

NEED/OPPORTUNITY STATEMENT (NOS)



Making the Grid More Resilience - Taree 132kV Bus Capacity Augmentation

NOS- 000000001414 revision 2.0

Ellipse project description:

TRIM file: [TRIM No]

Project reason: Reliability - To meet connection point reliability requirements

Project category: Prescribed - NCIPAP

Approvals

| | | |
|-----------------------------|---------------------|---|
| Author | Bhavin Sanghavi | Operations Analysis Engineer |
| Endorsed | Hoang Tong | Operations Analysis Manager |
| | Jahan Peiris | Network Modelling & Performance Manager |
| Approved | Nalin Pahalawaththa | Manager/Power System Analysis |
| Date submitted for approval | | |

1. Background

This proposal forms part of the Network Capability Incentive Parameter Action Plan (NCIPAP), for the 2018/19 to 2022/23 regulatory control period. The NCIPAP portion of the STPIS described in section 5 of the STPIS guideline¹ is a plan consisting of a suite of small projects aimed at improving the capability of transmission assets through operational expenditure and minor capital expenditure on the transmission network which results in:

- > Improved capability of those elements of the transmission system most important to determining spot prices;
OR
- > Improved capability of the transmission system at times when Transmission Network Users place greatest value on the reliability of the transmission system.

This project proposes a *priority project* to improve the limit of the injection point for the benefit of the Transmission Network Users. This *priority project* is consistent with the requirements of the clause 5.2(a)(2) in section 5 of the STPIS guideline and is consistent with the objectives of the NCIPAP scheme².

Taree 132/66/33 kV Substation on the NSW lower Mid-North Coast supplies Taree and surrounding areas. It has three 132 kV connections, 96P from Stroud 132 kV (Essential Energy Substation), 963 from Tomago 330 kV and 964 from Port Macquarie Substation. Taree substation provides 66kV and 33kV supplies to a number of Essential Energy feeders. At present the maximum demand at Taree connection point is about 71 MW and is forecast to increase to about 74 MW in 2024³.

Summer 2016/17

- > Taree 33kV – 23 MW, 6 MVar
- > Taree 66kV – 48 MW, 12 MVar

Winter 2016

- > Taree 33kV – 23 MW, 4 MVar
- > Taree 66kV – 49 MW, 7 MVar

The existing arrangement of Taree 132kV busbar is as shown below in figure 1.

¹ AER, Final Electricity Transmission Network Service Providers Service Target Performance Incentive Scheme, Version 5 October 2015.

² Explanatory statement section 5.3.1 - AER, Draft Electricity Transmission Network Service Providers Service Target Performance Incentive Scheme, Version 5 June 2015.

³ TransGrid, NSW Transmission Annual Planning Report 2015

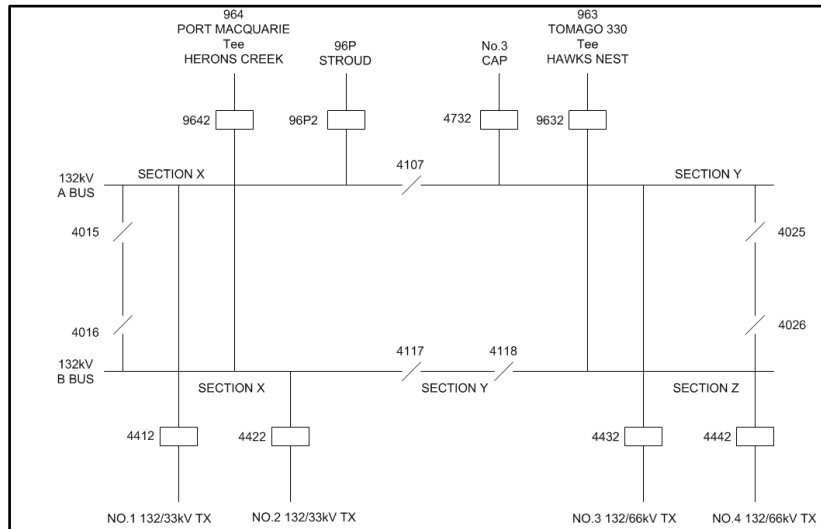


Figure 1 – Existing arrangement of Taree 132/66/33kV substation

2. Need/opportunity

The 132kV busbar (figure 1 above) is a double bus arrangement with both busbars connected by bus couplers on either ends. Both bus couplers only have two disconnectors but there are no circuit breakers installed. The disconnectors in bus couplers are normally closed which results into busbar A and busbar B operating as a solid bus. A trip of any busbar section would trip both busbars A and B and hence result into total supply interruption. Essential Energy has advised that they cannot restore Taree load from their network and it would take at least two hours for a TransGrid site person to attend Taree substation to arrange isolation and switching required for restoring the load.

A severe under voltage condition can occur in the various areas of mid north coast (Boambee South, Nambucca, Raleigh, Macksville) if entire 132kV supply is interrupted at Taree substation at the time of planned maintenance outage of Coffs Harbour No.4 transformer.

The reliability of Taree 66kV and 33kV supplies can be increased by installing a 132kV circuit breaker in one of the bus couplers (as shown in figures 2 and 3 below). The disconnectors in the other bus coupler can be left normally open. The configuration A or B in the figures below would achieve the same purpose as only busbar A or busbar B would trip for a trip of any busbar section.

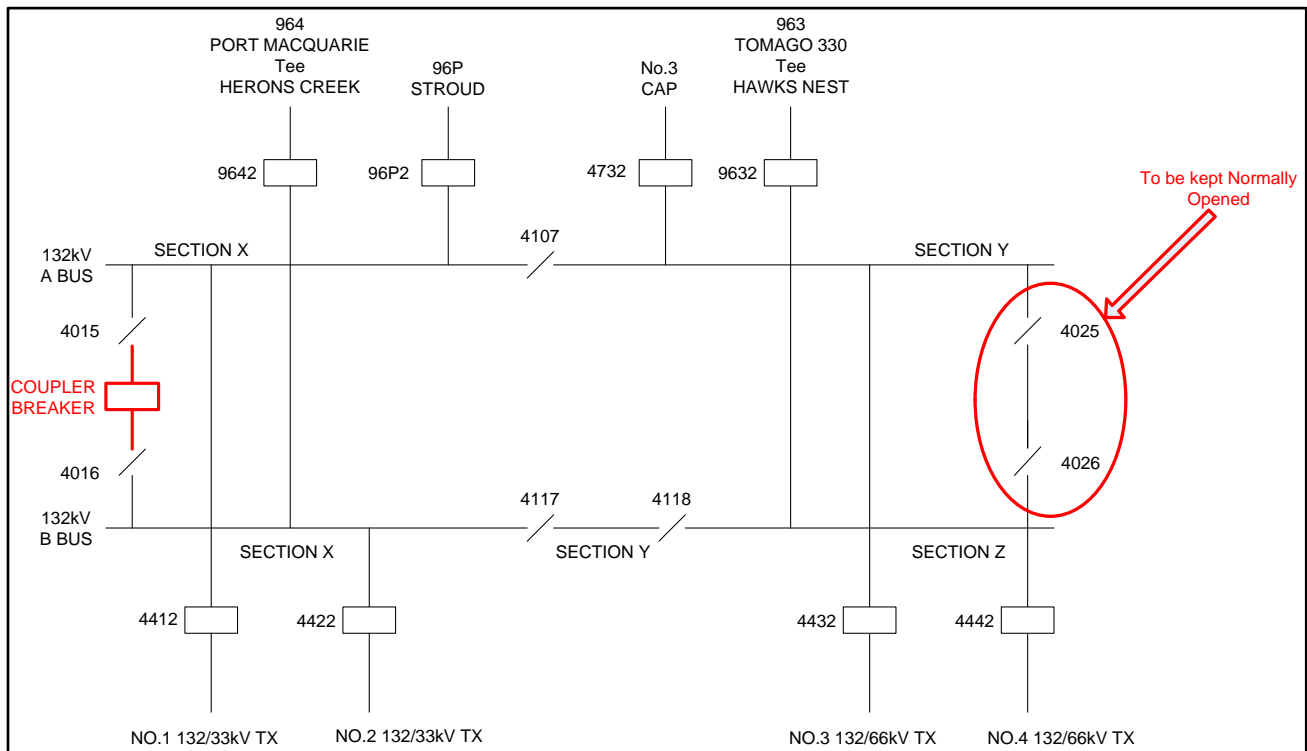


Figure 2 – Configuration A

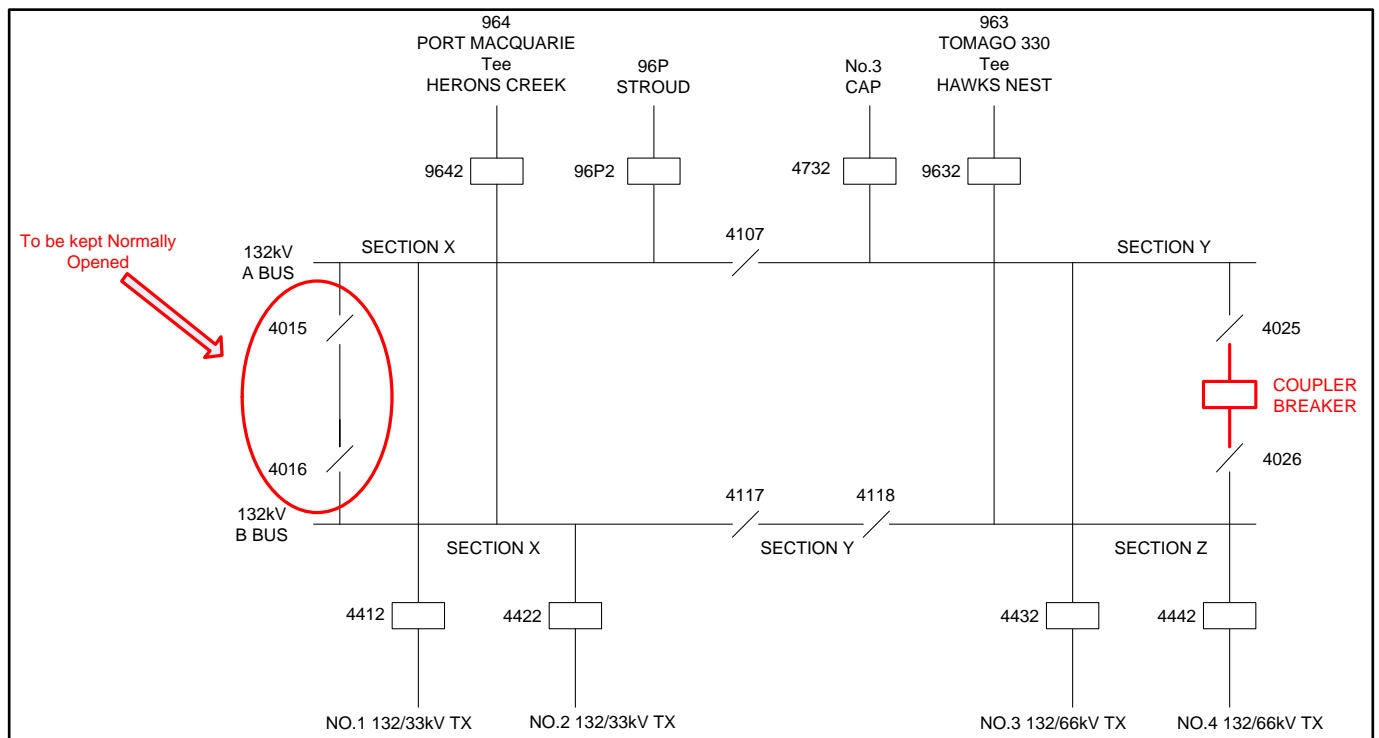


Figure 3 – Configuration B

The new CB bay would need to include a set of CTs and then the establishment of 2 BBP zones. Making and breaking parallels for access to any bus section or the new CB bay could be managed as they are currently. Forced outages of the bus section CB (non-credible and common to all sites with bus section CBs) will have the equivalent impact as a bus trip now. However, the probability of loss of load is significantly less. (as the corresponding loss is mostly driven by simultaneous failure of two assets, bus section as well as CB).

Therefore, with this proposed *priority project*, the post contingency capacity at the supply point can be improved as follows:

| Option | Post contingency (outage of line 978 or 97D) capacity |
|------------------------------------|---|
| Do nothing | 0 MW for 2 hours |
| Installation of a new bus couplers | 49 MW peak demand |

3. Related needs/opportunities

None.

4. Recommendation

It is recommended that a 132kV bus coupler breaker be installed at Taree substation to increase reliability of 33kV and 66kV supplies and to be included in TransGrid NCIPAP for the regulatory period 2018 – 2023.

Attachment 1 Risk costs summary

Current Option Assessment - Risk Summary

Project Name: Taree 132kV Bus Capacity Augmentation

Option Name: 1414 - Base Case

Option Assessment Name: 1414 - Base Case - Assessment 1

Rev Reset Period: Next (2018-23)



| Major Component | No. | Minor Component | Sel. Hazardous Event | LoC x CoF (\$M) | Failure Mechanism | NoxLoC x CoF (\$M) | PoF (Yr 1) | Total Risk (\$M) | Risk (\$M) (Rel) | Risk (\$M) (Op) | Risk (\$M) (Fin) | Risk (\$M) (Peo) | Risk (\$M) (Env) | Risk (\$M) (Rep) |
|-----------------|-----|-----------------|--------------------------------|-----------------|--------------------|--------------------|------------|------------------|------------------|-----------------|------------------|------------------|------------------|------------------|
| Busbar | 1 | Busbar | Unplanned Outage - HV (Busbar) | \$4.24 | Structural Failure | \$4.24 | 7.00% | \$0.30 | \$0.27 | | \$0.03 | | | \$0.00 |
| | | | | \$4.24 | | \$4.24 | | \$0.30 | \$0.27 | | \$0.03 | | | \$0.00 |

Total VCR Risk: \$0.27

Total ENS Risk: