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1. EXECUTIVE SUMMARY

Ergon Energy is responsible (under its Distribution Authority) for electricity supply to the Whitsunday Regional Council area in central Queensland. We have identified emerging limitations in the electricity distribution network supplying the Cannonvale-Airlie area. The loads on Ergon Energy's zone substations and 66kV and 11kV networks in the Cannonvale-Airlie area have progressively increased such that augmentation is required if reliable supply is to be maintained.

The Cannonvale-Airlie area is presently supplied by four zone substations. The Cannonvale 66/11kV substation is supplied by a 66kV radial line from T39 Proserpine 132/66kV substation. The Jubilee Pocket and Mt Rooper 66/11kV substations and the Shutehaven 66/22kV substation are supplied by a second 66kV radial line T39 Proserpine substation.

Ergon Energy's security of supply criteria require that 66kV feeder loads greater than 15MVA must be restored within 30 minutes in the event of a feeder contingency causing loss of customer supply. The peak loads on both 66kV feeders into the Cannonvale-Airlie area exceed 15MVA, and supply cannot be restored within the required 30 minutes in the event of a feeder contingency.

To meet the security of supply criteria for the Cannonvale-Airlie area Ergon Energy needs an additional minimum of 32.3MVA firm capacity at 66kV to be provided to this area. This size has been matched to expected load requirements within Ergon Energy's typical ten year planning horizon.

In order to ensure that supply to customers in the Cannonvale-Airlie area complies with Ergon Energy's security of supply criteria, initial corrective action is required immediately but in practice may be completed prior to the summer of 2012/13. A decision about the selected option is required by August 2010 if any option involving significant construction is to be completed by November 2012.

Ergon Energy published a Request for Information relating to this emerging network constraint on 19 April 2010 and a Consultation Paper and Draft Recommendation on 2 June 2010. No submissions were received by the closing dates of 24 May 2010 and 16 June 2010 respectively.

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

- | | |
|----------|--|
| Option 1 | Install a 66kV Switchyard at Cannonvale Substation in 2012 and Construct a 66kV Cannonvale-Jubilee Pocket Feeder in 2015 |
| Option 2 | Construct a 66kV Cannonvale-Jubilee Pocket Feeder in 2012 and Install a 66kV Switchyard at Cannonvale Substation in 2014 |

In accordance with the requirements of the National Electricity Rules, this is now a Final Report where Ergon Energy provides both economic and technical information about possible solutions, and the solution decided on, being Option 1, to install a 66kV Switchyard at Cannonvale Substation by late 2012 and Construct a 66kV Cannonvale-Jubilee Pocket Feeder by late 2015.

Information relating to the consultation about this project is provided on our web site:

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

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2. INTRODUCTION

Ergon Energy Corporation Limited (Ergon Energy) has identified emerging limitations in the electricity distribution network supplying the Cannonvale-Airlie area of Central Queensland.

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.

This Final Report is based on:

- the assessment that a reliable power supply is not able to be maintained in the Cannonvale-Airlie 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.

Information relating to the consultation about this project is provided on our web site:

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

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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 Rules¹ to notify Rules Participants² and Interested Parties³ 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 options⁴.
- 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 solutions⁵.

Ergon Energy is responsible for electricity supply to the Cannonvale-Airlie area (under its Distribution Authority) and has identified emerging limitations in the electricity distribution network supplying Cannonvale, Airlie and Shutehaven. Augmentation to the electricity distribution network supplying this area is required if reliable supply is to be restored.

3.2. Purpose of this “Final Report”

The purpose of this Final Report is to:

- Provide information about the existing distribution network in the Cannonvale-Airlie 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.
- Report the solution Ergon Energy has decided on.

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 CANNONVALE-AIRLIE AREA

4.1. Geographic Region

The geographic region covered by this Final Report is broadly described as the Cannonvale-Airlie area as shown on the map below.



4.2. Existing Supply System

The Cannonvale-Airlie area is presently supplied by four zone substations. The Cannonvale 66/11kV substation is supplied by the radial 66kV Cannonvale Feeder from T39 Proserpine 132/66kV substation. The Jubilee Pocket and Mt Rooper 66/11kV substations and the Shutehaven 66/22kV substation are supplied by the radial 66kV Mt Rooper Feeder from T39 Proserpine substation. The two 66kV feeders can be connected together via manual switches at Cannonvale substation to restore customer supply after a line contingency.

Cannonvale substation has two 15MVA 66/11kV transformers in service which deliver a firm substation capacity of 18.7MVA at the 11kV bus. The 2009/10 summer peak load on Cannonvale substation reached 17.8MVA and load growth is forecast at 9.4% per annum for the next ten years. Cannonvale substation presently supplies approximately 5,700 customers in the Cannonvale, Airlie and Jubilee Pocket urban areas.

Jubilee Pocket substation is due to be commissioned in third quarter 2010 and will have one 32MVA 66/11kV transformer in service. It will supply the Jubilee Pocket and some Airlie load and reduce the load on Cannonvale substation below its firm substation capacity.

Shutehaven substation supplies the island tourist resorts on Hayman, Long and Hamilton Islands via 22kV submarine cables. Shutehaven substation has one 25MVA 66/22kV transformer and experienced peak load of 10.3MVA during summer 2009/10.

Mt Rooper substation supplies the island tourist resorts on South Molle and Daydream Islands via 11kV submarine cables, as well as approximately 150 customers on the mainland at Shutehaven. Mt Rooper substation has one 5MVA 66/11kV transformer and experienced peak load of 2.0MVA during summer 2009/10.

5. EMERGING NETWORK LIMITATIONS

A load forecast for the substations in the Cannonvale-Airlie area is shown in Table 1 below.

TABLE 1 – Cannonvale-Airlie Area – Supply Substations Load History & Forecast

<u>Year</u>	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16		19/20
Cannonvale Substation Load (MVA) Limitation @ N-1 Capacity is: 18.7MVA	17.1	17.7	17.8	Forecast 16.6	Forecast 18.2	Forecast 20.0	Forecast 21.9	Forecast 24.0	Forecast 26.3		Forecast 37.6
Jubilee Pocket Substation Load (MVA) Limitation @ N-1 Capacity is: 0MVA	-	-	-	Forecast 5.8	Forecast 6.4	Forecast 6.7	Forecast 7.1	Forecast 7.5	Forecast 7.9		Forecast 10.0
Shutehaven Substation Load (MVA) Limitation @ N-1 Capacity is: 0MVA	10.0	11.2	10.3	Forecast 11.5	Forecast 11.8	Forecast 12.1	Forecast 12.4	Forecast 12.7	Forecast 13.0		Forecast 14.3
Mt Rooper Substation Load (MVA) Limitation @ N-1 Capacity is: 0MVA	3.7	3.6	2.0	Forecast 2.0	Forecast 2.1	Forecast 2.1	Forecast 2.1	Forecast 2.1	Forecast 2.2		Forecast 2.4
66kV Mt Rooper Feeder Load (MVA)	16.6	16.6	15.6	Forecast 21.4	Forecast 22.0	Forecast 22.3	Forecast 22.7	Forecast 23.1	Forecast 23.4		Forecast 24.7

Ergon Energy's security of supply criteria require that where a 66kV feeder carries more than 15MVA load, and the load supplied by the feeder is predominately residential load, then in the event of a line contingency the load must be restored within 30 minutes. Since the 66kV switches at Cannonvale substation have no remote control, switching to restore supply after a line contingency is not feasible within 30 minutes. Therefore Cannonvale substation must be provided with N-1 line capacity.

From Table 1 it can be seen that load will need to be transferred from Cannonvale substation onto Jubilee Pocket substation via the 11kV feeder network to maintain the load on Cannonvale substation below its N-1 capacity of 18.7MVA. These load transfers will gradually load Jubilee Pocket substation until by summer 2015/16 the Jubilee Pocket load will exceed 15MVA, at which time N-1 line capacity will be required to comply with Ergon Energy's security of supply criteria.

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

- Ergon Energy's security of supply criteria are not being met for the load supplied by 66kV Cannonvale Feeder.
- Ergon Energy's security of supply criteria are not being met for the load supplied by 66kV Mt Rooper Feeder.
- The load in the Cannonvale-Airlie area is forecast to grow strongly during the next ten years and this will exacerbate the extent of the non-compliance with Ergon Energy's security of supply criteria.

5.1. Timeframes for Taking Corrective Action

In order to ensure that security of supply to customers in the Cannonvale-Airlie area complies with Ergon Energy's planning and security criteria, corrective action should be completed immediately but in practice may be completed before summer 2012/13.

A decision about the selected option is required by August 2010 if any option involving significant construction is to be completed by November 2012.

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 Cannonvale-Airlie 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 Cannonvale-Airlie area.

On 19 April 2010 Ergon Energy released a Request for Information providing details on the emerging network limitations in the Cannonvale-Airlie 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 17 May 2010, being the closing date for submissions to the Request for Information paper.

Therefore, in accordance with the requirements of the Rules, on 2 June 2010, Ergon Energy released a Consultation Paper and Draft Recommendation setting out feasible options, economic analysis and a draft recommended solution. There were no submissions received by the closing date on 16 June 2010

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 – Install a 66kV Switchyard at Cannonvale Substation in 2012 and Develop a 66kV Ring-Feed in 2015

Option 1 – Install a 66kV Switchyard at Cannonvale Substation		
<i>Date Req'd</i>	<i>Augmentation</i>	<i>Capital Cost</i>
2012	Install a 66kV Switchyard at Cannonvale Substation	\$8.07
2015	Construct a 66kV Cannonvale-Jubilee Pocket Feeder	\$14.88
2015	Upgrade the capacity of the existing 66kV Cannonvale-Jubilee Pocket Feeder	\$1.99

This option involves:-

- Installation of a new 66kV switchyard at Cannonvale substation, and connection of two incoming 66kV feeders, by late 2013. The 66kV Cannonvale and Mt Rooper feeders are presently connected into Cannonvale substation via manual switches. This work will deliver N-1 line capacity to Cannonvale substation.
- Construction of a second 66kV Cannonvale-Jubilee Pocket feeder, and augmentation of the existing 66kV Cannonvale-Jubilee Pocket feeder to increase its capacity, by late 2015. This work will develop a 66kV ring-feed which will provide N-1 line capacity to Jubilee Pocket substation.

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

- The proposed new 66kV switchyard in 2012 will deliver N-1 feeder capacity to Cannonvale substation and minimise the risk of loss of supply to customers supplied from that substation. This work also facilitates the construction of the proposed second 66kV Cannonvale-Jubilee Pocket feeder in 2015.
- The proposed 66kV ring-feed in 2015 will deliver N-1 feeder capacity to Jubilee Pocket substation and minimise the risk of loss of supply to customers supplied from that substation.
- This option will provide increased network operational flexibility.
- This option has a lower immediate cost, and a lower Nett Present value cost than Option 2.

Disadvantages of this option are:

- Nil

7.2. Option 2 – Construct a 66kV Cannonvale-Jubilee Pocket Feeder in 2012 and Install a 66kV Switchyard at Cannonvale Substation in 2014

Option 2 – Construct a 66kV Cannonvale-Jubilee Pocket Feeder		
<i>Date Req'd</i>	<i>Augmentation</i>	<i>Capital Cost</i>
2012	Construct a 66kV Cannonvale-Jubilee Pocket Feeder	\$14.88
2012	Upgrade the capacity of the existing 66kV Cannonvale-Jubilee Pocket Feeder	\$1.99
2014	Install a 66kV Switchyard at Cannonvale Substation	\$8.07

This option involves:-

- Construction of a second 66kV Cannonvale-Jubilee Pocket feeder, and augmentation of the existing 66kV Cannonvale-Jubilee Pocket feeder to increase its capacity, by late 2012. This work will develop a 66kV ring-feed which will provide N-1 line capacity to Jubilee Pocket substation, but not to Cannonvale substation which would remain effectively teed off one section of the ring-feed.
- Installation of a new 66kV switchyard at Cannonvale substation, and connection of two incoming 66kV feeders, by late 2014. This work will deliver N-1 line capacity to Cannonvale substation.

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

- The proposed second 66kV Cannonvale-Jubilee Pocket feeder in 2012 will deliver N-1 feeder capacity to Jubilee Pocket substation and minimise the risk of loss of supply to customers supplied from that substation.
- The proposed new 66kV switchyard in 2015 will deliver N-1 feeder capacity to Cannonvale substation and minimise the risk of loss of supply to customers supplied from that substation
- This option will provide increased network operational flexibility.

Disadvantages of this option are:

- This option has a higher immediate cost than Option 1.
- This option has a higher Nett Present Value cost than Option 1.
- Negotiations to acquire an approved line route for the second 66kV Cannonvale-Jubilee Pocket feeder have been in progress for more than three years and are still not finalised. There is risk that the failure to finalise the line route acquisition could delay construction of the feeder beyond 2012.
- This option delivers N-1 line capacity to Jubilee Pocket substation, which will have a significantly lower load than Cannonvale substation when it is commissioned. Therefore to comply with Ergon Energy's security of supply criteria Cannonvale substation should be unloaded below 15MVA by 11kV feeder load transfers onto Jubilee Pocket substation. This will be difficult and is not expected to be sustainable later than 2014/15, hence the intention to deliver the Cannonvale switchyard in 2014.

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 Cannonvale-Airlie 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 (Install a 66kV Switchyard at Cannonvale Substation in 2012 and Construct a second 66kV Cannonvale-Jubilee Pocket Feeder in 2015)** has the lowest present value under all scenarios.

8.2.2 Summary of Economic Analysis

		Option 1 Install a 66kV Switchyard at Cannonvale Substation in 2012	Option 2 Construct a 66kV Cannonvale-Jubilee Pocket Feeder in 2012
Scenario A	PV (\$M)	\$17.97	\$20.24
Base Case	Rank	1	2
Scenario B	PV (\$M)	\$16.19	\$18.34
Low Load Growth	Rank	1	2
Scenario C	PV (\$M)	\$19.93	\$22.53
High Load Growth	Rank	1	2
Scenario D	PV (\$M)	\$16.30	\$18.77
Discount Rate = 12%	Rank	1	2
Scenario E	PV (\$M)	\$19.38	\$21.47
Discount Rate = 8.5%	Rank	1	2
Scenario F	PV (\$M)	\$21.56	\$24.29
Increased Capital Costs	Rank	1	2
Scenario G	PV (\$M)	\$14.38	\$16.20
Decreased Capital Costs	Rank	1	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 2012/13, Ergon Energy will not be able to meet its security criteria in the event of a 66kV feeder failure in the Cannonvale-Airlie area, resulting in possible 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 (Install a 66kV Switchyard at Cannonvale Substation in 2012 and Construct a second 66kV Cannonvale-Jubilee Pocket Feeder in 2015), 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. FINAL REPORT & DECISION

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:-

- **Install a 66kV Switchyard at Cannonvale Substation for a cost of \$8.07M with commissioning to be scheduled for late 2012, and**
- **Construct a second 66kV Cannonvale-Jubilee Pocket feeder and upgrade the existing feeder for a cost of \$16.87M with commissioning to be scheduled for late 2015.**

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

Ergon Energy now intends to take immediate steps to implement the solution decided on to ensure system reliability is maintained.