

NEED/OPPORTUNITY STATEMENT (NOS)



Strengthening Far West NSW Network

NOS- 000000001698 revision 1.0

Ellipse project no(s): P0010132

TRIM file: [TRIM No]

Project reason: Reliability - To meet overall network reliability requirements

Project category: Prescribed - Augmentation

Approvals

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Approved	Andrew Kingsmill	Manager / Network Planning
Date submitted for approval	12 December 2016	

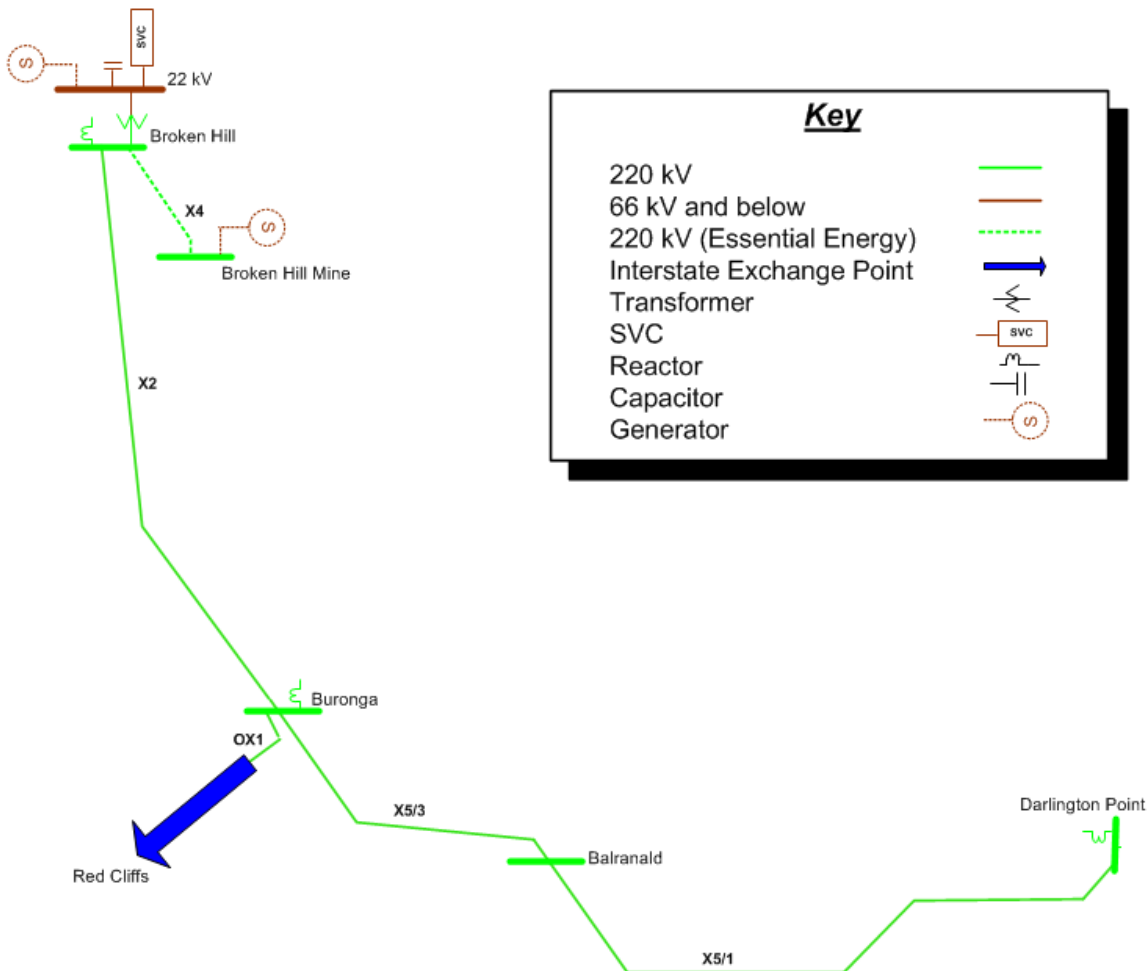
Change history

Revision	Date	Amendment
0	27/10/2016	Initial issue
1	12/12/2016	Updated risks

1. Background

TransGrid's Broken Hill 220/22 kV Substation is supplied via one 220 kV line from Buronga and the 53 MW Broken Hill Solar Farm connected to Broken Hill via two dedicated 22 kV lines. Broken Hill Substation has two 100 MVA 220/22 kV transformers connected to a 22 kV busbar supplying Essential Energy's loads at Broken Hill. The Broken Hill mines substation is owned and operated by Perilya, supplied by a short 220 kV line X4 (owned by Essential Energy) from the 220 kV bus.

Figure 1: Existing Far West NSW Network



2. Need/opportunity

In a study commissioned by TransGrid¹, Ernst & Young (EY) has identified a number of projects which, should they eventuate, would result in additional spot loads imposed on the TransGrid network and may impact the TransGrid network development plan. The EY study identified, an additional 354 MW in potential uncommitted spot loads over the upcoming planning horizon. This additional load growth may result in additional network limitations, within the planning horizon, that would need to be managed by TransGrid.

One of these projects is a possible Hawsons Iron Ore Project, 60km south west of TransGrid's Broken Hill 220/22 kV Substation. The Hawsons Iron Ore Project would likely connect in the vicinity of the existing Broken Hill substation to either the Essential Energy or TransGrid networks. The EY study provides probabilities of completion of the project for the high, medium and low load demand growth scenarios as well as an estimated project completion date as shown in Table 1:

Table 1: Potential future loads (uncommitted)

Project	Location	Additional Load	Estimated Date
Hawsons Iron Ore Project	60km South West of Broken Hill	+121 MW	Summer 2019/20

TransGrid are obliged as a transmission network services provider to comply with the relevant clauses of the National Electricity Rules. Relevant to this Need is that is that TransGrid must operate the network in a *satisfactory operating state* as defined in the NER section 4.2.2, specifically:

The power system is defined as being in a satisfactory operating state when:

(b) the voltage magnitudes at all energised busbars at any switchyard or substation of the power system are within the relevant limits set by the relevant Network Service Providers in accordance with clause S5.1.4 of schedule 5.1;

(c) the current flows on all transmission lines of the power system are within the ratings (accounting for time dependency in the case of emergency ratings) as defined by the relevant Network Service Providers in accordance with schedule 5.1;

TransGrid has analysed the impact of this additional spot load in conjunction with the high, medium and low growth forecasts as described in the Far West Area Plan. It would be reasonable to include this spot load in the high, medium and low growth scenarios, as the probability is greater than 50% for each of these growth scenarios. From this analysis, TransGrid has have identified that, voltages at Broken Hill and Buronga, would be outside acceptable levels in the system normal case and a trip of the proposed load under system normal ('n') operating conditions would also cause the voltage on the Buronga 220 kV busbar to be in breach of the National Electricity Rules (NER) required voltage profile (NER Figure S5.1a.1). TransGrid have also identified that the loading on 220 kV line X2 would be beyond the nominal rating with the additional load supplied at Broken Hill. Therefore TransGrid has determined that establishment of a large block load of the proposed magnitude at Broken Hill Substation would cause operation of the network outside of the *satisfactory operating state*.

Under these circumstances, TransGrid would not be able to connect the mine(s) to the HV network, unless network upgrades were completed.

TransGrid's analysis hence determines that voltage issues at Broken Hill and Buronga substation and rating issues on line X2 necessitates a solution if the projects were to occur within the current planning horizon.

¹ EY 2016, Expansion of demand scenarios, Ernst and Young, 10 October 2016.

2.1 Date to Address the Need

An estimated Need date is coincident with the establishment of the additional spot load, estimated as Summer 2019/20 for high, medium and low load growth scenarios as detailed in the Far West Area Plan².

2.2 Risks

Non-compliance with National Electricity Rules

The primary risk for TransGrid of not addressing the identified need is non-compliance with the NER, particularly clause 5.2 (Obligations), which requires TransGrid to facilitate connections to the network. The results are anticipated to include, inter alia, the following:

- > application of a fine similar to the civil penalty as defined in the National Electricity Law (1996).³
- > damage to TransGrid's reputation (negative media coverage).
- > litigation by customers/consumer groups.

The worst-case total cost of these risks has been calculated in the investment risk tool:

There is a financial risk of receiving a fine similar to the civil penalty as defined in the NEL.

$$\text{civil penalty} = [\$105k + (\$10k * 365)] = \text{\$3.80 million per annum}$$

There is a reputational risk cost (\$0.09 million) and reliability risk cost (\$0.50 million).⁴

The total risk cost is:

$$\text{total risk cost} = \text{\$4.39 million per annum}$$

A risk-cost summary extract from the Investment Risk Tool appears in Attachment 1.

Probability of Need emerging in 2018-23

A probability was assigned to the identified projects by EY for inclusion in a Low, Medium or High demand growth scenario and also for the likelihood of the project proceeding. These are shown in Table 2. The demand probability corresponds to the relative likelihood of each demand scenario occurring and the project probability in demand scenario corresponds to EY's estimate of the likelihood of the uncommitted projects occurring coincident with the demand scenario. The demand probability and project probability in demand scenario are multiplied together to determine a project probability for each demand scenario.

Table 2: Calculation of probability weighted likelihood

Demand scenario likelihood	Demand Probability	Project probability in demand scenario	Project probability
High	10.0%	90.0%	9.0%
Medium	60.0%	75.0%	45.0%
Low	30.0%	70.0%	21.0%
Overall weighted likelihood (sum):			75.0%

² AP S1 – Far West December 2016

³ As the standard has not been signed off by the Minister at time of writing, it is uncertain whether any fines may apply for non-compliance. However, we have assumed that a fine similar to that stipulated in the NEL clause 2AA is entirely within the realm of possibility.

⁴ These are assumed risk costs if the spot load was not connected.

The impact on the Need is that there is an estimated overall 75% weighted likelihood of the Need occurring within the 2018-23 regulatory period. TransGrid will use the calculated overall project probability, together with the consequence to assess the overall risk of the Need and the requirement for risk mitigation measures.

3. Related needs/opportunities

> [Need DCN564 Carpentaria Exploration Ltd - Hawsons Iron Project connect to X2-BKH-BRG](#)

This project was for an initial customer connection investigation for Hawsons Iron that did not progress to an application to connect.

> [Need 1570 - Reinforcement of South Western Network](#)

Establishment of a 275 kV interconnector between Buronga in NSW and Robertsown in South Australia.

> [Need 1649 - Reliability of Supply to Broken Hill](#)

Improvement of unserved energy minutes in line with IPART recommendations for energy reliability.

4. Recommendation

It is recommended that options be considered to address the identified need/opportunity.

Attachment 1 Risk cost summary

Current Option Assessment - Risk Summary

Project Name: Stengthening the Far West NSW Network

Option Name: Base Case

Option Assessment Name: 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 xCoF (\$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)
Circuit Breaker	1	Mechanical	Unplanned Outage - HV (Circuit Breaker)	\$4.39	Failure	\$4.39	100.00%	\$4.39	\$0.50		\$3.80			\$0.09
				\$4.39		\$4.39		\$4.39	\$0.50		\$3.80			\$0.09

Total VCR Risk: \$0.00

Total ENS Risk: \$0.00