

NEED/OPPORTUNITY STATEMENT (NOS)



Mudgee Reinforcement

NOS- 000000001697 revision 3.0

Ellipse project no(s): P0010130

TRIM file: [TRIM No]

Project reason: Reliability - To meet connection point reliability requirements

Project category: Prescribed - Augmentation

Approvals

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Date submitted for approval	5 December 2016	

Change history

Revision	Date	Amendment
0	25/10/2016	Initial Issue
1	27/11/2016	Clarified references to IPART reliability standard and expanded risk cost

1. Background

The Independent Pricing and Regulatory Tribunal (IPART) was asked to recommend a reliability planning standard for electricity transmission in NSW, and in doing so have recommended a new reliability standard based on levels of reliability redundancy and an annual unserved energy allowance.

IPART's optimisation model makes recommendations on the optimal value of expected unserved energy at each Bulk Supply Point (BSP) which the TNSP is expected to meet.

The new reliability standard is to be applied from 1 July 2018 for each BSP, should the NSW Minister for Infrastructure approve the *Electricity transmission reliability standards - Draft Report May 2016^a* and the *Electricity transmission reliability standards - Supplementary Draft Report September 2015^b*. The latter draft (supplementary) report advised that:

"The allowance for expected unserved energy for Mudgee that should be included in the NSW transmission reliability standard is 14 minutes (maximum value per year in minutes at average demand)."

2. Need/opportunity

Mudgee 132 kV tee connects Mudgee to the 132 kV 94M Beryl to Mt Piper tee Ilford line. There is an informal back-up for the Mudgee area load available from Beryl via Essential Energy's distribution network. Essential Energy advised in their submission to IPART's *Draft Reliability Standard Supplementary Report^c* that

"Essential Energy endorses the recommended allowance for expected unserved energy of 14 minutes for Mudgee, noting that informal arrangements allow back-up supply from Essential Energy's distribution network within about 1 hour."

TransGrid has assessed the present Mudgee 132 kV Tee on 94M line unserved energy minutes based on outage information and the current Essential Energy backup strategy to restore load to the Mudgee area.

Connection Point	Present unserved energy minutes	IPART unserved energy minutes
Mudgee 132 kV Tee on 94M line	30 minutes ^A	14 minutes

^A Assumes one hour change-over to the backup supply (from Beryl via Essential's 66 kV network). Mudgee 132kV tee transmission line failure rate and restoration time are estimated using the TransGrid's historical outage average (failure rate of 0.49/yr^d with 1hr average restoration time)

At present Mudgee tee connects to 94M, which means any line section failure will take out the entire Beryl to Mt Piper line. The calculated unserved energy minutes for Mudgee 132 kV Tee presently exceeds the IPART

^a *Electricity transmission reliability standards - An economic assessment Energy — Draft Report May 2016*, <https://www.ipart.nsw.gov.au/files/sharedassets/website/shared-files/investigation-section-12-publications-electricity-transmission-reliability-standards/draft-report-electricity-transmission-reliability-standards-may-2016.pdf>, retrieved on 2nd December 2016.

^b *Electricity transmission reliability standards - Unserved energy allowances for Inner Sydney and Broken Hill, Molong, Mudgee, Mungah and Wellington Town Energy — Supplementary Draft Report September 2015*, <https://www.ipart.nsw.gov.au/files/sharedassets/website/shared-files/investigation-section-12-publications-electricity-transmission-reliability-standards/supplementary-draft-report-electricity-transmission-reliability-standards-september-2016.pdf>, retrieved on 2nd December 2016.

^c Essential Energy submission for *Electricity transmission reliability standards - Unserved energy allowances for Inner Sydney and Broken Hill, Molong, Mudgee, Mungah and Wellington Town Energy — Supplementary Draft Report September 2015*, <https://www.ipart.nsw.gov.au/files/sharedassets/website/shared-files/investigation-section-12-submissions-electricity-transmission-reliability-standards-supplementary-draft-report/online-submission-essential-energy-b.-supple-28-oct-2016-161618220.pdf>, retrieved on 2nd December 2016.

^d The length of 94M line is 126.05km and the generic failure rate for 132 kV transmission line using TransGrid's historical outage data is 0.39 events / 100km / year. Therefore the failure rate for 94M line is 0.39/100*126.05 = 0.49 events / year.

recommended unserved energy minutes. There is an opportunity to increase the reliability of the tee-connection point to reduce the present unserved energy minutes to 14 minutes.

2.1 Risks

Non-compliance with reliability standards

The primary risk for TransGrid not addressing the identified need is non-compliance with the *Draft Electricity Transmission Reliability Standards*. The results are anticipated to include, inter alia, the following:

- > exposing customer connections to an excess of 16 minutes^e of unserved energy.
- > application of a fine similar to the civil penalty as defined in the National Electricity Law (1996).^f
- > damage to TransGrid's reputation (negative media coverage).
- > litigation by customers/consumer groups.

VCR Risk Cost

$$VCR \text{ risk cost} = \text{Excess USE in MWh} * VCR^g$$

$$\text{Excess USE in MWh} = \frac{\text{excess USE in "minutes"}}{60} * \{\text{estimated average annual demand at Molong in MW}\}$$

$$\text{Excess USE in MWh} = \frac{16}{60} \text{ hrs} * 8.22 \text{ MW}^h = 2.2 \text{ MWh}$$

$$\therefore VCR \text{ risk cost} = 2.2 \text{ MWh/year} * \$38,350/\text{MWh} = \mathbf{\$84,370 \text{ per annum}}$$

Note that the VCR risk cost is expected to be the same every year of the 2018 – 2023 regulatory period, as the Mudgee load is forecast to be constant during the period.ⁱ

Reliability Risk Cost

$$\text{Reliability risk cost} = VCR \text{ risk cost} + \text{litigation cost}^j$$

$$\therefore \text{Reliability risk cost} = \$84,370 + \$203$$

$$\therefore \mathbf{Reliability \text{ risk cost} = \$84,573 \text{ per annum}}$$

Financial Risk Cost

$$\text{Financial risk cost} = \text{civil penalty}^k + \text{investigation cost}^l$$

$$\therefore \mathbf{Financial \text{ risk cost} = \$219 \text{ per annum}}$$

Reputation Risk Cost

$$\text{Reputational risk cost} = \text{external consultations \& communications costs}^m$$

$$\therefore \mathbf{Reputational \text{ risk cost} = \$10 \text{ per annum}}$$

^e That is, the existing 30 minutes minus the allowable 14 minutes, using IPART's stipulated failure rate and 1hr restoration time.

^f 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.

^g TransGrid's Investment Risk Tool bases the Value of Customer Reliability (VCR) on figures published by AEMO in its Value of Customer Reliability Review - Final Report, September 2014. In this case we use the mixed residential/industrial figure of \$38,350/MWh.

^h IPART's Supplementary Draft Report (September 2016) defines Average Demand as the total energy supplied during the year (MWh) divided by the number of hours in the year. TransGrid historical data in 2015 shows an average demand of 2.4 MW at Molong.

ⁱ TransGrid 2016, *Transmission Annual Planning Report*, 30 June 2016.

^j This component is an assumed litigation risk cost.

^k As per NEL clause 2AA. Assuming the Need goes unaddressed for the duration of the five-year regulatory period.

^l This component is an assumed financial risk cost.

^m This component is an assumed reputational risk cost.

Total Risk Cost

total risk cost = Reliability risk cost + financial risk cost + reputational risk cost

∴ total risk cost = \$84,573 + \$219 + 10

∴ total risk cost = \$84,802 per annum

A risk-cost summary extract from the Investment Risk Tool appears in Attachment 1. A full risk cost breakdown report is available [on PDGS](#).

3. Related needs/opportunities

These Needs are related in that they are also addressing an excess of unserved minutes per IPART's draft reliability standard:ⁿ

- > Need 1696 – Molong Reinforcement
- > Need 1649 – Reliability of Supply to Broken Hill

4. Recommendation

It is recommended that network and non-network options be evaluated and a preferred option recommended by 1 July 2018 to meet the Mudgee reliability value (thereby reducing the number of unserved energy minutes) to meet the new Planning Reliability Standard.

ⁿ See footnote a.

Attachment 1 – Risk Costs Summary

Current Option Assessment - Risk Summary



Project Name: Mudgee Reinforcement

Option Name: 1697 - Base Case

Option Assessment Name: 1697 - Base Case

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)
94M line trip	1	Conductor (inc Joints)	Unplanned Outage - HV (94M line trip)	\$1,512.94	Break	\$1,512.94	0.01%	\$0.08	\$0.08		\$0.00			\$0.00
				\$1,512.94		\$1,512.94		\$0.08	\$0.08		\$0.00			\$0.00

Total VCR Risk: \$0.08

Total ENS Risk: \$0.00