

NEED/OPPORTUNITY STATEMENT (NOS)



CCTV System Replacement

NOS-000000001398 revision 1.0

Ellipse project no.: P0008095

TRIM file: [TRIM No]

Project reason: Capability – Improved Asset management

Project category: Prescribed – Security/Compliance

Approvals

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Approved	Lance Wee	Manager / Asset Strategy
Date submitted for approval	22 November 2016	

Change history

Revision	Date	Amendment
0	3 May 2016	Initial issue
1	28 October 2016	Update to 2016/17 dollars
2	22 November 2016	Update to format

1. Background

TransGrid is subject to security risks emanating from a number of threat sources, all with variable likelihood and consequences. Incidents may range from unauthorised access, vandalism and criminal acts through to sabotage and terrorist acts. It is an inherent obligation of owners and operators of critical infrastructure to effectively manage assets under their control.

The Work Health and Safety (WHS) Regulation 2011 considers TransGrid as a PCBU (person conducting a business or undertaking) and imposes multiple obligations on it in managing risk to the health and safety¹. This regulation is based on The Work Health and Safety (WHS) Act 2011 and is considered legally binding.

Under the WHS Regulation, TransGrid as a PCBU has an obligation to ensure that the risk to the health and safety of its workers and members of the public is managed So Far As Is Reasonably Practicable (SFAIRP). This implies that TransGrid must:

- > Identify all reasonably foreseeable risks to the health and safety of its workers and members of the public.
- > Identify all control measures which eliminate or minimise the risks.
- > Then decide which of the controls are 'reasonably practicable' to be implemented.
- > This 'reasonableness of acting' infers that cost solely by itself is unlikely to be a sufficient justification in the court of law for not implementing or lowering a control measure unless the cost is grossly disproportionate to the risk.

TransGrid's Network Security Standard (TRIM No: D2004/2634, Rev 3) outlines the minimum standard for security at TransGrid network sites and Regional Centres/Depots². The Network Security Standard is based heavily on "National Guidelines for Prevention of Unauthorised Access to Electricity Infrastructure" (ENA DOC 015-2006). While adopting the ENA guideline, the Network Security Standard remains mindful that the imposed health and safety obligations by the WHS Regulation are met.

2. Need/opportunity

CCTV:

A gap analysis of TransGrid's existing substation sites for CCTV cameras against the Network Security Standard has revealed that:



¹ *Work Health and Safety Regulation 2011, part 3.1*. New South Wales. Available at: <http://www.legislation.nsw.gov.au/maintop/view/inforce/subordleg+674+2011+cd+0+N>. (Accessed 20 January 16).

² TransGrid Network Security Standard, Rev 3, Section 5.6.

- > An unauthorised entry to a substation site can potentially lead to personal injury and equipment outage.
- > The total risk cost from this asset category that the business is carrying is \$0.32m per annum (see Attachment A).

DVR:

- > The purpose of DVR is to work as an interface to communicate with and control cameras, store footage and allow remote logon to view live/archived video.
- > A gap analysis of TransGrid existing substations sites for CCTV DVR has revealed that:

> [REDACTED]

[REDACTED]

[REDACTED]

- [REDACTED]. As mentioned for CCTV cameras, an unauthorised entry to substation site can lead to personal injury and equipment outage. The expected risk cost the business carrying is \$1.2m per annum [REDACTED] the DVRs.

Quad Lens Camera:

[REDACTED]

[REDACTED]

- > These additional cameras will provide rapid and accurate response to an asset incident. There is an opportunity to reduce callout cost by \$26k per year.
- > The total risk cost from this asset category that the business is carrying is \$0.2m per annum (see Attachment 1).

Thermal Imaging Camera:

- > Thermal Imaging cameras can be used to perform regular and on-demand thermography inspection of the energised assets, hot joints and can assist in confirming outages due to transient causes such as direct lightning strikes, flying debris. This will enable Asset Monitoring Centre and System Operators in verifying SCADA/condition monitoring alarms/incidents, to have a conditional awareness of the energised assets and to perform remote visual inspections as required. It has the potential to be used to perform thermography inspection remotely and to track slow deterioration of network assets.

- > These additional thermal imaging cameras will provide on demand remote thermal inspection of a substation site. There is an opportunity to reduce thermal inspection cost by \$66k per year.
- > The risk cost is \$0.04m per annum if thermal imaging camera is not installed at [REDACTED] sites.

Uninterruptible Power Supply (UPS):

- > [REDACTED] It is envisaged that investing in additional [REDACTED] UPS at the [REDACTED] (generally 1 per site) will offer following benefits:
- > In the event of failure of auxiliary power supplies, UPS is able to provide backup supply for CCTV system in verifying intrusion, fire and condition monitoring alarms/incidents, and enable accurate and rapid response to a verified incident. There is an opportunity to save post incident investigation due to service interruption by \$365k per year.
- > The risk cost is \$0.03m per annum if nothing is done in regards to replacing [REDACTED] UPSs at [REDACTED] sites.

To sum up, the following areas of opportunity have been identified:

- > To replace and upgrade all analogue cameras at [REDACTED] sites with CCTV digital or IP cameras with new posts and cables.
- > To install additional [REDACTED] quad lens cameras for [REDACTED] sites (1 per site).
- > To replace [REDACTED] CCTV DVR with latest [REDACTED] with both analogue and IP cameras.
- > To install thermal imaging cameras at [REDACTED] substation sites.
- > To replace [REDACTED] UPSs at [REDACTED] substation sites.

3. Related needs/opportunities

NIL.

4. Recommendation

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

Attachment 1 – Risk costs summary

Summary of results is attached below. Refer to supporting document in PDGS for full risk assessment.

CCTV camera:

Current Option Assessment - Risk Summary

Project Name: CCTV Systems - Replace CCTV Camera

Option Name: 1398b - Base Case

Option Assessment Name: 1398b - 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)
CCTV Camera	73	CCTV	Unauthorised Entry (Security System)	\$0.03	Failure	\$2.47	13.00%	\$0.32	\$0.07		\$0.19	\$0.06		\$0.00
				\$0.03		\$2.47		\$0.32	\$0.07		\$0.19	\$0.06		\$0.00

Total VCR Risk: \$0.07

Total ENS Risk: \$0.00

DVR:

Current Option Assessment - Risk Summary

Project Name: CCTV Systems - DVR Replacement

Option Name: 1398a - Base Case

Option Assessment Name: 1398a - 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)
CCTV DVR	73	CCTV	Unauthorised Entry (CCTV DVR)	\$0.03	Failure	\$2.47	49.00%	\$1.21	\$0.27		\$0.72	\$0.22		\$0.00
				\$0.03		\$2.47		\$1.21	\$0.27		\$0.72	\$0.22		\$0.00

Total VCR Risk: \$0.27

Total ENS Risk: \$0.00

Quad lens camera:

Current Option Assessment - Risk Summary

Project Name: CCTV Systems - Install Quad Lens Camera

Option Name: 1398c - Base Case

Option Assessment Name: 1398c - 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)
Quad Lens Camera	73	CCTV	Unauthorised Entry (Quad Lens Camera)	\$0.00	Failure	\$0.21	100.00%	\$0.21			\$0.21			
				\$0.00		\$0.21		\$0.21			\$0.21			

Total VCR Risk:

Total ENS Risk:

Thermal Imaging Camera:

Current Option Assessment - Risk Summary



Project Name: CCTV System - Install Thermo vision camera

Option Name: 1398e - Base Case

Option Assessment Name: 1398e - 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)
Thermo Vision camera	73	CCTV	Unauthorised Entry (Thermo Vision camera)	\$0.00	Failure	\$0.05	100.00%	\$0.05	\$0.05		\$0.00			\$0.00
				\$0.00		\$0.05		\$0.05	\$0.05		\$0.00			\$0.00

Total VCR Risk: \$0.05 Total ENS Risk: \$0.00

UPS:

Current Option Assessment - Risk Summary



Project Name: CCTV System - UPS Replacement

Option Name: 1398d - Base Case

Option Assessment Name: 1398d - 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)
UPS	73	Security Panel	Unauthorised Entry (UPS)	\$0.06	Failure	\$4.26	0.70%	\$0.03	\$0.02		\$0.01	\$0.00		\$0.00
				\$0.06		\$4.26		\$0.03	\$0.02		\$0.01	\$0.00		\$0.00

Total VCR Risk: \$0.02 Total ENS Risk: \$0.00

The following assumptions are considered to identify the risk cost using Risk Tool Analysis:

> Probability of Failure (POF):

- Probability that CCTV camera may fail (to perform their intended tasks) per year is [REDACTED] based on TransGrid defect maintenance data from July 2015 to September 2015.
- Probability of failure of DVR per year is [REDACTED] based on TransGrid defect maintenance data from July 2015 to Sept 2015.
- Since the quad lens cameras are [REDACTED], the probability that they fail to perform their intended functionality is [REDACTED] used in base case.
- Since the thermal imaging cameras are **not currently installed**, the probability that they fail to perform their intended functionality is [REDACTED] used in base case.
- Probability that UPS may fail (to perform their intended tasks) per year is [REDACTED] considering two factors. One is TransGrid Energy Not Supplied (ENS) event when TransGrid lost the whole substation load and due to faulty UPS, the CCTV system was unavailable. So System operator was unable to monitor the site remotely and to get a situational awareness. This implies probability of this event is [REDACTED] which represents 1 incident in [REDACTED] years. The second factor is the probability for any electronic device aged over 10 years may fail is [REDACTED]. Considering both factors, the pre investment POF for UPS is [REDACTED].

> Consequences:

- Personal Injury: For both CCTV camera, DVR and UPS, the likelihood of consequence (LoC) for personal injury is [REDACTED] based on rate of unauthorised entry in TransGrid substation sites.
- Repair cost to TransGrid substation asset:

- It is considered that damage to TransGrid asset caused by intruder would cost \$20K based on TransGrid unauthorised entry rate of [REDACTED] per annum for CCTV, DVR and UPS.
- Quad lens camera: It is assumed that quad lens camera can pick the defects before scheduled substation asset inspection and could reduce the risk. Average repair cost of \$60k is considered for HV equipment failure due to leakage or mechanical damage for each site. Considering Transformer failure rate and bushing failure rate, LoC of Transformer bushing's defect is [REDACTED] based on criticality framework.

> Service Interruption:

- The LoC for service interruption (electricity) is assumed to be [REDACTED] for CCTV camera, DVR, UPS and thermal imaging camera. This is based on the fact that both a high voltage electrocution/arc flash and an unauthorised operation of equipment by an intruder will cause a service interruption.
- For thermal imaging camera, the average risk cost for unplanned busbar outage based on criticality frame work, number of hour required to bring a bus back in service and the busbar forced outage rate of [REDACTED] based on Theos are considered for calculating consequence.