

# NEED/OPPORTUNITY STATEMENT (NOS)



Molong Secondary Systems Renewal

NOS 000000001267 revision 3.0

**Ellipse project no.:** P0005403

**TRIM file:** [TRIM No]

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

**Project category:** Prescribed - Replacement

## Approvals

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<b>Endorsed</b>	Mark Jones	Secondary Systems and Communications Asset Manager
<b>Approved</b>	Lance Wee	M/Asset Strategy
<b>Date submitted for approval</b>	15 November 2016	

## Change history

Revision	Date	Amendment
0	28 April 2016	Initial issue
1	11 October 2016	Update to 2016/17 dollars
2	15 November 2016	Update to format

## 1. Background

Molong 132/66kV Substation is located in Molong, northwest of Orange and was commissioned in 2001. It consists of 3x 132kV feeders, 1x transformer and 1x 66kV feeder supplying Essential Energy. Essential Energy also operate a 66/11kV transformer off the 66kV busbar, an 11kV busbar and frequency injection equipment from this site. The secondary systems assets have install dates between 2001 and 2015.

Molong Substation is a necessary customer connection point and is connected to Wellington, Manildra, and Orange North. The site will remain a connection point to Essential Energy into the foreseeable future as outlined in the load forecasts of the 2015 Transmission Annual Planning Report.

## 2. Need/opportunity

In accordance with TransGrid's Renewal and Maintenance Strategies for Automation<sup>1</sup> and Metering Systems<sup>2</sup>, Table 1 below shows the assets at Molong Substation that have been identified for replacement by 2023.

**Table 1 - Identified Asset Replacements at Molong Substation from 2014-2023**

Need Description	Quantity of Assets to be addressed	% of services at Site	Need Driver
Need ID 1382 – Protection - GE FAC Condition	1	50% of all transformer protection relays on site	<ul style="list-style-type: none"> <li>&gt; Regular firmware updates required, increasing lifecycle costs</li> <li>&gt; Numerous component failures leading to spurious trips and Circuit Breaker Failure operations</li> </ul>
Need ID 610 – Replacement of EDMI MKIII Energy Meters	2	100% of all market meters on site	<ul style="list-style-type: none"> <li>&gt; Microprocessor Energy Meters failing as they approach 15 years of life</li> <li>&gt; Component obsolescence resulting in a lack of spares and no manufacturer support</li> </ul>
Need ID 629 – Replacement of Remote Terminal Units (RTUs)	1	MITS protocol Converter	<ul style="list-style-type: none"> <li>&gt; Component obsolescence resulting in a lack of spares and no manufacturer support</li> </ul>

Additionally, condition assessments for all these individual asset types have been completed<sup>3</sup>.

The risk cost associated with all secondary systems at Molong Substation is \$3.10m per annum. The most significant elements of concern are the cost consequence of an LV AC distribution system failure due to cable fire. There is a mixed customer load at the site with a forecast 5MW as the average of the summer and winter loads in the Transmission Annual Planning Report and an estimated 16 hours to recover the site and load after a hazardous event. The risk costs are based on 2015/16 probabilities of failure taken as a trend of existing defect rates of applicable asset types derived from the condition assessments. These probabilities are forecast to continue increasing over the coming years, with the consequence of failure also likely to escalate due to TransGrid's means of mitigating and repairing these failures being almost exhausted.

<sup>1</sup> Refer SSA Strategy - Renewal and Maintenance - Automation Systems

<sup>2</sup> Refer SSA Strategy - Renewal and Maintenance - Metering Systems

<sup>3</sup> Refer NACA-SSAP - Protection, NACA-SSAC - Control, NACA-SSAM - Metering

There is additional risk identified from market meters (which considers repair and potential litigation costs).

In accordance with TransGrid's Renewal and Maintenance Strategy for Secondary Systems Site Installations<sup>4</sup>, an opportunity exists to address these risks by performing a full secondary system replacement at Molong (as listed in the risk summary in Attachment 1). This opportunity is due to the high concentration of the secondary system assets required to be addressed. It is expected that this would provide additional benefits for the organisation including:

- > Moving from a centralised Alarm and Control platform to a distributed control architecture that improves operational control and reliability while reducing the consequence of equipment failure
- > Optimising the current investment in TransGrid's High Capacity Telecommunications to the site by upgrading all ancillary systems to TransGrid's latest design standard which provides the greatest amount of real time operational and condition data to better support the planning, operation and maintenance of the Network

### 3. Related needs/opportunities

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The following related needs contain works for Molong Substation that could be fulfilled by completing a Secondary Systems Replacement:

- > Need ID 1382 – Protection - GE FAC Condition
- > Need ID 610 – Replacement of EDMI MK3 Energy Meters
- > Need ID 629 – Replacement of Remote Terminal Units (RTUs)

### 4. Recommendation

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

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<sup>4</sup> Refer SSA Strategy - Renewal and Maintenance - Secondary Systems Site Installations

# Attachment 1 - Risk costs summary

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

## Current Option Assessment - Risk Summary

Project Name: Molong Secondary Systems Renewal

Option Name: 1267 - Base Case

Option Assessment Name: 1267 - 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)
Battery and Charger System	2	Battery	Uncontrolled Electrical Contact / Discharge (Battery and Charger System)	\$0.06	Failure	\$0.13	9.20%	\$0.01	\$0.01	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Battery and Charger System	2	Battery	Unplanned Outage - HV (Battery and Charger System)	\$0.05	Failure	\$0.10	9.20%	\$0.01	\$0.01	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Battery and Charger System	2	Charger	Uncontrolled Electrical Contact / Discharge (Battery and Charger System)	\$0.06	Failure	\$0.13	9.20%	\$0.01	\$0.01	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Battery and Charger System	2	Charger	Unplanned Outage - HV (Battery and Charger System)	\$0.05	Failure	\$0.10	9.20%	\$0.01	\$0.01	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Controls	1	Bay Controller	Unplanned Outage - HV (Controls)	\$0.10	Failure	\$0.10	6.50%	\$0.01	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Controls	1	Control Cabling	Unplanned Outage - HV (Controls)	\$0.10	Failure	\$0.10	6.50%	\$0.01	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Low Voltage AC Supply	1	AC Low Voltage Board/Panel/Box	Uncontrolled Electrical Contact / Discharge (Low Voltage AC Supply)	\$2.76	Failure	\$2.76	31.00%	\$0.86	\$0.73	\$0.08	\$0.08	\$0.01	\$0.00	\$0.03
Low Voltage AC Supply	1	AC Low Voltage Board/Panel/Box	Unplanned Outage - HV (Low Voltage AC Supply)	\$5.80	Failure	\$5.80	31.00%	\$1.80	\$1.68	\$0.08	\$0.08	\$0.00	\$0.00	\$0.03
Low Voltage AC Supply	1	AC Low Voltage Cable	Uncontrolled Electrical Contact / Discharge (Low Voltage AC Supply)	\$2.76	Failure	\$2.76	3.20%	\$0.09	\$0.08	\$0.01	\$0.01	\$0.00	\$0.00	\$0.00
Low Voltage AC Supply	1	AC Low Voltage Cable	Unplanned Outage - HV (Low Voltage AC Supply)	\$5.80	Failure	\$5.80	3.20%	\$0.19	\$0.17	\$0.01	\$0.01	\$0.00	\$0.00	\$0.00
Low Voltage DC Supply	2	DC Low Voltage Board/Panel/Box	Uncontrolled Electrical Contact / Discharge (Low Voltage DC Supply)	\$0.06	Failure	\$0.12	2.00%	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Low Voltage DC Supply	2	DC Low Voltage Board/Panel/Box	Unplanned Outage - HV (Low Voltage DC Supply)	\$0.05	Failure	\$0.10	2.00%	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Low Voltage DC Supply	2	DC Low Voltage Cable	Uncontrolled Electrical Contact / Discharge (Low Voltage DC Supply)	\$0.06	Failure	\$0.12	2.00%	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00

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)
Low Voltage DC Supply	2	DC Low Voltage Cable	Unplanned Outage - HV (Low Voltage DC Supply)	\$0.05	Failure	\$0.10	2.00%	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Metering	2	Meter	Failed Compliance Obligations (Metering)	\$0.11	Failure	\$0.22	4.40%	\$0.01			\$0.01			
Protection - 132kV	7	Protection	Unplanned Outage - HV (Protection - 132kV)	\$0.15	Failure	\$1.08	5.49%	\$0.06	\$0.02	\$0.02	\$0.04	\$0.04	\$0.00	\$0.00
Protection - 132kV	7	Protection Relay	Explosive Failure of Asset (Protection - 132kV)	\$0.13	Failure	\$0.88	5.49%	\$0.05	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01
				\$18.16		\$20.41		\$3.11	\$2.73	\$0.27	\$0.02	\$0.00	\$0.00	\$0.09

Total VCR Risk: \$2.13      Total ENS Risk: \$0.56