Investment Evaluation Summary (IES)

Project Details:

Project Name:	Replace high voltage cable
Project ID:	00678
Thread:	Underground System
CAPEX/OPEX:	CAPEX
Service Classification:	Standard Control
Scope Type:	A
Work Category Code:	REUGC
Work Category Description:	Replace cables UG - HV
Preferred Option Description:	Option 1: Replacement of substandard/defective sections of cable [Preferred Option] Replacement of substandard/defective sections of cables with new XLPE cable. Advantages: • Reduces the likelihood of harm occurring as a result of substandard installations. • Network reliability maintained. • Capitalisation of replacements under fault conditions Disadvantages: • Capital expenditure required This is the lowest cost option to reduce the business risks to manageable.
Preferred Option Estimate (Nominal Dollars):	$3,000,000

	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26	26/27
Unit ($)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Volume	2	2	2	2	2	2	2	2	2	2
Estimate ($)										
Total ($)	$300,000	$300,000	$300,000	$300,000	$300,000	$300,000	$300,000	$300,000	$300,000	$300,000

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
Replace high voltage cable - IES	http://projectzone.tnad.tasnetworks.com.au/business-projects/nis-program/DD17SAM/Deliverables/Underground%20Systems/DRAFT%20IES%20REUGC%20High%20voltage%20cable%20replacement.docx

Section 1 (Gated Investment Step 1)

1. Background

High voltage cable consists of 33, 22 and 11 kV underground cable, these are either paper insulated: oil draining, oil-filled, mass impregnated non-draining (MIND), XLPE and XLPE-TR. The following table shows the length of cable and there periods of installation.

HV cable is replaced either proactively due to the cable condition and previous fault/repair history or a significant section of cable is replaced under fault and the replacement is capitalised upon. Both of these replacements options are detailed in this work category.

Table 1 - HV Cable information and description – currently in the network

Description of cables	Installation period	Installed length (km)
Paper insulated, oil draining	1920-1960	30
Paper insulated, Oil-filled Cable (Sub-transmission only)	1964-1971	16
Paper insulated, mass impregnated non-draining (MIND)	1960-1992	505
Submarine cable	1949 - Current	30
XLPE insulated, PVC/HDPE sheathed	1992- 2010	447
XLPE-TR insulated, PVC/HPDE sheathed	2007 -Current	166

Submarine cable is not included in this IES as it is evaluated within 'REUGC – Replace High Voltage Submarine Cable'.

1.1 Investment Need

Replacement of high voltage cable to reduce the likelihood of harm occurring to members of the public and to ensure network reliability is maintained. Seen below is historical failure data showing that failures have been consistent, averaging 16 failures per annum as seen below. Nominally two planned replacement jobs of poor condition cable are undertaken annually and one reactive replacement is undertaken.

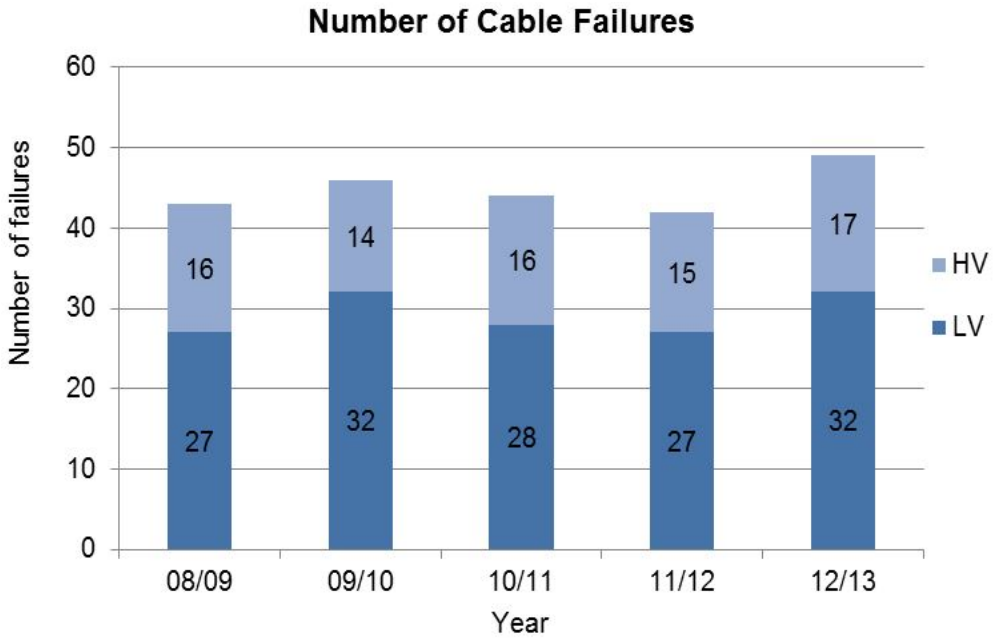

Figure 1 - Cable failure volumes from 2008-13

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 continue the replacement of the high voltage cable on the distribution network to:

- Eliminate the safety risk from substandard installations
- Maintain the frequency of high voltage cable failures on the network to prevent a reduction in network reliability.
- Capitalise on appropriate cable replacements under fault conditions

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 defective and substandard cables on the distribution network there is a risk that a cable fault could result in death or serious injury to a member of the public or customer.

The business risk associated with these assets has been evaluated by using the TasNetworks risk framework.

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	Minor	Low
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	Unlikely	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 option is to replace high voltage cable on the distribution network where:

- A non-compliant installation is identified
- An installation has an elevated potential for causing harm
- The failure history of a cable is having a detrimental impact on network reliability
- Where required to support other network activities e.g. substation replacements
- Where a significant length of cable is replaced under emergency fault conditions.

5.1 Scope

Cable sections would be replaced when they meet the criteria defined in section 5.

The scope would entail replacement of the high voltage cable annually with new XLPE insulated cable. The installation would need to comply with legislative requirement and TasNetworks' design standard.

Significant cable lengths that are replaced under fault conditions will be capitalised.

5.2 Expected outcomes and benefits

This program would:

- Reduce the likelihood of high voltage cables causing harm to members of the public
- Reduce the reduction in network reliability that would occur as a result of increased failure rates from the ageing and deteriorating condition of the underground infrastructure.
- Facilitate capital replacement of cable which is replaced under fault conditions.

5.3 Regulatory Test

Not applicable.

6. Options Analysis

6.1 Option Summary

Option description	
Option 0	Option 0: Do Nothing All cable installations remain in service with only repairs undertaken when defects identified. Advantages: • Lowest cost solution. Disadvantages: • Does not reduce the likelihood of harm. • Reduction in network reliability as aging and deteriorating cable condition results in increased cable failures This option does not address the risks previously identified in Section 4.
Option 1 (preferred)	Option 1: Replacement of substandard/defective sections of cable [Preferred Option]

	Replacement of substandard/defective sections of cables with new XLPE cable. Advantages: • Reduces the likelihood of harm occurring as a result of substandard installations. • Network reliability maintained. • Capitalisation of replacements under fault conditions Disadvantages: • Capital expenditure required This is the lowest cost option to reduce the business risks to manageable.
Option 2	Option 1: Replacement of substandard/defective sections of cable [Preferred Option] Replacement of substandard/defective sections of cables with new XLPE cable. Advantages: • Reduces the likelihood of harm occurring as a result of substandard installations. • Network reliability maintained. • Capitalisation of replacements under fault conditions Disadvantages: • Capital expenditure required This is the lowest cost option to reduce the business risks to manageable.

6.2 Summary of Drivers

Option	
Option 0	Customer impact from asset failures will increase over time. Network impact from asset failures will increase over time. Risk to reputation from failures occurring that causes personal harm. Does not address safety risk
Option 1 (preferred)	Reduces the risk of customer impact from asset failures. Network reliability maintained. Reduces the risk to reputation from cable failures Reduces the likelihood and risk of harm occurring to public from defective/poor condition assets.
Option 2	Reduces the risk of customer impact from asset failures. Network reliability maintained. Reduces the risk to reputation from cable failures. Reduces the likelihood and risk of harm occurring to public from defective/poor condition assets.

6.3 Summary of Costs

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

6.4 Summary of Risk

Option 0: Do Nothing

Public safety risk remains at ‘Medium’ due to the potential for harm due to substandard or defective installations.

Reduction in network reliability as aging and deteriorating cable condition results in increased cable failures

Option 1: Replacement substandard/defective cables with new cables [Preferred Option]

Public safety risk reduced to ‘Low’

Option 2: Replacement of all high voltage cables based on condition or predefined age.

Public safety risk reduced to 'Low'

6.5 Economic analysis

Option	Description	NPV
Option 0	Option 0: Do Nothing All cable installations remain in service with only repairs undertaken when defects identified. Advantages: • Lowest cost solution. Disadvantages: • Does not reduce the likelihood of harm. • Reduction in network reliability as aging and deteriorating cable condition results in increased cable failures This option does not address the risks previously identified in Section 4.	$0
Option 1 (preferred)	Option 1: Replacement of substandard/defective sections of cable [Preferred Option] Replacement of substandard/defective sections of cables with new XLPE cable. Advantages: • Reduces the likelihood of harm occurring as a result of substandard installations. • Network reliability maintained. • Capitalisation of replacements under fault conditions Disadvantages: • Capital expenditure required This is the lowest cost option to reduce the business risks to manageable.	$0
Option 2	Option 1: Replacement of substandard/defective sections of cable [Preferred Option] Replacement of substandard/defective sections of cables with new XLPE cable. Advantages: • Reduces the likelihood of harm occurring as a result of substandard installations. • Network reliability maintained. • Capitalisation of replacements under fault conditions Disadvantages: • Capital expenditure required This is the lowest cost option to reduce the business risks to manageable.	$0

6.5.1 Quantitative Risk Analysis

Not applicable.

6.5.2 Benchmarking

Minimising the safety risk that the electrical distribution network presents to the public is also considered a high priority to other DNSPs around Australia. Maintaining network reliability is a performance target also adopted by other DNSPs around Australia.

6.5.3 Expert findings

Not applicable.

6.5.4 Assumptions

Not applicable.

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:			