

NEED/OPPORTUNITY STATEMENT (NOS)



Protection - VF Intertrip Condition

NOS- 000000001371 revision 3.0

Ellipse project no.: P0008010

TRIM file: [TRIM No]

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

Project category: Prescribed - Asset Renewal Strategies

Approvals

Author	Hazem Khamis	Secondary Systems Strategist
Endorsed	Mark Jones	Secondary Systems and Communications Asset Manager
Approved	Lance Wee	M/Asset Strategy
Date submitted for approval	17 November 2016	

Change history

Revision	Date	Amendment
0	21 May 2016	Initial issue
1	17 October 2016	Update to 2016/17 dollars
2	17 November 2016	Update to format

1. Background

VF Intertrip systems are used throughout the NSW network to aid and accelerate the clearance of faults on transmission lines where high speed clearance is required to maintain the stability of the network. There are currently 230 VF Intertrip systems utilising 460 assets installed within TransGrid's network with install dates between 1997 and 2016.

The assets investigated under this need are aged VF Intertrip systems that have reached the end of their technical life resulting in reduced capabilities to meet backup supply performance requirements.

The use of VF Intertrip systems to provide accelerated clearance of faults is a continuing requirement of the Australian Energy Regulator (AER) as outlined in the National Electricity Rules (NER). VF Intertrip systems to meet critical clearance times are required into the foreseeable future.

2. Need/opportunity

The following VF Intertrip systems are covered by this need:

Voltage Level	Systems	Number of Systems
330kV	VF Intertrip	190
132kV	VF Intertrip	40

The risk cost associated with the 230 systems is \$17.35m per annum. The most significant element of concern is the reliability consequence associated with the destabilisation of the network due to the malfunction of VF Intertrips resulting in a failure to clear a fault within the critical clearing time. VF Intertrips protect the network at 330kV and 132kV voltage levels and critical clearance times are a requirement of the NER. It is estimated that 8 hours would be required to recover any loss of load occurring due to the slow clearance of a fault. The risk costs are based on 2015/16 probabilities of failure derived from Ellipse historical failure data. These probabilities are forecast to continue increasing over the coming years as the assets continue past their expected life.

3. Related needs/opportunities

The following Needs may benefit from coordination with these works:

- > Need ID 1356 - Protection - Reyrolle OHx Condition
- > Need ID 1376 - Protection - Alstom Pxxx Condition
- > Need ID 1379 - Protection GE Multilin Condition
- > Need ID 1380 - Protection - Schweitzer SELxxx Condition
- > Need ID 1381 - Protection - Siemens 7xx Condition

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.

Current Option Assessment - Risk Summary

Project Name: Protection - VF Intertrip Condition

Option Name: 1371 - Base Case

Option Assessment Name: 1371 - 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)
132kV - VF Intertrip	78	Protection	Unplanned Outage - HV (132kV - VF Intertrip)	\$0.56	Failure	\$43.83	1.00%	\$0.44	\$0.37		\$0.07			\$0.00
132kV - VF Intertrip	78	Protection Relay	Explosive Failure of Asset (132kV - VF Intertrip)	\$0.60	Failure	\$47.17	1.00%	\$0.47	\$0.37		\$0.10	\$0.00	\$0.00	\$0.00
330kV - VF Intertrip	378	Protection	Unplanned Outage - HV (330kV - VF Intertrip)	\$0.09	Failure	\$33.23	1.00%	\$0.33	\$0.00		\$0.33			\$0.00
330kV - VF Intertrip	378	Protection Relay	Explosive Failure of Asset (330kV - VF Intertrip)	\$4.26	Failure	\$1,610.43	1.00%	\$16.10	\$15.48		\$0.60	\$0.02	\$0.01	\$0.00
								\$17.35	\$16.22		\$1.10	\$0.02	\$0.01	\$0.00

Total VCR Risk: \$16.22 Total ENS Risk: \$0.00