Investment Evaluation Summary (IES)

Project Details:

Project Name:	Replace Ground Mounted Substation LV Switchgear
Project ID:	00512
Thread:	Ground Mounted Substations
CAPEX/OPEX:	CAPEX
Service Classification:	Standard Control
Scope Type:	A
Work Category Code:	RELSW
Work Category Description:	Replace Ground Mtd LV Switchgear
Preferred Option Description:	Install LV circuit breakers
Preferred Option Estimate (Nominal Dollars):	$900,000

	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26	26/27
Unit ($)	$45,000	$45,000	$45,000	$45,000	$45,000	$45,000	$45,000	$45,000	$45,000	$45,000
Volume	2	2	2	2	2	2	2	2	2	2
Estimate ($)	$90,000	$90,000	$90,000	$90,000	$90,000	$90,000	$90,000	$90,000	$90,000	$90,000
Total ($)	$90,000	$90,000	$90,000	$90,000	$90,000	$90,000	$90,000	$90,000	$90,000	$90,000

Governance:

Project Initiator:	Jarad Hughes	**Date:**	20/03/2015
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

Replace Ground Mounted Substation LV Switchgear - IES	http://projectzone.tnad.tasnetworks.com.au/business-projects/nis-program/DD17SAM/Deliverables/Ground%20Mounted%20Substations/DRAFT%20RELSW%20-%20Replace%20LV%20Switchgear%20IES.docx

Section 1 (Gated Investment Step 1)

1. Background

The low voltage switchgear installed at TasNetworks' ground mounted distribution substations varies dependent on the construction type, year of installation, as well as the number and type of customers connected.

The installations include HRC fuses, mechanical isolating links and different types of circuit breakers including Nilsen asbestos arc chute breakers and the current standard Schneider Masterpact.

1.1 Investment Need

There are 110 building type substations contain either no switchgear or mechanical isolating links, for these sites there is no protection for the low voltage board.

If an LV bus fault was to occur then the closest upstream protection device would be the HV circuit breaker or fuse. These protection devices may not operate in all instances and significant damage may occur to the low voltage board and also the transformer.

This situation poses a safety risk to operators as well as a potential fire hazard to the nearby assets and the building itself.

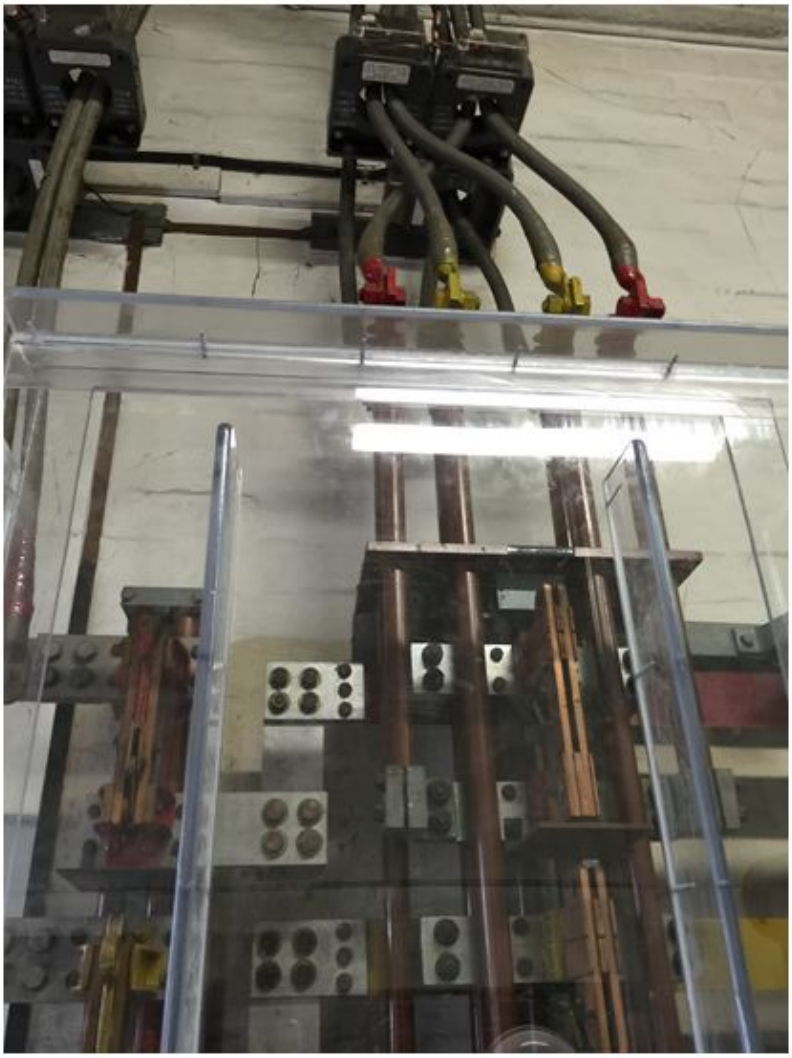

Figure 1 - Transformer Mechanical Links Example

TasNetworks had an incident in 2012 where an LV bus fault occurred at a substation supplying an aged

care home in Norwood. The lack of a protective device at the fault location and high fault level resulted in complete loss of the LV board. The fire that occurred resulted in complete loss of the substation.

Building type substations are at a larger risk due to the number of cables that come from these substations, their locations with regards to other buildings and because they are frequently visited by operators to complete inspections, maintenance and switching operations. It is proposed that these sites be addressed and that the work aligns with transformer replacements where possible.

1.2 Customer Needs or Impact

TasNetworks continues to undertake a 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)
- Increase 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, restoration of faults/emergencies and supply reliability

Customers will continue to be consulted through routine TasNetworks processes, including the Voice of the customer program, the Annual Planning Review and ongoing regular customer liaison meetings.

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) and 6.5.6(a).

6.5.7 (a) Forecast capital expenditure

(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 aim of this program is to install LV protection devices so that in the event of an LV bus fault, protection will operate preventing a catastrophic failure and damage to the transformer or surrounding

assets.

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.
- 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
- We care for our assets to ensure they deliver safe and reliable network services
- We will transform our business with a focus on:
    - the customer, and a strong commitment to delivering services they value
    - an engaged workplace with strong cultural qualities and people who will be great ambassadors for TasNetworks
    - a high performing culture with clear accountabilities for deliverables
    - an appropriate approach to the management and allocation of risk
    - a well run, efficient business, that delivers sustainable returns to the Tasmanian community and is resilient to future challenges.

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

- Customer engagement and service – customer net promoter score
- Price for customers – lowest sustainable prices
- Culture and people engagement – Culture score
- Culture and people engagement – Culture score
- Zero harm – significant and reportable incidents
- Network service performance – meet network planning standards
- Network service performance – outcomes under service target performance incentive schemes
- Sustainable cost reduction – efficient operating and capital expenditure

4. Current Risk Evaluation

If TasNetworks does nothing there will remain no protection on a substantial amount of low voltage boards. The safety risk to operators will remain at ‘Medium’ and there is potential for damage to the transformers as these sites only have protection on the HV switchgear. This lack of protection could lead to substation failures, with potential for damage to the public and their property.

The business risk associated with these assets has been evaluated by using the TasNetworks Risk 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 of up to 1,000 distribution customers	Possible	Negligible	Low
Environment and Community	Significant damage to building requiring remediation work	Rare	Minor	Low
Financial	Loss of equipment (nearby assets or buildings) from transformer fire	Unlikely	Negligible	Low
Safety and People	Serious injury or fatality to an operator as a result of no LV bus protection, following a fault	Possible	Major	High

Section 1 Approvals (Gated Investment Step 1)

Project Initiator:	Jarad Hughes	**Date:**	20/03/2015
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 install LV circuit breakers for building type substations where there is no LV bus protection

5.1 Scope

The work to be undertaken at each site will include the following:

- Installation of frame/switchboard for housing new circuit breaker
- Installation of new Schneider Masterpact LV circuit breaker of appropriate size for the transformer and connected loads;
- Installation of cables or busbars to connect to the existing LV busbar
- Replacement of LV transformer tails as necessary

5.2 Expected outcomes and benefits

This program will result in a safer more secure installation at each site which can operate quickly to isolate faults.

5.3 Regulatory Test

Not applicable

6. Options Analysis

6.1 Option Summary

Option description	
Option 0	Do nothing
Option 1 (preferred)	Install LV circuit breakers

6.2 Summary of Drivers

Option	
Option 0	Safty risk remains as doing nothing does not address risk of no LV bus protection on these assets
Option 1 (preferred)	This work will prevent serious injury or fatality operators, damage to other assets (transformers, buildings) and extended outages to customers

6.3 Summary of Costs

Option	Total Cost ($)
Option 0	$0
Option 1 (preferred)	$900,000

6.4 Summary of Risk

Option 0: Do Nothing

Continuing with the use of HV links, fuses and asbestos will result in an increase in transformer fire due to faults on the LV board. This will increase the likelihood of serious injury, fatality and property damage. There will also be an increase in the possibility of asbestos related health issues to personnel with asbestos arc chute circuit breakers still in service.

Option 1: Replace LV Switchgear

Replacing LV switchgear with modern switchgear with protection for the transformer will reduce the likelihood of a transformer fire and bring the risk from medium of both 'Safety and People' and Environment and Community' drivers down to low. The asbestos heath issue will be eliminated.

6.5 Economic analysis

Option	Description	NPV
Option 0	Do nothing	$0
Option 1 (preferred)	Install LV circuit breakers	$0

6.5.1 Quantitative Risk Analysis

Not applicable

6.5.2 Benchmarking

Undertaking remedial work at electrical installations to reduce the risk of supply disruption and incidents causing harm to operational personnel and the public is a strategy undertaken by other utilities across Australia.

6.5.3 Expert findings

Nil

6.5.4 Assumptions

Nil

Section 2 Approvals (Gated Investment Step 2)

Project Initiator:	Jarad Hughes	**Date:**	20/03/2015
Project Manager:		**Date:**	

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