

Investment Evaluation Summary (IES)



Project Details:

Project Name:	Replace transformers at Claremont Zone
Project ID:	00647
Thread:	Zone Substations
CAPEX/OPEX:	CAPEX
Service Classification:	Standard Control
Scope Type:	A
Work Category Code:	REUZZ
Work Category Description:	Replace Urban/CBD Zones Transformers
Preferred Option Description:	Replace both transformers
Preferred Option Estimate (Nominal Dollars):	\$3,000,000

	18/19
Unit (\$)	N/A
Volume	1
Estimate (\$)	
Total (\$)	\$3,000,000

Governance:

Project Initiator:	Michael Healy	Date:	25/03/2015
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
IES REUZZ Replace transformers at Claremont Zone Substation	http://projectzone.tnad.tasnetworks.com.au/business-projects/nis-program/DD17SAM/Deliverables/Zone%20Substations/DRAFT%20IES%20REUZZ%20Replace%20transformers%20at%20Claremont%20Zone%2010%20June%202015.docx
Claremont Zone transformer replacement	http://projectzone.tnad.tasnetworks.com.au/business-projects/nis-program/DD17SAM/Deliverables/Zone%20Substations/Claremont%20Zone%20transformer%20replacement%20NPV.xlsm

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

Section 1 (Gated Investment Step 1)

1. Background

Claremont Zone is a 33/11kV substation of 45MVA capacity in the northern suburbs of Hobart. It supplies residential and commercial customers in the areas of Claremont, Chigwell, and parts of Berriedale and Austin's Ferry. It also provides a critical supply to the Cadbury Chocolate Factory in Claremont. The substation supplies 5215 customers. The substation was commissioned in 1964. The substation is also strategic in providing alternative supply to other surrounding areas, eg. Glenorchy, Old Beach, Gagebrook, Bridgewater and Brighton in the event of need to supplement Bridgewater, Chapel St or Geilston Bay substations.



Photo 1 – Claremont Zone transformers

1.1 Investment Need

Due to the deteriorating condition of the 33/11kV, 22.5 MVA power transformers at the substation their replacement in the 2018/2019 financial year 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 nearing end of life, with a remaining service life of approximately five years. The items of note were:

- The tap changers are of an older more complex design making maintenance and staff familiarity difficult;
- The conservator oil temperature gauge on transformer 2 is faulty and these devices on both transformers do not have electrical contacts to alarm on low oil level;
- Explosion vents as opposed to pressure relief devices are fitted which do not close and could cause further damage to the transformer following abrupt accumulation of gasses;
- Free breathing oil preservation systems which are susceptible to moisture ingress;
- Oil leaks on different transformer components on both transformers;
- Rust developing;
- Damage to transformer 1, 33kV bushing;
- Both transformers are very noisy suggesting looseness of the transformer core, most likely due to slacked compression of the winding insulation;
- With the exception of some possible heating within transformer 2, the oil analysis did not identify any significant issues.

The deteriorating condition of the assets combined with the criticality of the installation has identified a need to undertake planned and controlled asset replacement prior to assets failure occurring.

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 supply reliability.

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 replace the power transformers at Claremont Zone to ensure the security of supply is maintained for the site for long term.

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 replace there is a risk that a failure could occur resulting in a significant disruption to all customers supplied from Claremont Zone.

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	Potential trauma to public exposed to catastrophic incident	Rare	Minor	Low

Section 1 Approvals (Gated Investment Step 1)

Project Initiator:	Michael Healy	Date:	25/03/2015
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 replace the power transformers at Claremont Zone.

5.1 Scope

The scope would consist of:

- Replacement of power transformers T1 and T2
- Installation of an oil containment system
- Replacement of the transformer protection system
- Replacement of the transformer control system
- Replacement of the HV and LV feeder tails

5.2 Expected outcomes and benefits

Following the completion of this project the security of supply for the site would be maintained for the long term.

5.3 Regulatory Test

Not applicable

6. Options Analysis

6.1 Option Summary

Option description	
Option 0	Do nothing
Option 1 (preferred)	Replace both transformers
Option 2	Replace one transformers

6.2 Summary of Drivers

Option	
Option 0	<ul style="list-style-type: none"> • 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 transformer fails
Option 1 (preferred)	<ul style="list-style-type: none"> • Greatly reduces the likelihood of customer impact from asset failures • Greatly reduces the risk of network disruption from asset failures • Greatly reduces the risk to reputation from a failure occurring that causes significant network disruption. • Greatly reduces the likelihood of an event occurring that has the potential to cause harm.
Option 2	<ul style="list-style-type: none"> • 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 • Increased fault level has the potential to expose people to high voltages under earth fault conditions

6.3 Summary of Costs

Option	Total Cost (\$)
Option 0	\$0
Option 1 (preferred)	\$3,000,000
Option 2	\$2,000,000

6.4 Summary of Risk

Option 0: Do Nothing

Customer risk remains at 'Medium', with the risk increasing further over time as the transformer condition further deteriorates.

Option 1: Replacement of both power transformers [Preferred Option]

Reliability of supply maintained for the long term. Both transformers replaced with assets designed for up to 45 years of reliable service. Customer risk reduced to 'Low'.

Option 2: Replacement of one power transformer

Reliability of supply not maintained as failure of either transformer would result in loss of customer supply. Risk of failure of older transformer has high likelihood due to poor condition.

The replacement transformer would be of higher impedance which would prevent closed bus operation of the substation. Loss of either transformer would result in supply disruptions. To maintain closed bus operation of the substation the new transformer could be of low impedance design similar to the units currently installed, but this would result in higher fault levels and more stress of the electrical infrastructure and a potential public safety risk.

Customer risk reduced, but would remain at 'Medium'.

6.5 Economic analysis

Option	Description	NPV
Option 0	Do nothing	\$0
Option 1 (preferred)	Replace both transformers	\$5,344,129
Option 2	Replace one transformers	\$2,917,453

6.5.1 Quantitative Risk Analysis

Not applicable

6.5.2 Benchmarking

Maintaining security of supply for the electrical distribution network 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:	25/03/2015
Project Manager:		Date:	

Actions

Submitted for CIRT review:		Actioned by:	
CIRT outcome:			