

Reliable Provision of Electricity to the Turkinje 66kV supply area



NETWORK

Part of Energy Queensland

Notice of No Non-Network Options

07/10/2020



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.

IDENTIFIED NEED

A condition assessment of the Turkinje (TURK) 132/66kV Substation (T055) 66kV primary plant and secondary systems has identified assets that are nearing the end of their technical service lives with identified condition, safety and obsolescence issues.

These primary plant and secondary system assets:

- are forecast to reach the end of their technical service lives based on a combination of Condition Based Risk Management (CBRM) modelling and known issues with problematic assets, which are required to be replaced or decommissioned to manage the safety and network risks associated with unplanned failure
- include 66kV circuit breakers, 66kV voltage and current transformers, electromechanical and static protection relays, porcelain post and segmented porcelain insulators used on rotary isolators

Failure of the primary plant and secondary systems is a risk to network security which may lead to a breach of legislated Safety Net requirements and exposes customers to the risks and consequences of an increasingly unreliable electricity supply. Catastrophic failure of plant or secondary systems presents a safety risk to staff as well as to the general public.

Planning studies have confirmed there is an enduring need for the 66kV to maintain the supply of electricity in the Tablelands area.

The purpose of this project is to address the risk to safety and network security posed by poor condition and problematic assets.

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 Turkinje 66kV supply area 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

Turkinje (TURK) 132/66kV Substation (T055) is a Powerlink Queensland and Ergon Energy Corporation Limited shared site located near Mareeba in far north Queensland. The Turkinje Substation Ergon Energy Corporation Limited owned 66kV switchyard hub which was established in 1966 is the sole connection to the Tablelands 66kV sub-transmission network that supplies 26,750¹ customers with a combined peak load of 62.9MVA (2018/19 forecast).

Turkinje Substation incorporates two Powerlink 60/80 MVA 132/69 kV transformers which connect a 66kV sub-transmission network of five (5) 66kV feeders that traverses north, south and west across the Tablelands geographic area.

In conjunction with supply of the networks' load base and major townships Mareeba, Atherton, Malanda, Dimbulah, Ravenshoe and Mount Garnet, the 66kV network enables renewable generation from the Ravenshoe wind farm (12MW), Tablelands Sugar Mill (17MW) and approximately 16MW of rooftop Micro Embedded Generation Units (MEGU) connected to the LV (230/400V) network. In future, Mossman Zone Substation and its associated Sugar Mill will be re-supplied from the Turkinje Substation 132kV transmission network.

A significant portion of the 66kV primary plant in the Turkinje Substation is original manufacture from between 1961 and 1964 and is now approaching the end of its technical service life. The condition of this primary plant and secondary systems pose significant safety risks to staff working in proximity to these assets and expose customers to the risks and consequences of an increasingly unreliable 66kV electricity supply.

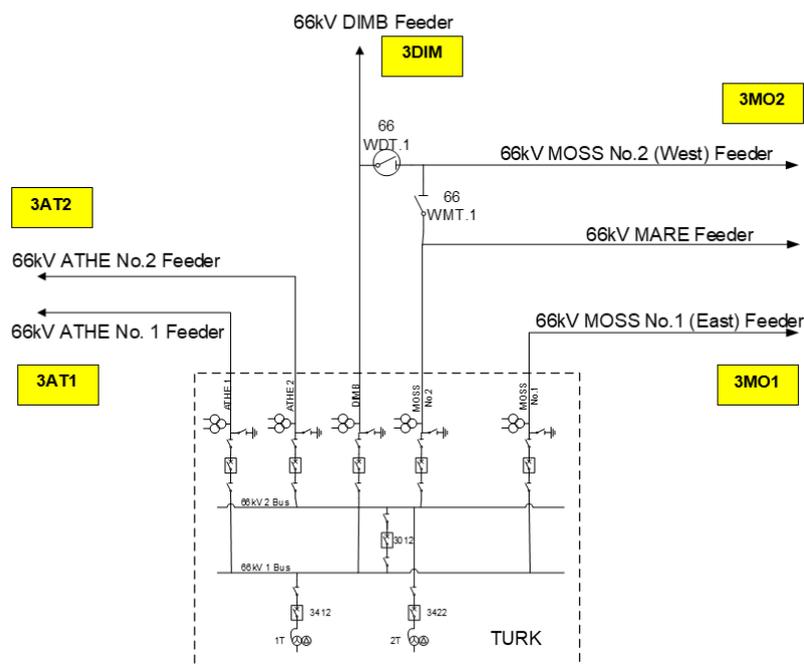


Figure 1 – Turkinje Substation 66kV switchyard

¹ Connect Assets Feb 2019 – this number will be reduced to approximately 23,522 customers once Mossman Zone Substation is supplied via the 132kV network

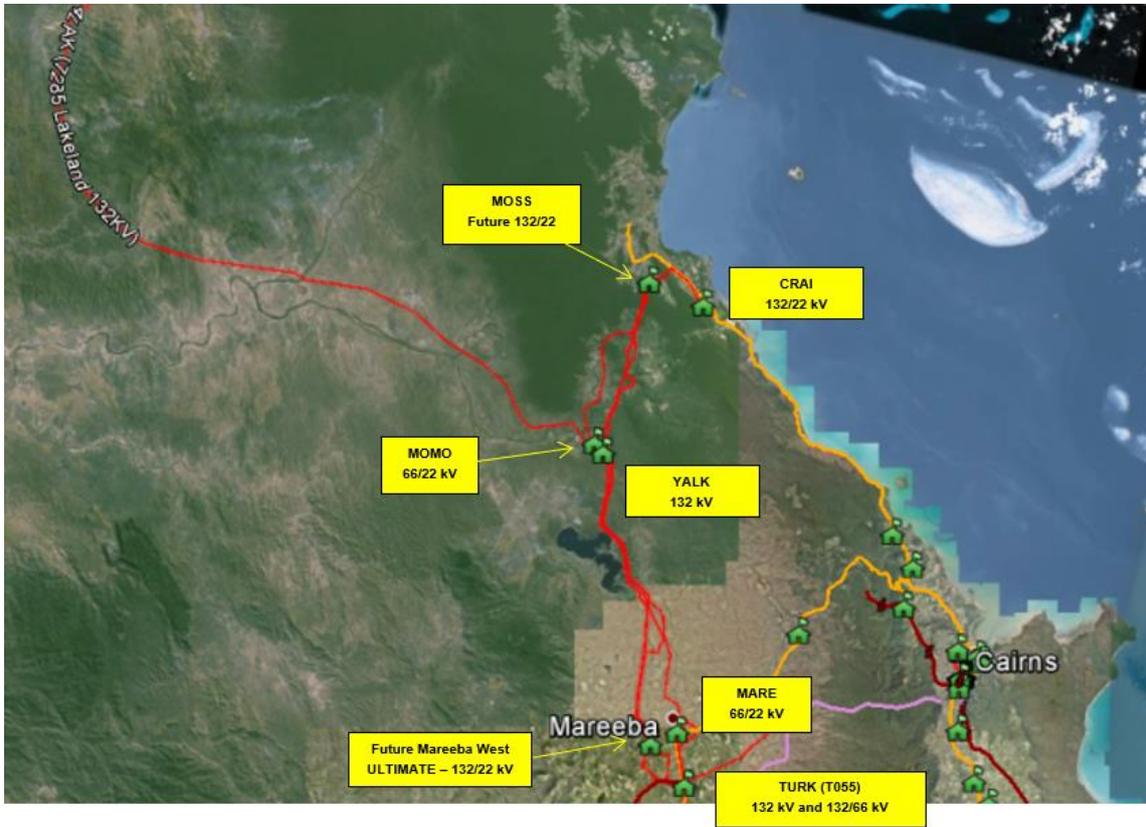


Figure 2 – Turkinje 66kV – North

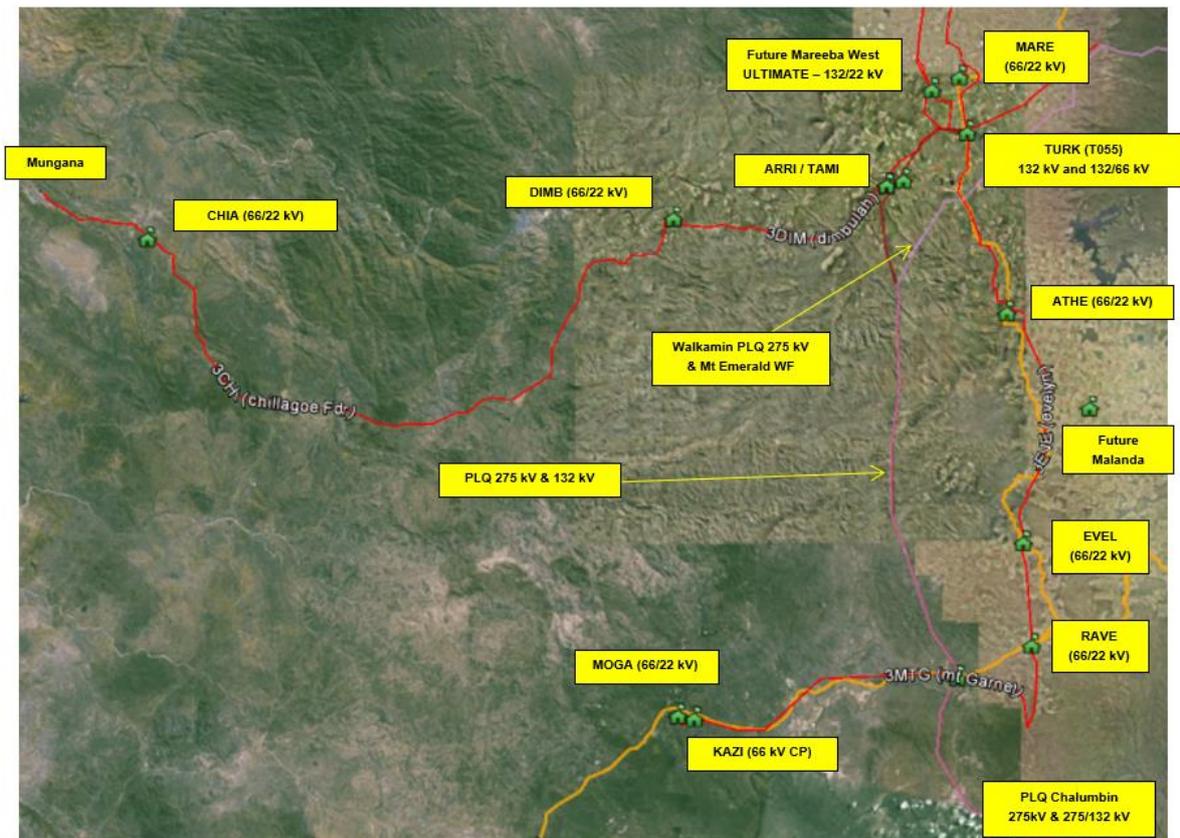


Figure 3 – Turkinje 66kV – West and South

2 Identified Need

2.1. Asset Replacement

A condition assessment of Turkinje Substation 66kV switchyard 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.

The assessment identified that major items of substation plant and secondary systems require replacement. These include 66kV circuit breakers, 66kV voltage and current transformers, electromechanical and static protection relays, porcelain post and segmented porcelain insulators used on rotary isolators.

Failure of the primary plant and secondary systems is a risk to network security which may lead to a breach of legislated Safety Net requirements and exposes customers to the risks and consequences of an increasingly unreliable electricity supply. Catastrophic failure of primary plant or secondary systems presents a safety risk to staff as well as to the general public.

3 Network Options Considered

The preferred network option is to replace 66kV primary plant and secondary systems at Turkinje Substation that have been identified as being in poor condition.

Project practical completion is estimated as May 2025.

The estimated preferred project cost is \$12.67M.

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 Turkinje 66kV 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.

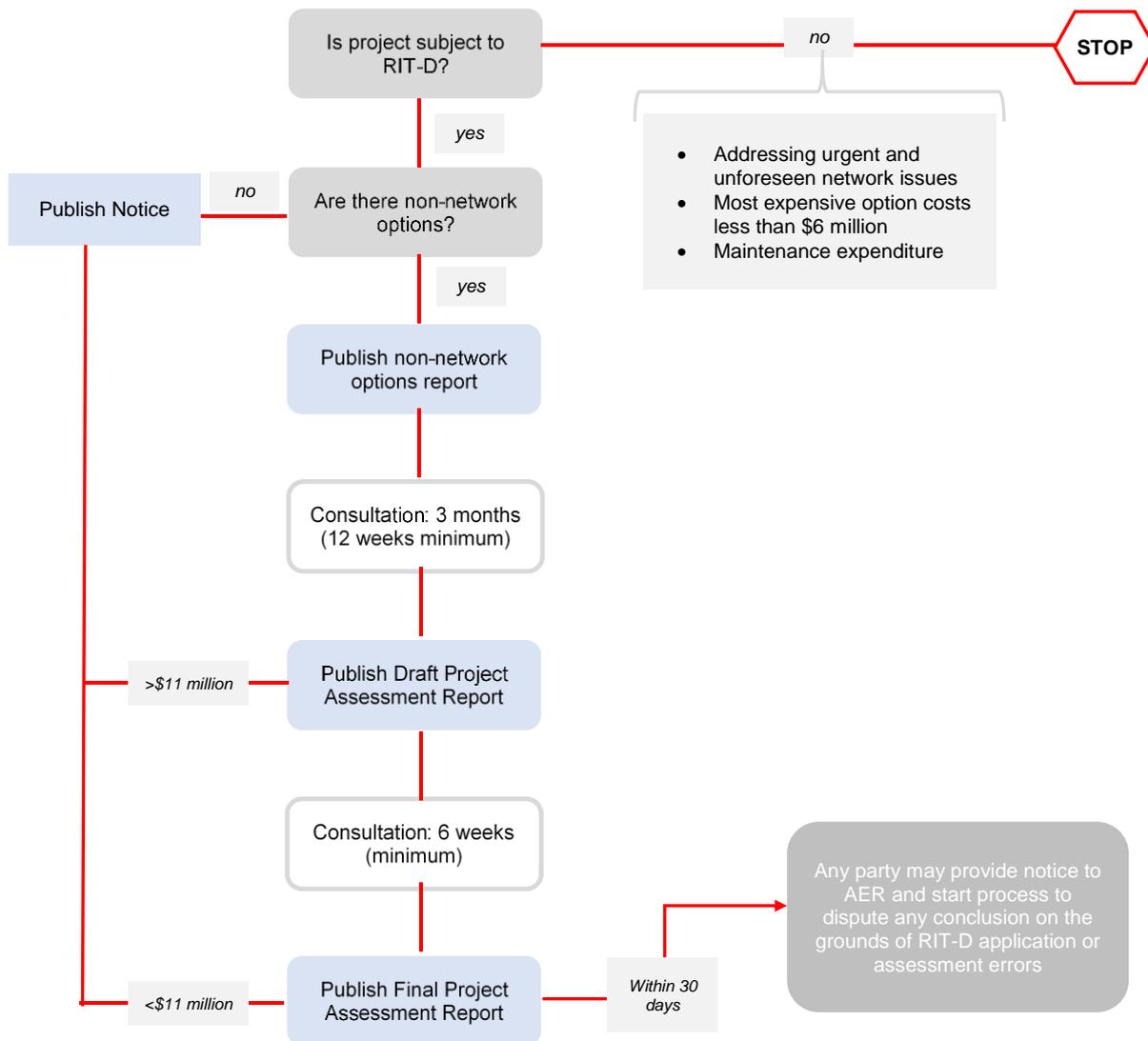
They have been assessed as not technically viable as they will not address the network risk associated with poor condition assets.

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 Turkinje 66kV supply area to address the identified need.

The preferred network option is to replace the assets in poor condition. 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 Draft 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.