

# NEED/OPPORTUNITY STATEMENT (NOS)



Wellington No.1 Reactor Renewal

NOS- 000000001282 revision 2.0

**Ellipse project no.:** P0005463

**TRIM file:** [TRIM No]

**Project reason:** Capability - Improved Asset Management

**Project category:** Prescribed - Asset Renewal Strategies

## Approvals

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<b>Endorsed</b>	Tony Gray	Substations Asset Manager
<b>Approved</b>	Lance Wee	Manager / Asset Strategy
<b>Date submitted for approval</b>	23 November 2016	

## Change history

Revision	Date	Amendment
0	7 April 2016	Initial issue
1	14 November 2016	Updated risk cost and risk summary included in Attachment.
2	23 November 2016	Update to format

## 1. Background

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Wellington 330kV substation contains two 330kV 50MVAR shunt reactors. The No.1 Reactor is connected to the 79 Wollar transmission line and the No.2 reactor is connected to 72 Mt Piper line.

The No.1 reactor was installed in 1983 and will therefore be 40 years old by the end of the next regulatory period, although the assessed age is greater than this. A condition assessment has been conducted on the reactor and has confirmed that it is exhibiting signs that it is approaching the end of its useful life.

## 2. Need/opportunity

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The key indicators that the reactor is approaching the end of its life are:

- > High furan levels indicating advanced paper insulation degradation due to age (at danger level according to the condition monitoring manual (CMM))
- > The moisture in paper is high (at the caution level in CMM)
- > Decreased dielectric breakdown strength of the oil (at caution level)
- > The actual age of the reactor is beyond the current nominal technical life of 35 years defined in the substations renewal and maintenance strategy
- > Minor oil leaks and staining associated with valves, radiators, buchholz relay bleed valve
- > Poor paint condition (although no evidence of corrosion)

The white phase bushing also leaking from the DDF point and should be addressed. The reactor bund consists of a concrete floor and brick walls. The brick walls do not comply with current design standards and therefore present an additional risk of oil escaping from the bund during a significant failure event.

The risks associated with reactor failure continue to increase with age and further degradation of asset condition. TransGrid's strategy for oil filled shunt reactors is to address the risk of failure (by extending life or replacement of the asset) before the risk becomes unacceptably high.

The main risks associated with the failure of the reactor are:

- > Operational – failure of the reactor may lead to system constraints
- > Safety – the reactor may fail explosively which can result in fire and significant risk of injury to nearby staff
- > Environmental – oil may escape from the reactor, although this risk is reduced by the installation of an oil containment system

The risk cost associated with this reactor is \$0.4m per annum and the needs date is 2023.

## 3. Related needs/opportunities

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Separate transformer and reactor renewal programs will be established to address other similar asset needs. These needs, and their associated delivery strategies, should be considered when determining how to address the Wellington No.1 reactor need.

## 4. Recommendation

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

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: Wellington No1 Reactor

Option Name: 1282 - Base Case

Option Assessment Name: 1282 - 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)
Reactor (Air Core)	1	Reactor (Air Core)	Unplanned Outage - HV (Reactor (Air Core))	\$4.48	Failure	\$4.48	9.73%	\$0.44	\$0.44	\$0.01	\$0.41	\$0.01	\$0.00	\$0.00
								\$0.44	\$0.44	\$0.01	\$0.41	\$0.01	\$0.00	\$0.00

Total VCR Risk: \$0.00      Total ENS Risk: \$0.01