

NEED/OPPORTUNITY STATEMENT (NOS)



Protection - Reyrolle OHx Condition

NOS- 000000001356 revision 2.0

Ellipse project no.: P0007980

TRIM file: [TRIM No]

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

Project category: Prescribed - Asset Renewal Strategies

Approvals

Author	Anuraag Malla	Secondary System Analyst
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Approved	Lance Wee	Manager Asset Strategy
Date submitted for approval	17 October 2016	

Change history

Revision	Date	Amendment
0	27 April 2016	Initial issue
1	11 October 2016	Update to 2016/17 dollars
2	17 November 2016	Update to format

1. Background

The Reyrolle OH series relays (consisting of OH1-311, OH-305 and OH-305+DS4) are primarily used in line/feeder protection schemes across all voltage levels. The majority of this asset population is young and have not demonstrated any significant defects to-date. With an exception of one year (2009/10), the asset fault rate in the last 9 years has been generally constant without any alarming defect increment. The only minor issues noted required the relay firmware to be upgraded.

There are currently 206 in-service relays with 85 of them being ≥ 8 years old. These 85 relays will either reach or age beyond their nominal life of 15 years by 2023. During the regulatory period 2019-23, TransGrid needs to target the replacement of these 85 relays.

2. Need/opportunity

This proposed replacement is driven by the need to maintain network reliability and provide reliable and fast protection of transmission lines. The following relay models are covered by this need:

Relay Model	Installed Quantity ≥ 8 years old in 2016	Installed Quantity not to be replaced under Secondary Systems Renewal or on negotiated services
OH1-311	61	37
OH-305	22	14
OH-305+DS4	2	0

These relays are used in line/feeder protection schemes where the risk due to bushfire is the predominant concern. There are also few of these ageing relays protecting lines at 330kV level and therefore carries a risk of system black event in case of relay malfunction.

The associated risk cost is \$971 thousand per annum. The most significant element of concern is the reliability consequence associated with a protection system failing to operate during a genuine fault due to the malfunction of the protection relays identified for replacement above. This hazard can result in a number of different outcomes including load shedding, explosive failure of associated primary assets, offloading generation or in the most extreme case, black start of the entire network. The risk costs are based on 2015/16 probabilities of failure taken as a trend of existing defect rates of the assessed assets derived from the condition assessment¹.

3. Related needs/opportunities

N/A

¹ Refer NACA-SSAP - Protection

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 - Reyrolle Ohx Condition

Option Name: 1356 - Base Case

Option Assessment Name: 1356 - 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)
Protection <= 150 MW	32	Protection	Unplanned Outage - HV (Protection <= 150 MW)	\$0.24	Failure	\$7.83	2.20%	\$0.17	\$0.10		\$0.07			\$0.00
Protection <= 150 MW	32	Protection Relay	Explosive Failure of Asset (Protection <= 150 MW)	\$0.21	Failure	\$6.60	2.20%	\$0.15	\$0.10		\$0.03	\$0.00	\$0.02	\$0.00
Protection <=220 kV, >150MW	11	Protection	Unplanned Outage - HV (Protection <=220 kV, >150MW)	\$1.21	Failure	\$13.26	2.20%	\$0.29	\$0.27		\$0.03			\$0.00
Protection <=220 kV, >150MW	11	Protection Relay	Explosive Failure of Asset (Protection <=220 kV, >150MW)	\$1.17	Failure	\$12.84	2.20%	\$0.28	\$0.27		\$0.01	\$0.00	\$0.01	\$0.00
Protection >= 330 kV	0	Protection Relay	Explosive Failure of Asset (Protection >= 330 kV)	\$4.22	Failure	\$0.00	2.20%	\$0.00	\$0.00		\$0.00	\$0.00	\$0.00	\$0.00
				\$7.05		\$40.52		\$0.89	\$0.73		\$0.14	\$0.00	\$0.03	\$0.00
Total VCR Risk:				\$0.73	Total ENS Risk:				\$0.00					