energised and in service during the construction work. Consequently there will be significant risk of cost increases and time delays.

8. FINANCIAL ANALYSIS & RESULTS

8.1. Format and Inputs to Analysis

8.1.1 Regulatory Test Requirements

The requirements for the comparison of options to address an identified network limitation are contained in the Regulatory Test prescribed by the Australian Competition and Consumer Commission (ACCC).

The Regulatory Test requires that, for reliability augmentations, the recommended option be the one that **"minimises the present value of costs, compared with a number of alternative options in a majority of reasonable scenarios"**. To satisfy the Regulatory Test, the proposed augmentation must achieve the lowest cost in the majority (but not necessarily all) credible scenarios.

The Regulatory Test contains guidelines for the methodology to be used to identify the lowest cost option. Information to be considered includes construction, operating and maintenance costs and the costs of complying with existing and anticipated laws and regulations. The Regulatory Test specifically excludes indirect costs and costs that cannot be measured in terms of financial transactions in the electricity market.

8.1.2 Inputs to Analysis

A solution to address the future supply requirements for the Maryborough area as outlined in this document is required to satisfy reliability requirements linked to Schedule 5.1 of the National Electricity Rules and the requirements of the Queensland *Electricity Act 1994*.

According to the ACCC Regulatory Test, this means that the costs of all options must be compared, and the least cost solution is considered to satisfy the Regulatory Test. The results of this evaluation, carried out using a discounted cash flow model to determine the present value costs of the various options, are shown in section 8.2.2.

The cost to implement the network augmentations outlined in section 7 has been estimated by Ergon Energy. Sensitivity studies have been carried out using variations in capital cost estimates of plus or minus 20%. The operating and maintenance costs have been derived as a fixed proportion of capital cost. As a result, a variation in capital costs would be equivalent to separately varying the operating and maintenance cost.

The financial analysis considers all foreseeable cost impacts of the proposed network augmentations to market participants as defined by the regulatory process. Estimated savings in the cost of network losses have been excluded from the analysis because they were not found to differ significantly between the two feasible options over the 15 year study period.

8.2. Financial Analysis

The economic analysis undertaken considered the present value of cost of alternative options over the 15 year period from 2010 to 2024.

8.2.1 Present Value Analysis

Financial analysis was carried out to calculate and compare the Present Value (PV) of the costs of each option under the range of assumed scenarios.

A 15 year analysis period was selected as an appropriate period for financial analysis. A discount rate of 10% was selected as a relevant commercial discount rate.

The Base Case (Scenario A) was developed to represent the most likely market scenario.

Market scenarios B - G were formulated to test the robustness of the analysis to variations in load forecast, capital costs and the discount rate. As required by the Regulatory Test, the lower boundary of the sensitivity testing was the regulated cost of capital.

Under the Regulatory Test, it is the ranking of options which is important, rather than the actual present value results. This is because the Regulatory Test requires the recommended option to have the lowest present value cost compared with alternative projects.

The following table is a summary of the economic analysis. It shows the present value cost of each alternative and identifies the best ranked option, for the range of scenarios considered.

The summary shows that **Option 1 (Develop Maryborough North Substation in 2013) has the lowest present value under all scenarios**.

8.2.2 Summary of Economic Analysis

		Option 1 Establish Maryborough North Substation in 2013	Option 2 Redevelop Maryborough City Substation in 2013
Scenario A Base Case	PV ($M) Rank	$24.82 1	$25.36 2
Scenario B Low Load Growth	PV ($M) Rank	$21.97 1	$22.74 2
Scenario C High Load Growth	PV ($M) Rank	$27.31 1	$28.24 2
Scenario D Discount Rate = 12%	PV ($M) Rank	$21.78 1	$22.60 2
Scenario E Discount Rate = 8.5%	PV ($M) Rank	$27.48 1	$27.78 2
Scenario F Increased Capital Costs	PV ($M) Rank	$29.79 1	$30.43 2
Scenario G Decreased Capital Costs	PV ($M) Rank	$19.86 1	$20.28 2

8.3. Discussion of Results

The following conclusions have been drawn from the analysis presented in this report:

- There is no acceptable 'do nothing' option. If the emerging network constraints are not addressed by summer 2013, Ergon Energy will not be able to meet its security criteria in the event of a transformer failure Maryborough City Substation, resulting in likely loss of supply to network users.
- Economic analysis carried out in accordance with the Regulatory Test has identified that proposed augmentation described in Option 1 (Develop Maryborough North Substation in 2013), is the least cost solution over the 15 year period of analysis in all scenarios considered.
- Sensitivity testing showed that the analysis is robust to variations in capital costs and the selected discount rate.
- As Option 1 is the lowest cost option in all scenarios, it is considered to satisfy the ACCC Regulatory Test.

9. DRAFT RECOMMENDATION

Based on the conclusions drawn from the analysis in sections 7 and 8 above, it is recommended that Ergon Energy proceeds with Option 1 to:-

- **Establish Maryborough North 66/11kV Zone Substation and its associated 66kV and 11kV supply lines for a cost of $16.5M with commissioning to be scheduled for mid-2013.**

Technical details relevant to the proposed new large distribution asset are contained in section 7.1.

10. CONSULTATION

In accordance with the Rules provisions[6], Ergon Energy invites submissions from affected Rules Participants, AEMO and Interested Parties on this Consultation Paper and Draft Recommendation.

10.1. Timetable for Submissions

Submissions in writing (electronic preferably) are due by **25 March 2010** and should be lodged to:

Ergon Energy Corporation Limited

P O Box 15107

City East QLD 4002

Attention: Network Planning and Development

Email: Glenys.Davies@ergon.com.au

10.2. 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 - **Complete**.	Date Released: **27 January 2010**
Step 2	Submissions in response to the Request for Information - **Complete.**	Due Date: **24 February 2010**
Step 3	Review and analysis by Ergon Energy - **Complete**. This is likely to involve further consultation with proponents and additional data may be requested.	Anticipated to be completed by: **3 March 2010**
Step 4	Release of Ergon Energy's Consultation Paper and Draft Recommendation of solution which satisfies the Regulatory Test - **This document**.	Anticipated to be released by: **11 March 2010**
Step 5	Submissions in response to the Consultation Paper & Draft Recommendation.	Due Date: **25 March 2010**
Step 6	Release of Final Recommendation (including summary of submissions received).	Anticipated to be released by: **5 May 2010**
Ergon Energy reserves the right to revise this timetable at any time. The revised timetable will be made available on the Ergon Energy website (http://www.ergon.com.au/network_info/consultations/default.asp).		

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/network_info/consultations/default.asp.

The consultation timetable is driven by the need to make a decision by May 2010 if any option involving significant construction is to be in place by June 2013.

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

[6] National Electricity Rules section 5.6.2(f)