Investment Evaluation Summary (IES)

Project Details:

Project Name:	Refurbishment of New Norfolk Zone
Project ID:	00663
Thread:	Zone Substations
CAPEX/OPEX:	CAPEX
Service Classification:	Standard Control
Scope Type:	A
Work Category Code:	RERZT
Work Category Description:	Replace Rural Zones Transformers
Preferred Option Description:	Replacement of transformers with two 5 MVA units
Preferred Option Estimate (Nominal Dollars):	$1,743,239

	17/18	**18/19**
Unit ($)	N/A	N/A
Volume	1	1
Estimate ($)		
Total ($)	$614,675	$913,597

Governance:

Project Initiator:	Michael Healy	**Date:**	26/03/2015
Thread Approved:	David Ellis	**Date:**	02/11/2015
Project Approver:	David Ellis	**Date:**	02/11/2015

Document Details:

Version Number:	1

Related Documents:

Description	**URL**
IES REUZT Refurbishment of New Norfolk Zone	http://projectzone.tnad.tasnetworks.com.au/business-projects/nis-program/DD17SAM/Deliverables/Zone%20Substations/DRAFT%20IES%20REUZT%20Refurbishment%20of%20New%20Norfolk%20Zone%20substation.docx

New Norfolk CAR	http://assetzone.tnad.tasnetworks.com.au/distribution/zone-substations/new-norfolk-zone/Reports/New Norfolk Zone Substation CAR.docx?Web=1
New Norfolk transformer replacement NPV	http://projectzone.tnad.tasnetworks.com.au/business-projects/nis-program/DD17SAM/Deliverables/Zone%20Substations/New%20Norfolk%20transformer%20replacement%20NPV.xlsm

Section 1 (Gated Investment Step 1)

1. Background

New Norfolk Zone is a 22/11kV rural zone substation located off Dixon Street New Norfolk on the southern side of the CBD and is in close proximity to New Norfolk Terminal Substation. It is supplied from New Norfolk Terminal Substation at 22kV and steps down the voltage to 11kV to supply the southern side of the River Derwent including New Norfolk, Lachlan, Uxbridge, Glenfern, and Molesworth. The substation supplies 2435 customers, both residential and commercial. It was commissioned in 1962.

Photo 1 – New Norfolk Zone

1.1 Investment Need

Due to the deteriorating condition of the substation the refurbishment of the substation in the 2017/2018 financial year is required is required to ensure adequate network reliability and security is maintained for the high voltage feeders supplied from the zone substation.

A condition assessment of the transformers was undertaken in May 2015. It determined that the transformers were in poor condition and at end of life. Oil insulated power transformers typically have a service live of 45 -55 years.

The items of note identified form the condition assessment were:

- Numerous oil leaks on transformers 1-3 and no oil containment;
- Oil temperature gauges without contacts to alarm or trip the transformers;
- Surge arresters with earth lead disconnects, and spark gap surge diverters that do not align with TasNetworks' current standard;
- Pressure relief devices that upon operation could cause further damage to transformers including oil fires and with no walls or barriers between the transformers could damage other units;
- Isolation links that only permit single phase operations and may result in unbalanced current flow on the network;
- Free breathing oil preservation systems which are susceptible to moisture ingress; and
- Air break switches and cast iron potheads that have known failure modes placing persons at risk from flying/dropping porcelain and cast iron.
- The oil in all four units was in very poor condition, with signs of significant insulation degradation evident.

The deteriorating condition of the assets combined with the criticality of the installation has identified a need to undertake planned and controlled asset replacement in the 2017/18 financial year.

1.2 Customer Needs or Impact

TasNetworks continues to undertake consumer engagement as part of business as usual and through the voice of the customer program. This engagement seeks in depth feedback on specific issues relating to:

- How it prices impact on its services;
- Current and future consumer energy use;
- Outage experiences (frequency and duration) and expectations;
- Communication expectations;
- STPIS expectations (reliability standards and incentive payments); and
- Increasing understanding of the electricity industry and TasNetworks;

Consumers have identified safety, restoration of faults/emergencies and supply reliability as the highest performing services offered by TasNetworks.

Consumers also identified that into the future they believe that affordability, green, communicative, innovative, efficient and reliable services must be provided by TasNetworks.

This project specifically addresses the requirements of consumers in the areas of safety and affordability.

1.3 Regulatory Considerations

This project is required to achieve the following capital and operational expenditure objectives as described by the National Electricity Rules section 6.5.7(a).

(2) Comply with all applicable regulatory obligations or requirements associated with the provision of standard control services;

(3) To the extent that there is no applicable regulatory obligation or requirement in relation to:

(i) The quality, reliability or security of supply of standard control services; or

(ii) The reliability or security of the distribution system through the supply of standard control services, to the relevant extent:

(iii) Maintain the quality, reliability and security of supply of standard control services; and

(iv) Maintain the reliability and security of the distribution system through the supply of standard control services; and

(4) Maintain the safety of the distribution system through the supply of standard control services.

2. Project Objectives

The objective of this project is to refurbish the New Norfolk Zone to ensure adequate network reliability is maintained for the distribution network in the surrounding area.

3. Strategic Alignment

3.1 Business Objectives

Strategic and operational performance objectives relevant to this project are derived from TasNetworks 2014 Corporate Plan, approved by the board in 2014. This project is relevant to the following areas of the corporate plan:

- We understand our customers by making them central to all we do;
- We enable our people to deliver value; and
- We care for our assets, delivering safe and reliable networks services while transforming our business.

3.2 Business Initiatives

The business initiatives that relate to this project are as follows:

- Safety of our people and the community, while reliably providing network services, is fundamental to the TasNetworks business and remains our immediate priority; and
- We care for our assets to ensure they deliver safe and reliable network services

The strategic key performance indicators that will be impacted through undertaking this project are as follows:

- Price for customers – lowest sustainable prices;
- Zero harm – significant and reportable incidents; and
- Sustainable cost reduction – efficient operating and capital expenditure

4. Current Risk Evaluation

If TasNetworks does not refurbish the New Norfolk Zone there is a risk that a failure could occur that results in a significant power disruption to all customers in New Norfolk and the surrounding areas that are supplied from the substation.

The assessment of risk was undertaken using TasNetworks' Risk Management Framework.

The level of risk identified was such that a treatment plan is required to reduce the risk down to a manageable level.

4.1 5x5 Risk Matrix

TasNetworks business risks are analysed utilising the 5x5 corporate risk matrix, as outlined in TasNetworks Risk Management Framework.

Relevant strategic business risk factors that apply are follows:

Risk Category	Risk	Likelihood	Consequence	Risk Rating
Customer	Loss of supply	Possible	Moderate	Medium
Network Performance	Partial disconnection of network	Possible	Minor	Low
Reputation	Damage to reputation from harm to member of the public	Possible	Minor	Low
Safety and People	Personal injury or death to member of the public	Rare	Major	Medium

Section 1 Approvals (Gated Investment Step 1)

Project Initiator:	Michael Healy	**Date:**	26/03/2015
Line Manager:		**Date:**	
Manager (Network Projects) or Group/Business Manager (Non-network projects):		**Date:**	
[Send this signed and endorsed summary to the Capital Works Program Coordinator.]			

Actions			
CWP Project Manager commenced initiation:		**Assigned CW Project Manager:**	
PI notified project initiation commenced:		**Actioned by:**	

Section 2 (Gated Investment Step 2)

5. Preferred Option:

The preferred solution is to refurbish the zone substation to replicate the functionality, with upgrades where necessary to make it compliant with current standards.

5.1 Scope

The scope would consist of:

- Design, Procurement, Installation and Commissioning, including Project Management and Network Outages.
- replacement of the four power transformers with two 5 MVA 22/11 kV transformers, with associated plinths, separate bunds, 3 x flame-traps and pipework. Fire-wall between the transformers. 5MVA transformers are the standard size used for the rural zone networks. The use of a standard units eliminate the need to procure spare transformers to accommodate asset failueres;
- installation of a 4000 litre oil containment tank;
- provision made for installation of a third transformer;
- one 11 kV ABS with associated pole, power cables and surge arrestors. Feeder cables for main incomer Fdr 563 (C252) & 3 additional feeders. Connection to stand-by feeder to be removed;
- removal and disposal of existing 22 kV & 11 kV busbars, 4 x 2.5 MVA 22/11 kV transformers and associated 22 kV and 11 kV disconnectors, earthing transformer, NIS station services transformer and 3 x 11 kV Nulec;
- installation of SCADA (SEL3505-3 RTAC device) and telecommunications (OPUC) to terminal substation;
- installation of control cables & conduits to control cabinet, with trips & alarms from transformer DMCR & pressure relief valve;
- a feeder protection system comprising of four 11 kV feeder O/C & E/F protection; and
- protection and control modifications to 22 kV switchboard, including settings and SCADA to place 3 additional feeders into service and associated circuitry for external trip signals from the Zone substation.

5.2 Expected outcomes and benefits

Following the completion of this project:

- the reliability of supply from the substation would be maintained for the long term; and
- the site would be compliant with legislative requirements.

5.3 Regulatory Test

No applicable

6. Options Analysis

6.1 Option Summary

Option description	
Option 0	Do nothing
Option 1	Replacement of four transformers with four 2.5 MVA units
Option 2 (preferred)	Replacement of transformers with two 5 MVA units
Option 3	Replacement of transformers with three 5 MVA units

6.2 Summary of Drivers

Option	
Option 0	• Potential for significant power disruption. • Potential for significant network disruption. • Risk to reputation from asset failures resulting in large power disruption. • Potential for harm when assets fails
Option 1	• Reduces the likelihood of customer impact from asset failures. • Reduces the risk of network disruption from asset failures. • Reduces the risk to reputation from a failure occurring that causes significant network disruption. • Greatly reduces the potential for people to be exposed to live equipment causing harm.
Option 2 (preferred)	Reduces the likelihood of customer impact from asset failures. Reduces the risk of network disruption from asset failures. Allows for some future load growth Reduces the risk to reputation from a failure occurring that causes significant network disruption. Greatly reduces the potential for people to be exposed to live equipment causing harm.
Option 3	• Greatly reduces the likelihood of customer impact from asset failures. • Greatly reduces the risk of network disruption from asset failures. • Allows for future load growth • Greatly reduces the risk to reputation from a failure occurring that causes significant network disruption. • Greatly reduces the potential for people to be exposed to live equipment causing harm.

6.3 Summary of Costs

Option	Total Cost ($)
Option 0	$0
Option 1	$1,797,565
Option 2 (preferred)	$1,743,239
Option 3	$2,369,489

6.4 Summary of Risk

Option 0: Do Nothing

Customer supply risk remains at 'Medium', with the risk increasing further over time as the condition of the assets at the substation further deteriorates.

Restoration of supply would be dependent on network load and availability of spare components.

Option 1: Replacement of four transformers with four 2.5 MVA units

Achieves project objectives, but does not accommodate any future load growth.

Option 2: Replacement of power transformer with two 5MVA transformers

Achieves project objectives, but no ability to accommodate future load growth.

Limited ability to accommodate asset failures without notable customer disruptions

Option 3: Replacement of power transformers with three 5MVA transformers [Preferred option]

Eliminates existing risks and does not create any new risks.

6.5 Economic analysis

Option	Description	NPV
Option 0	Do nothing	$0
Option 1	Replacement of four transformers with four 2.5 MVA units	-$4,217
Option 2 (preferred)	Replacement of transformers with two 5 MVA units	$244,485
Option 3	Replacement of transformers with three 5 MVA units	$130,921

6.5.1 Quantitative Risk Analysis

Not Applicable

6.5.2 Benchmarking

Maintaining network reliability and minimising public safety risk is also considered a high priority to other DNSP's around Australia.

6.5.3 Expert findings

Not applicable

6.5.4 Assumptions

Nil

Section 2 Approvals (Gated Investment Step 2)

Project Initiator:	Michael Healy	**Date:**	26/03/2015
Project Manager:		**Date:**	

Actions			
Submitted for CIRT review:		**Actioned by:**	
CIRT outcome:			