Investment Evaluation Summary (IES)

Project Details:

Project Name:	HV Links Replace with Air Break Switch
Project ID:	00492
Thread:	Overhead
CAPEX/OPEX:	CAPEX
Service Classification:	Standard Control
Scope Type:	A
Work Category Code:	REOHS
Work Category Description:	Replace OH Switchgear
Preferred Option Description:	Ongoing replacement of 5 HV link units with an ABS per year.
Preferred Option Estimate (Nominal Dollars):	$717,166

	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26	26/27
Unit ($)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Volume	5	5	5	5	5	5	5	5	5	5
Estimate ($)										
Total ($)	$71,717	$71,717	$71,717	$71,717	$71,717	$71,717	$71,717	$71,717	$71,717	$71,717

Governance:

Project Initiator:	Jack Terry	**Date:**	19/03/2015
Thread Approved:	David Ellis	**Date:**	02/11/2015
Project Approver:	David Eccles	**Date:**	30/10/2015

Document Details:

Version Number:	1

Related Documents:

Description	URL
Annualised cost analysis	http://projectzone.tnad.tasnetworks.com.au/business-projects/nis-program/DD17SAM/Deliverables/Overhead%20Systems%20and%20Structures/REOHS%20and%20RERER%20-%20Other%20overhead%20SWGR%20works/Annualised%20Costs%20of%20replaceing%20Links%20with%20ABS.xlsx?Web=1
NPV Document	http://projectzone.tnad.tasnetworks.com.au/business-projects/nis-program/DD17SAM/Deliverables/Overhead%20Systems%20and%20Structures/REOHS%20and%20RERER%20-%20Other%20overhead%20SWGR%20works/Replace%20links%20with%20ABS%20options%20NPV%20R1.xlsm?Web=1
IES Document	http://projectzone.tnad.tasnetworks.com.au/business-projects/nis-program/DD17SAM/Deliverables/Overhead%20Systems%20and%20Structures/REOHS%20and%20RERER%20-%20Other%20overhead%20SWGR%20works/Investment%20Evaluation%20Summary%20Replace%20HV%20Links%20with%20Air%20Break%20Switches.docx?Web=1

Section 1 (Gated Investment Step 1)

1. Background

High voltage (HV) links allow the isolation of network sections when the line section is dead, for network reconfiguration purposes. Each phase is comprised of two insulating pins, with a knife blade that allows the connection and disconnection of the two network sections on either side. As the cannot be opened under load, to utilise HV links for load transfer purposes, the networks on either side of the links must be made dead by an upstream load break devices such as an air break switch.

Additionally, HV links require the use of insulated poles, to open and close the connection. In windy conditions, this can be significantly challenging, and introduces additional delays in the restoration of power.

Thirdly, the fault withstand capacity of HV links is typically lower than that of other disconnection devices. Although best endeavours are made to ensure that devices are installed with an appropriate rating for the fault level in the network to which they are connected, it is possible that inadequate devices are installed, or network reconfiguration results in an increase in the fault level seen by the device.

Figure 1 Pole mounted HV Links

1.1 Investment Need

The investment need for this project is to reduce the impact of unplanned outages and increase operational flexibility in network configurations. The installation of air break switches to replace HV links is justified in network sections where the HV links supplies large sections of load and/or the HV links are commonly used for isolation/reconfiguration. In the case of HV links, to break the network section, the next upstream load break device would need to be operated, which would take out both sections of load. With an air break switch in place, only the downstream section of network need be disconnected. This will result in a reduction in the kVA disconnected during a planned outage.

1.2 Customer Needs or Impact

The main impacts on the customer that are associated with this option are - Cost impacts through implementation of the program; and - Impact on reliability through planned/unplanned outages. The selected option finds an optimal balance between the cost incurred to the customer and the improvement in reliability through the additional operational flexibility.

1.3 Regulatory Considerations

N/A

2. Project Objectives

The proposed project is to replace key HV links in the distribution network with air break switches, to reduce the amount of connected kVA that must be disconnected from supply under network reconfigurations.

3. Strategic Alignment

3.1 Business Objectives

Maintaining network service performance is a key part of enabling TasNetworks to achieve its strategic goal of taking care of its assets, delivering safe and reliable network services while transforming our business. This investment helps achieve this business objective, by reducing unnecessary outage durations, for network reconfigurations and load transfers.

3.2 Business Initiatives

TasNetworks continues to undertake consumer engagement as part of business as usual through the Voice of the Customer program. Customers have identified that into the future they believe that affordability, green, communicative, innovative, efficient and reliable services must be provided by TasNetworks. This project specifically provides improvements to consumers with respect to 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.

4. Current Risk Evaluation

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
Financial	-	-	-	-
Customer	-	-	-	-
Regulatory Compliance	-	-	-	-
Network Performance	Maintain current performance WRT unplanned outages	Almost Certain	Negligible	Medium
Reputation	Negative impacts on image through unplanned outages	Possible	Negligible	Low
Environment and Community	-	-	-	-
Safety and People	-	-	-	-

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	Non material supply interruption to less than 1,000 distribution customers.	Possible	Negligible	Low
Network Performance	Maintain current performance WRT unplanned outages.	Almost Certain	Negligible	Medium
Reputation	Negative impacts on image through unplanned outages.	Possible	Negligible	Low

Section 1 Approvals (Gated Investment Step 1)

Project Initiator:	Jack Terry	**Date:**	19/03/2015
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:

To reduce the magnitude of kVA disconnected through network configurations, and improve the operability of the asset under planned and unplanned outages, it is recommended provision is included for the replacement of a small selection of HV links in the network with ABSs per year.

5.1 Scope

The scope of this work is the replacement of 5 HV links with air break switches, per year, in select areas of the network where there is a large portion of load, and/or the device is used frequently for network reconfigurations. The specific locations of the links to be replaced will be determined through an appropriate prioritisation process that mainly considers the location of the link within the network, the limitations that are imposed by not having a load break device, and the increased transfer capability through its replacement with a load break device.

5.2 Expected outcomes and benefits

If an air break switch is available for use in the place of HV links, - increased flexibility in load transfer is introduced which may allow the reduction of outage durations for certain customers. - the actions required to operate the device is simplified, which may reduce the duration of unplanned and planned outages. - the fault withstand capacity of the device is increased, which may result in an increased longevity.

5.3 Regulatory Test

6. Options Analysis

Summary of Options

Option description	
Option 0 - Do Nothing	No action
Option 1	Ongoing replacement of 5 HV link units with an ABS per year.
Option 2	Ongoing replacement of 10 HV link units with an ABS per year.
Option 3	Ongoing replacement of 20 HV link units with an ABS per year.

Summary of Drivers

Summary of Drivers	Network performance – planned outage performance	Minimise cost to customer
Option 0 - Do Nothing	Unplanned outage performance remains constant	Low cost
Option 1	Improvement in unplanned outage performance	Low cost
Option 2	Improvement in unplanned outage performance	Moderate cost
Option 3	Improvement in unplanned outage performance	High cost

Appendix A

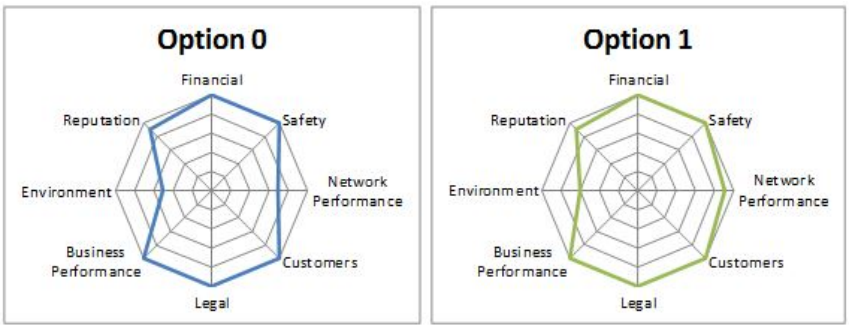
6.5.4 Risk Comparison

heT project options each have a different impact on the future asset risk. The table below provides a summary of the risk considerations in terms of the 5 x 5 corporate risk matrix and provides the input to the spider web risk diagrams.

Qualitative Risk Evaluation Matrix

	Option 0 Do Nothing				Option 1 Targeted installation of reclosers in MV Network				Option 2				Option 4			
	Likelihood	Impact	Risk Number	Risk	Likelihood	Impact	Risk Number	Risk	Likelihood	Impact	Risk Number	Risk	Likelihood	Impact	Risk Number	Risk
Financial loss per annum			10	ERROR			10	ERROR			10	ERROR			10	ERROR
			10	NC			10	NC			10	NC			10	NC
			10	NC			10	NC			10	NC			10	NC
Safety			10	ERROR			10	ERROR			10	ERROR			10	ERROR
			10	NC			10	NC			10	NC			10	NC
			10	NC			10	NC			10	NC			10	NC
Network Performance			6	Medium			6	Medium			10	ERROR			10	ERROR
	Likely	Minor	6	Medium	Likely	Minor	6	Medium			10	NC			10	NC
			10	NC			10	NC			10	NC			10	NC
Customers			7	Low			7	Low			10	ERROR			10	ERROR
	Likely	Insignificant	7	Low	Likely	Insignificant	7	Low			10	NC			10	NC
			10	NC			10	NC			10	NC			10	NC
Regulatory, Legal and Compliance			10	ERROR			10	ERROR			10	ERROR			10	ERROR
			10	NC			10	NC			10	NC			10	NC
			10	NC			10	NC			10	NC			10	NC
Business Performance			10	ERROR			10	ERROR			10	ERROR			10	ERROR
			10	NC			10	NC			10	NC			10	NC
			10	NC			10	NC			10	NC			10	NC
Environment			5	Medium			6	Medium			10	ERROR			10	ERROR
	Unlikely	Major	5	Medium	Rare	Major	6	Medium			10	NC			10	NC
			10	NC			10	NC			10	NC			10	NC
Reputation and Management Effort			9	Low			9	Low			10	ERROR			10	ERROR
	Unlikely	Insignificant	9	Low	Unlikely	Insignificant	9	Low			10	NC			10	NC
			10	NC			10	NC			10	NC			10	NC

Spider web ri8sk diagrams -



Summary of Risk

The main risks associated with selecting option 0 are:

- Non-material interruption of supply to customers through inadequate fault clearance, and fault restoration;
- reduction in network performance (SAIDI and SAIFI) through failure to clear temporary MV faults;
- maintained operational expenditure required for sending crews on site to restore supply after temporary faults; and
- No Reduction in the risk of bushfire through the non-operation of AK power EDO type sectionalisers.

SUMMARY OF ECONOMIC ANALYSIS OF OPTIONS

Option No.	Option description	NPV	Reason got selection/rejection
Option 0 - Do Nothing	No replacement of HV Links with ABSs	$0	Does not address risks.
Option 1	Replace 5 HV links with ABSs per year.	-$550,465	Adequately addresses risk. Appropriate cost.
Option 2	Replace 5 HV links with ABSs per year.	-$1,100,930	Adequately addresses risk. Excessive cost.
Option 3	Replace 5 HV links with ABSs per year.	-$2,201,859	Adequately addresses risk. Excessive cost.

SUMMARY OF OPTIONS COSTS

Option	Total Costs ($)
Option 0 - Do Nothing	$0
Option 1	$487,200
Option 2	$974,400
Option 3	$1,948,800

Note: Total cost is calculated in nominal dollars, as per table 1.

Conclusion -

The preferred Solution is Option 1.

6.1 Option Summary

Option description	
Option 0	Do nothing
Option 1 (preferred)	Ongoing replacement of 5 HV link units with an ABS per year.
Option 2	Ongoing replacement of 10 HV link units with an ABS per year.
Option 3	Ongoing replacement of 20 HV link units with an ABS per year.

6.2 Summary of Drivers

Option	
Option 0	Network performance - Unplanned outage performance remains constant Cost to customer - Low cost
Option 1 (preferred)	Network performance - Partial improvement in unplanned outage performance Cost to customer - Low cost
Option 2	Network performance - Partial improvement in unplanned outage performance Cost to customer - Moderate cost
Option 3	Network performance - Partial improvement in unplanned outage performance Cost to customer - High cost

6.3 Summary of Costs

Option	Total Cost ($)
Option 0	$0
Option 1 (preferred)	$717,166
Option 2	$1,434,333
Option 3	$2,868,666

6.4 Summary of Risk

6.5 Economic analysis

Option	Description	NPV

Option 0	Do nothing	$0
Option 1 (preferred)	Ongoing replacement of 5 HV link units with an ABS per year.	-$795,209
Option 2	Ongoing replacement of 10 HV link units with an ABS per year.	-$1,590,417
Option 3	Ongoing replacement of 20 HV link units with an ABS per year.	-$3,180,834

6.5.1 Quantitative Risk Analysis

None

6.5.2 Benchmarking

None

6.5.3 Expert findings

None

6.5.4 Assumptions

Assumptions

New ABS units will have handles to allow operation from the ground.

Section 2 Approvals (Gated Investment Step 2)

Project Initiator:	Jack Terry	**Date:**	19/03/2015
Project Manager:		**Date:**	

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