

OPTIONS EVALUATION REPORT (OER)



Lismore 415V AC Dist. Replacement

OER 000000001517 revision 1.0

Ellipse project description:

TRIM file: [TRIM No]

Project reason: Capability - Asset Replacement for end of life condition

Project category: Prescribed - Replacement

Approvals

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Date submitted for approval	25 October 2016	

1. Need/opportunity

Lismore Substation is a customer connection point supplying Essential Energy's 66kV network in the NSW Far North Coast Region. The 415V AC system at Lismore has been identified as among those with a high proportion of defects and will be over 30 years old by 2023.

2. Related needs/opportunities

Nil.

3. Options

Base Case

The Base case for this Need is to continue with TransGrid's current management of defects through corrective maintenance and changes to work practices. This approach does not address the degrading condition of the 415V AC system or the structural deficiencies in the infrastructure. The risk cost of \$734k per annum will increase due to the probability of failure increasing as the assets move further past their expected life.

The key driver for this risk cost is the poor condition of the aging 415V system. This increases the likelihood of a hazardous event occurring.

While continuing the corrective maintenance will reduce the probability of failure in order to reduce the risk cost, a holistic approach to bring the system up to current requirements as per AS3000 will likely achieve better safety outcomes.

Option A — 415V AC Distribution Replacement <OFR 1517A, OFS 1517A>

Option A is to carry out installation of new 7 AC distribution boxes, and the replacement of 50% of related cables; replacement of the auxiliary building electrical panel; and replacement of switchyard lighting connection points. All other 415V AC distribution equipment is in good condition. As such, this option is designed to bring the system to current AS3000 requirements.

The expected capital costs for the option total \$811k (in un-escalated 2016/17 dollars). This costing is estimated using TransGrid's "Success" estimating system.

The residual risk associated with this option upon completion of the project amounts to \$29k per annum (base case risk cost = \$734k). The risk reduction is realised through the reduction in the probability of failure for all assets.

4. Evaluation

Evaluation of the proposed options has been completed using economic considerations. The results of this evaluation are outlined below.

Commercial Evaluation

The commercial evaluation of the technically feasible options is set out in the table below.

Option	Description	Capex (16/17 \$m)	Opex (\$m)	Post project risk cost (\$m pa)	Economic NPV (\$m) @10%	Financial NPV (\$m) @10%	Rank
Base case	Run to fail	N/A	-	0.734	N/A	N/A	-
A	415V AC Distribution Replacement	0.811	-	0.029	3.48	0.49	1

The commercial evaluation is based on:

- > Economic life of the assets is assumed 40 years; hence this assessment period has been applied.
- > Capital cost is not escalated and it does not include capitalised interest.

The sensitivity of the option with changing discount rate is shown in table below.

Option	Description	Economic NPV Discount Rate of 13% (16/17 \$m)	Economic NPV Discount Rate of 6.75% (16/17 \$m)
A	415V AC Distribution Replacement	2.36	5.52

SFAIRP/ALARP Evaluation

Options to reduce the network safety risk as per the risk treatment hierarchy have been considered in other lifecycle stages of the asset, and it has been determined that no reasonably practicable options exist to reduce the risk further than those capital investment options listed in **Error! Reference source not found.**

Evaluation of the proposed options has been completed against the SFAIRP (So Far As Is Reasonably Practicable)/ALARP (As Low as Reasonably Practical) obligation, as required by the Electricity Supply (Safety and Network Management) Regulation 2014 and the Work Health and Safety Act 2011. The Key Hazardous Events and the disproportionality multipliers considered in the evaluation are as follows:

- Catastrophic failure of asset/uncontrolled discharge or contact with electricity/ unauthorised access to site - 3 times the safety risk and 10% of the reliability risk (applicable to safety)

The results of this evaluation are summarised in the tables below.

Options	Description	CAPEX	Expected Life	Annualised CAPEX
Base	Do nothing	N/A	N/A	N/A
A	Complete In-Situ Replacement	\$0.811m	40 years	\$20k

Table 1: Feasible Options

Options	Annual Residual Risk			Annual Risk Savings		
	Safety Risk	Reliability Risk	Bushfire Risk	Safety Risk	Reliability Risk	Bushfire Risk
Base	\$0	\$553k	\$0	N/A	N/A	N/A
A	\$0	\$22k	\$0	\$0	\$531k	\$0

Table 2: Annual Risk Calculations

Option	Network Safety Risk Reduction ¹	Annualised CAPEX	Reasonably practicable ² ?
A	\$53k	\$20k	Yes

Table 3: Reasonably Practicable Test

Option A is reasonably practicable.

Preferred Option

The outcome of the SFAIRP/ALARP evaluation is that Option A is the preferred option as it is reasonably practicable and provides the greatest network safety risk reduction, and is therefore required to satisfy the organisation’s SFAIRP/ALARP obligations.

The preferred option to address the condition of the secondary system is Option A – 415V AC Distribution Replacement.

This option has been selected due to its technical viability and reduction in reliability risk. This option provides significant technical benefits and provides a positive NPV.

Capital and operating expenditure

The capital expenditure required to deploy the preferred option is justified in the high reduction in reliability risk and beneficial safety outcomes it provides.

Regulatory Investment Test

An RIT-T is not required as this is an asset replacement project with no augmentation component.

5. Recommendation

It is recommended that Option A – 415V AC Distribution Replacement be scoped in detail.

¹ The Network Safety Risk Reduction is calculated as 6 x Bushfire Risk Reduction + 3 x Safety Risk Reduction + 0.1 x Reliability Risk Reduction

² Reasonably practicable is defined as whether the annualised CAPEX is less than the Network Safety Risk Reduction