Reliable Provision of Electricity to the Maryborough Supply Area

Notice of No Non-Network Options

26/02/2020

Executive Summary

ABOUT ERGON ENERGY

Ergon Energy Corporation Limited (Ergon Energy) is part of the Energy Queensland Group and manages an electricity distribution network which supplies electricity to more than 740,000 customers. Our vast operating area covers over one million square kilometres – around 97% of the state of Queensland – from the expanding coastal and rural population centres to the remote communities of outback Queensland and the Torres Strait.

Our electricity network consists of approximately 160,000 kilometres of powerlines and one million power poles, along with associated infrastructure such as major substations and power transformers.

We also own and operate 33 stand-alone power stations that provide supply to isolated communities across Queensland which are not connected to the main electricity grid.

IDENTIFED NEED

Maryborough 132/66kV substation (MARYSS) T59 is a Bulk Supply Point which supplies approximately 50,000 customers and 125MVA of peak load through connected Zone Substations. The 75MW Susan River Solar Farm is also connected to the 66kV network through a dedicated substation. MARYSS is located west of Maryborough and supplies the majority of the Fraser Coast Local Government Area, including the major regional centres of Maryborough and Hervey Bay as well as several smaller towns.

The purpose of this project is to address poor condition assets, compliance Safety Net provisions of the Distribution Authority, and compliance with performance standards as set out in the National Electricity Rules.

APPROACH

The NER requires that, subject to certain exclusion criteria, network business investments for meeting service standards for a distribution business are subject to a Regulatory Investment Test for Distribution (RIT-D). Ergon Energy has determined that network investment is essential in this case for it to continue to provide electricity to the consumers in the Maryborough and Hervey Bay supply areas in a reliable, safe and cost-effective manner. Accordingly, this investment is subject to a RIT-D. An internal assessment has been carried out and it has been determined that no non-network solutions can potentially meet the identified need or form a significant part of the solution. This Notice has hence been prepared by Ergon Energy in accordance with the requirements of clause 5.17.4(d) of the NER.

1 Background

Maryborough 132/66kV substation (MARYSS) T59 is a Bulk Supply Point which supplies approximately 50,000 customers and 125MVA of peak load through connected Zone Substations. The 80MW Susan River Solar Farm is also connected to the 66kV network through a dedicated substation. MARYSS is located west of Maryborough and supplies the majority of the Fraser Coast Local Government Area, including the major regional centres of Maryborough and Hervey Bay as well as several smaller towns.

MARYSS has two incoming 132kV feeders originating from Aramara 132kV Switching Substation and six outgoing 66kV feeders. Maryborough and Hervey Bay are each supplied from a pair of 66kV feeders which form a ring in each town. The remaining two feeders link MARYSS to Kilkivan 132/66kV (KILKSS) T12 and Howard 66/11kV (HOWASS) respectively.

MARYSS was constructed in approximately 1980 and a condition assessment has identified several assets that require replacement due to their condition and associated risk. A review of substation limitations has also identified that MARYSS is not compliant with the Safety Net provisions of its Distribution Authority (DA) No. D01 or the Network Performance requirements of the National Electricity Rules (NER).

The purpose of this project is to address limitations on aged and poor condition assets, compliance Safety Net provisions of the Distribution Authority, and compliance with performance standards as set out in the National Electricity Rules.

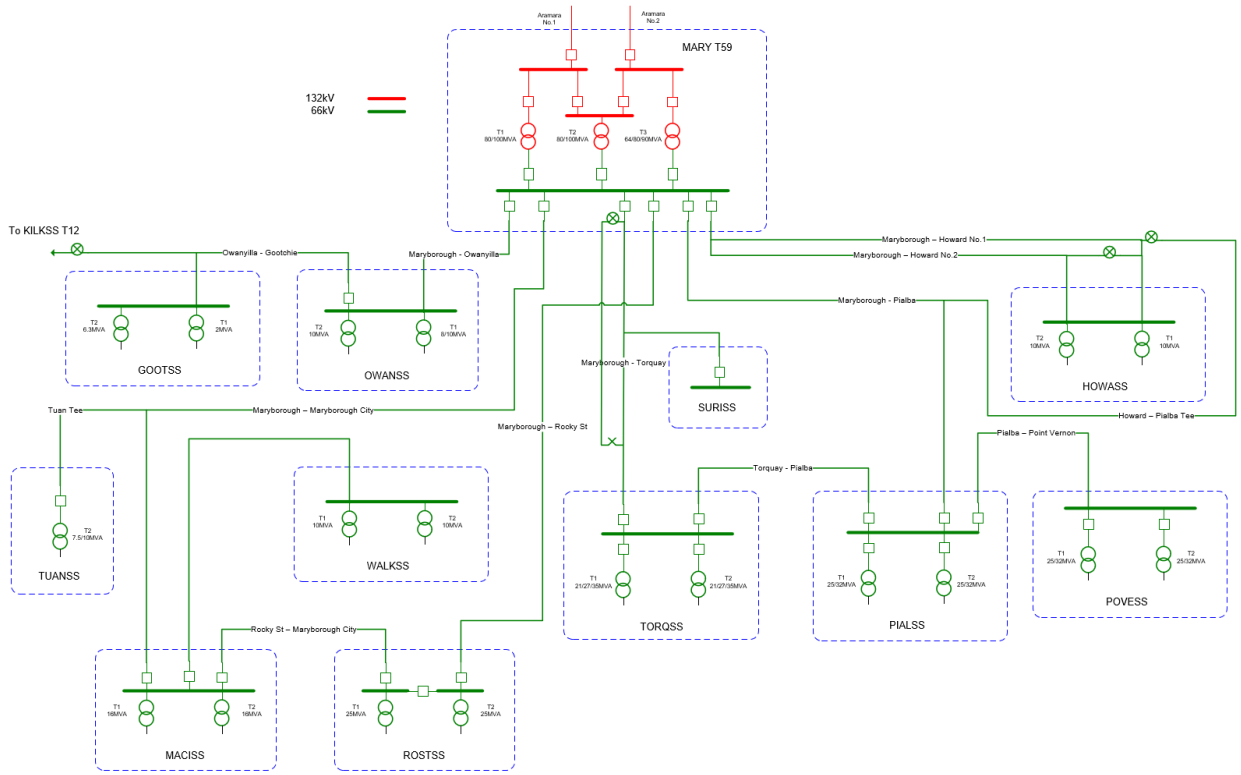


Figure 1 - Maryborough Sub-transmission Network

2 Identified Need

2.1. Asset Replacement

A condition assessment of MARYSS has identified assets that are recommended for replacement. These assets are forecast to reach retirement based on a combination of Condition Based Risk Management (CBRM) modelling and known issues with problematic plant, which are required to be replaced or decommissioned to manage the safety and network risks associated with unplanned failure. CBRM is a structured process that combines asset information, engineering knowledge and practical experience to define the current and future condition, performance and risk for network assets.

Assets recommended for replacement are outlined in Table 1 and

Table 2.

Table 1 - Primary plant recommended for replacement

Bay	kV	Asset	Asset ID	Make
Aramara fdr 7329	132	CB	CB73292	Oerlikon
	132	CT	ØA 73292	Tyree
	132	CT	ØB 73292	Tyree
	132	CT	ØC 73292	Tyree
	132	VT	ØA 7329	Trench Electric
	132	VT	ØB 7329	Trench Electric
	132	VT	ØC 7329	Trench Electric
Aramara fdr 7330	132	CB	CB73302	Oerlikon
2-3 Bus section	132	CB	CB4122	Oerlikon
TX01 bay	66	CB	A752	Asea
TX02 bay	66	CB	B752	Asea
Marybh City fdr	66	CB	G352	Asea
Torquay-SURI fdr	66	CB	E352	Asea
Pialba fdr	66	CB	C352	Asea
	66	CT	ØA C396	Tyree
	66	CT	ØB C396	Tyree
	66	CT	ØC C396	Tyree
Howard fdr	66	CB	A352	Asea
	66	CT	ØA A396	Tyree
	66	CT	ØB A396	Tyree
	66	CT	ØC A396	Tyree
66kV bus	66	VT	ØA A797C	Asea
	66	VT	ØB A797C	Asea
	66	VT	ØC A797C	Asea
	66	VT	ØA B797C	Asea
	66	VT	ØB B797C	Asea
	66	VT	ØC B797C	Asea

Table 2 - Relays recommended for replacement

Panel	Protection Relay	Protection	Make	Function
P14	PR94284116 PR93224090 PR93229836 PR93226023	66kV bus	EMAIL EMAIL EMAIL GEC	751/64 Bus Inst OC/EF 1194A BZ Mtr 1 1194B BZ Mtr 2 GEC TDR
P18	PR93229881 PR93229935 PR94284114	66kV Kilkivan Y pro	EMAIL GEC EMAIL	OCCHK ELCHK I351/64 GEC TIMER TDR TSR
P6	PR93224401 PR93229927 -	66kV Pialba Y pro	EMAIL GEC EMAIL	OCCHK ELCHK TIME DELAY RELAY TSR

2.2. Reliability

As a condition of its Distribution Authority (DA) Ergon Energy must ensure, to the extent reasonably practicable, that it achieves the Safety Net restoration targets as specified in the DA. The purpose of the Safety Net is to seek to effectively mitigate the risk of low probability high consequence network outages to avoid unexpected customer hardship and/or significant community or economic disruption.

A review of MARYSS against Safety Net compliance has identified that in the event of a 66kV bus trip, restoration targets will not be met. MARYSS has no 66kV bus section circuit breakers and consequently, a 66kV bus zone fault or CB Fail protection operation trips all three 66kV transformer circuit breakers resulting in instantaneous loss of supply to the 66kV network.

In a scenario where the 66kV bus trips, the expected time to restore unsupplied load to below 20MVA is 2 hours. This is above the 1 hour restoration target as specified in the DA, and MARYSS is therefore not compliant. This scenario is illustrated in Figure 2.

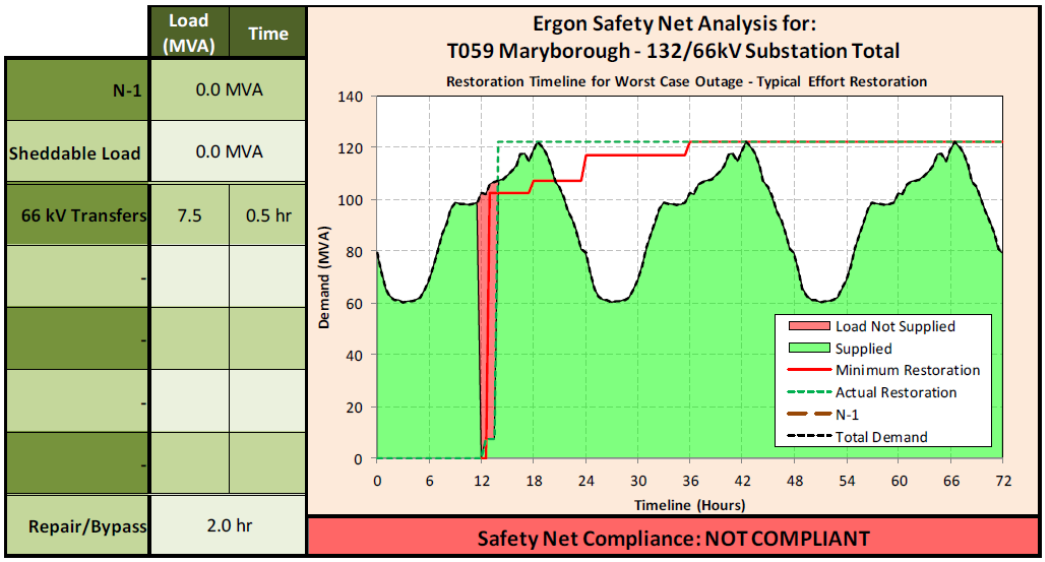


Figure 2 - MARYSS Safety Net Analysis

2.3. Network Performance

The National Electricity Rules (NER) (Chapter 5) specify performance standards for protection systems. A review of MARYSS has identified that the 132kV bus, 66kV bus, and several 66kV feeders have protection systems that do not comply with the minimum performance standards as set out in the NER.

The 132kV bus zones are protected with a single bus protection scheme using an RMS high impedance protection relay. There is no back up protection installed to meet the minimum protection performance criteria as specified by the NER.

The Pialba, Torquay, Kilkivan, and Howard 66kV feeders are protected with distance protection and earth fault protection relays. The earth fault relay does not provide phase fault protection and does not have the capability to detect circuit breaker failure (CBF), which does not meet the NER requirements.

3 Network Options Considered

3.1. Preferred Network Option

The preferred network option is to replace assets in poor condition, install bus couplers to address Safety Net and upgrade protection to meet NER Network Performance requirements.

The estimated preferred project cost is $6.5M.

4 Assessment of Non-Network Solutions

Ergon Energy's Demand and Energy Management (DEM) Team assesses the potential non-network options that individually or jointly might constitute a credible option. Credible options must be able to either substitute or defer the network investment, and also ensure that the solution is technically and commercially viable and can be delivered within required timeframe. Feasible non-network options must be able to be implemented in sufficient time to satisfy the identified risk to the public and/or the network due to the identified constraints.

Ergon Energy has considered a number of demand management technologies to determine their commercial and technical feasibility to assist with the identified need.

The following non–network solutions have been assessed for either deferring or replacing the network investment required in the Maryborough supply area:

- Demand Management (Demand Reduction) such as power factor correction, energy efficiency, load control.
- Demand Response through customer embedded generation, call off load and load curtailment contracts.

They have been assessed as not technically viable as:

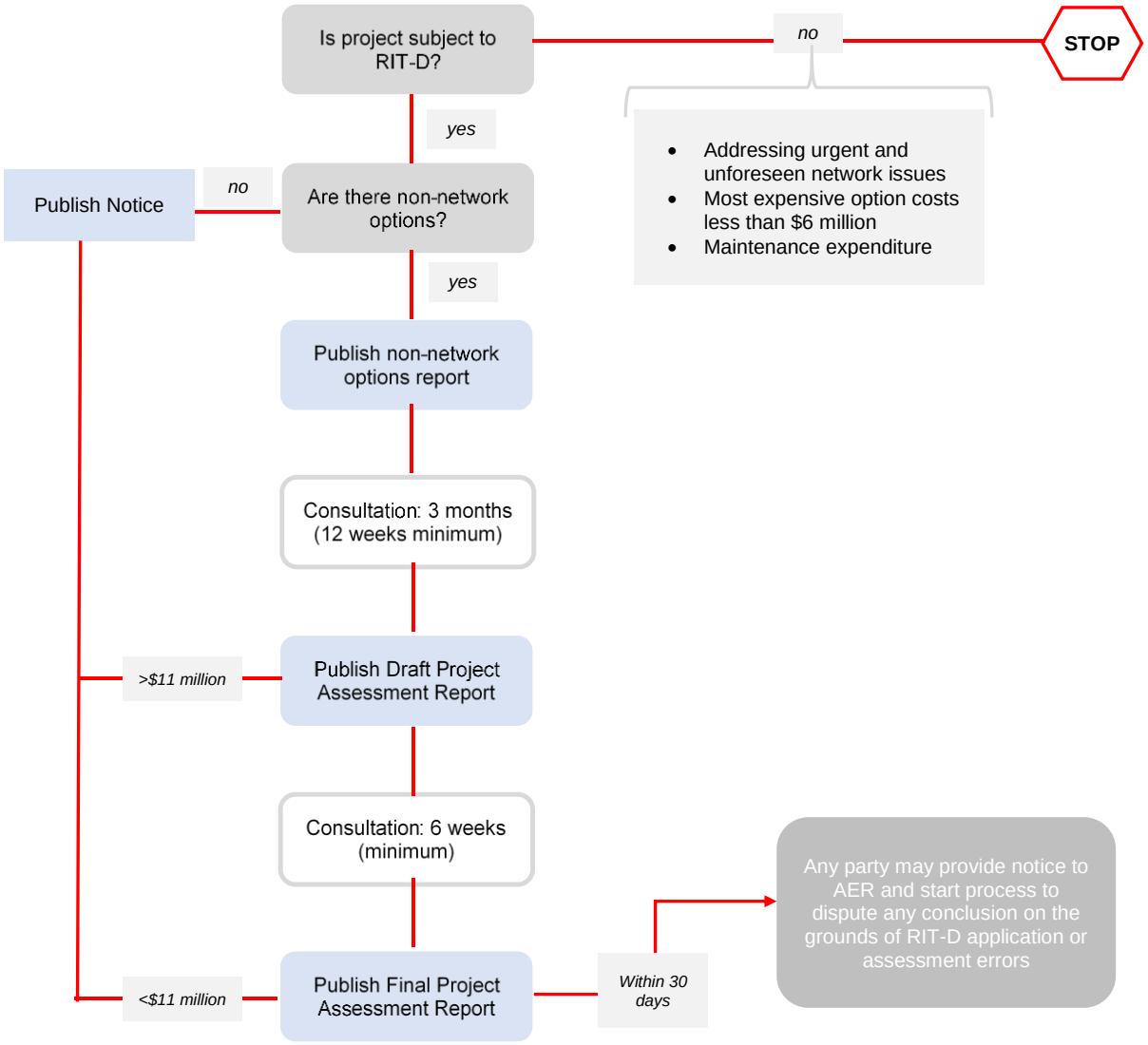
- they will not address the network risk associated with poor condition assets
- the required demand reduction to address Safety Net compliance is of significant magnitude and consequently will not be cost effective
- it will not address NER compliance

5 Conclusion and Next Steps

The internal investigations undertaken on the feasibility of the non-network solutions revealed that it is unlikely to find a complete non-network solution or a hybrid (combined network and non-network) solution to provide the magnitude of network support required in the Maryborough area to address the identified need.

The preferred network option is to replace assets in poor condition, install bus couplers to address Safety Net and upgrade protection to meet NER Network Performance requirements. This notice of no non-network options is therefore published in accordance with rule 5.17.4(d) of the National Electricity Rules. As the next step in the RIT-D process, Ergon Energy will now proceed to publish a Final Project Assessment Report.

Appendix – The RIT-D Process



Source: AEMC, *Rule determination: National Electricity Amendment (Replacement expenditure planning arrangements) Rule 2017*, July 2017, p. 64.