

Investment Evaluation Summary (IES)



Project Details:

Project Name:	Refurbishment of Richmond Zone
Project ID:	00710
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:	Refurbishment of substation and installation of two transformers
Preferred Option Estimate (Nominal Dollars):	\$2,853,576

	19/20	20/21
Unit (\$)	N/A	N/A
Volume	1	1
Estimate (\$)		
Total (\$)	\$844,473	\$2,009,103

Governance:

Project Initiator:	Greg Hall	Date:	27/03/2015
Thread Approved:	David Ellis	Date:	02/11/2015
Project Approver:	David Ellis	Date:	02/11/2015

Document Details:

Version Number:	1
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Related Documents:

Description	URL
Richmond transformer replacement	http://projectzone.tnad.tasnetworks.com.au/business-projects/nis-program/DD17SAM/Deliverables/Zone%20Substations/Richmond%20transformer%20replacement%20NPV.xlsm

NPV	
Richmond CAR	http://assetzone.tnad.tasnetworks.com.au/distribution/zone-substations/richmond/Reports/Richmond Zone Substation CAR.docx?Web=1
Refurbishment of Richmond Zone	http://projectzone.tnad.tasnetworks.com.au/business-projects/nis-program/DD17SAM/Deliverables/Zone%20Substations/DRAFT%20IES%20REUZE%20Refurbishment%20of%20Richmond%20Zone%20substation.docx

Section 1 (Gated Investment Step 1)

1. Background

Richmond Zone is a 22/11kV rural zone substation located on the southern side of the Richmond township. It is supplied from the Sorell Terminal substation and steps down the 22kV supply voltage down to 11kV to supply the surrounding area of Richmond, Campania, Colebrook, and Tea Tree. It was commissioned in 1960.



Photo 1 – Richmond Zone

1.1 Investment Need

Due to the deteriorating condition of the substation, refurbishment of the substation in the near future 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 near end of life, with an estimated service life of up to 7 years. The items of note were:

- Numerous oil leaks on the transformers no oil containment;
- Oil temperature gauges without contacts to alarm or trip the transformers;
- Free breathing oil preservation systems which are susceptible to moisture ingress;
- The oil samples analysed show that the oil in both these transformers is in poor condition and some paper insulation degradation has occurred.
- Surge arresters with earth lead disconnects that do not align with TasNetworks' current standard;
- Lack of gas impulse (Buchholz) relays for the early detection and isolation of faults, no pressure relief devices and no walls or barriers between the transformers;
- A voltage regulating transformer that limits the capacity of the substation;
- Isolation links that only permit single phase operations and may result in unbalanced current flow on the network;
- A fault throw switch that on operation puts unnecessary stress on network components;
- Air break switches that have a known failure mode where upon operation the porcelain insulators can break and fall creating a safety hazard for operators; and
- Low clearances to overhead conductors.

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 2019/20 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
- (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 Richmond zone substation 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 Richmond Zone there is a risk that a failure could occur that results in a significant power disruption to all customers in Richmond 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	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:	Greg Hall	Date:	27/03/2015
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 option is to refurbish the zone substation with replacement of assets that have reached end of life, with upgrades where necessary to make the site compliant with current standards.

5.1 Scope

The scope of the substation refurbishment would consist of:

- Design, Procurement, Installation and Commissioning, including Project Management and Network Outages;
- installation of a temporary regulator site to support voltage levels when the site is decommissioned;
- replacement of the two power transformers with two 5 MVA 22/11 kV transformer, with an associated plinth, bund, flame-traps and pipework to an oil containment system;
- replacement of the HV regulator with three single phase 11 kV regulators, with an associated plinth and pipework to an oil containment system;
- installation of a 5000 litre oil containment tank;
- commissioning
- removal and disposal of existing equipment

Due to space constraints at the site refurbishing the substation while it remains in service is not a viable option. Supply of the 11kv feeders while the substation is being refurbished would come from Cambridge Zone. Due to the distance from the site, the temporary installation of a HV regulator site and a generator would be required to maintain voltage levels and supply on the extremities of the 11kV feeders.

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
- the site would be compliant with legislative requirements.

5.3 Regulatory Test

Not applicable

6. Options Analysis

6.1 Option Summary

Option description	
Option 0	Do nothing
Option 1	Refurbishment of substation and installation of only one transformer
Option 2 (preferred)	Refurbishment of substation and installation of two transformers

6.2 Summary of Drivers

Option	
Option 0	<ul style="list-style-type: none"> • Customer - Potential for significant power disruption. • Network Performance - Potential for significant network disruption. • Reputation - Risk to reputation from asset failures resulting in large power disruption. • Safety and People - Potential for harm when assets fails
Option 1	<ul style="list-style-type: none"> • Customer - Reduces the likelihood of customer impact from asset failures. • Network Performance - Reduces the risk of network disruption from asset failures. Degradation in security of supply. • Reputation - Reduces the risk to reputation from a failure occurring that causes significant network disruption or harm to public. • Safety and People - Safety risks eliminated
Option 2 (preferred)	<ul style="list-style-type: none"> • Customer - Greatly reduces the likelihood of customer impact from asset failures. • Network Performance - Greatly reduces the risk of network disruption from asset failures. Network security maintained. • Reputation - Greatly reduces the risk to reputation from a failure occurring that causes significant network disruption or harm to public. • Safety and People - Safety risks eliminated

6.3 Summary of Costs

Option	Total Cost (\$)
Option 0	\$0
Option 1	\$2,510,377
Option 2 (preferred)	\$2,853,576

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.

Safety risk remains at 'Medium'

Option 1: Refurbishment of site transformers with one 5MVA transformer installed

Reliability of supply maintained and safety risk greatly reduced. Degradation in security of supply due to lack of redundancy within substation.

Option 2: Refurbishment of site transformers with two 5MVA transformers installed

Achieves project objectives, network reliability and security maintained for the long term. Safety risks greatly reduced.

6.5 Economic analysis

Option	Description	NPV
Option 0	Do nothing	\$0
Option 1	Refurbishment of substation and installation of only one transformer	\$67,139
Option 2 (preferred)	Refurbishment of substation and installation of two transformers	-\$43,348

6.5.1 Quantitative Risk Analysis

Not applicable

6.5.2 Benchmarking

Maintaining network reliability, security of supply 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:	Greg Hall	Date:	27/03/2015
Project Manager:		Date:	

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