

Investment Evaluation Summary (IES)



Project Details:

Project Name:	BFM - Replace/relocate open wire HV with insulated alternative (re vegetation management)
Project ID:	01514
Business Segment:	Distribution
Thread:	Overhead
CAPEX/OPEX:	CAPEX
Service Classification:	Standard Control
Scope Type:	A
Work Category Code:	REHVE
Work Category Description:	Replace/relocate HV OH (Vegetation)
Preferred Option Description:	Replace or relocate bare wire conductors with alternative engineering or technical solutions to minimise exposure to problematic vegetation areas.
Preferred Option Estimate (Dollars \$2016/2017):	\$10,215,000

	19/20	20/21	21/22	22/23	23/24	24/25	25/26	26/27	27/28	28/29
Unit (\$)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Volume	227.00	227.00	227.00	227.00	227.00	227.00	227.00	227.00	227.00	227.00
Estimate (\$)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total (\$)	\$2,043,000	\$2,043,000	\$2,043,000	\$2,043,000	\$2,043,000	\$2,043,000	\$2,043,000	\$2,043,000	\$2,043,000	\$2,043,000

Governance:

Works Initiator:	Darryl Munro	Date:	11/08/2017
Team Leader Endorsed:	Darryl Munro	Date:	11/08/2017
Leader Endorsed:	Nicole Eastoe	Date:	24/11/2017
General Manager Approved:	Wayne Tucker	Date:	25/11/2017

Related Documents:

Description	URL
TasNetworks Risk Management Framework	http://Reclink/R238142
TasNetworks Business Plan 2017-18	http://reclink/R779008
National Electricity Rules (NER)	http://www.aemc.gov.au/Energy-Rules/National-electricity-rules/Current-Rules
TasNetworks Corporate Plan - Planning period: 2017-18	http://reclink/R745475
TasNetworks Transformation Roadmap 2025	https://www.tasnetworks.com.au/customer-engagement/submissions/
Tasmanian Electricity Code Chapter 8A	http://www.economicregulator.tas.gov.au/Documents/Chapter%208A%20TEC%20revised%2014%20january%202015%20%2815%20134%29.pdf
Bushfire Risk Mitigation Plan, doc ref R 303735	http://reclink/R303735
Doc reference R260427 Overhead Conductors and Hardware Asset Management Plan	http://reclink/R260427
BFM REHVE NPV	http://reclink/R884510
Vegetation Asset Management Plan	http://reclink/R282674

Section 1 (Gated Investment Step 1)

1. Overview

1.1 Background

TasNetworks has the regulatory responsibility to manage trees growing near power lines and mitigate risks associated with trees coming into contact across the distribution network. The minimum standard to which TasNetworks must achieve is compliance with Chapter 8A of the Tasmanian Electricity Code.

Vegetation contacting bare wire powerlines is the single largest cause (and potential cause) of fires starting from the distribution network. Vegetation contacting powelines accounts for approximately 32 per cent of fire starts relating to distribution powerlines and unplanned outages caused by vegetation contacting powelines is within the top three causes (for both frequency and duration measures).

The aim of this program is to address the issue of vegetation contacting bare wire powerlines for locations whereby clearing vegetation from the vicinity of powerlines is not a practical, legal, or cost effective solution.

Historically, there have been cases where it is more efficient to relocate assets away from vegetation rather than managing the vegetation near the assets, such as areas where vegetation is protected under law (national parks), where there are community or environmental considerations or where there are onerous vegetation management requirements due to bushfire risk management.

This program has been in place for a number of years as part of both Replace HV Feeders (Safety) and Fire Mitigation asset replacements, however volumes have increased to cater for known hazard trees as a result of recently captured hazard tree data.

Note: Further detail regarding the definition and management of hazard trees can be found within Section 13 (*Vegetation Management Strategy*) of the Vegetation Asset Management Plan.

1.2 Investment Need

The driver for this program is to mitigate business operating risks posed by vegetation near powelines by providing alternative engineering options for locations whereby clearing vegetation from the vicinity of powerlines is not a practical, legal, or cost effective solution.

This program prioritises mitigation of risks associated with fire starts caused by vegetation coming into contact with bare wire powerlines within the High Bushfire Loss Consequence Area (HBLCA), as fires starting within this area have the potential to cause greatest impact on communities in terms of loss of life and damage to infrastructure.

The program will also have a positive impact on reducing outages and minimise potential safety issues posed by fallen conductors caused by vegetation contacting powerlines.

Note: Details on the HBLCA are provided in the bushfire risk mitigation plan.

1.3 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 its 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:

- minimising outages;
- safety, restoration of faults/emergencies and; and
- affordability, green, communicative, innovative, efficient and reliable services.

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.

1.4 Regulatory Considerations

This project is required to achieve the following capital expenditure objectives as described by the National Electricity Rules section 6.5.7(a).

6.5.7 (a) Forecast capital expenditure

- (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 program is to provide alternative engineering options to manage vegetation impacts on bare wire conductors where clearing vegetation is not a practical, legal, or cost effective option.

This program prioritises the mitigation of risks associated with fire starts caused by vegetation coming into contact with bare wire conductors and will have a positive effect of reducing outages and minimise potential safety issues posed by fallen bare wire conductors caused by impacts from vegetation.

3. Strategic Alignment

3.1 Business Objectives

Strategic and operational performance objectives relevant to this project are derived from TasNetworks 2017-18 Corporate Plan, approved by the Board in 2017. 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 reflected in TasNetworks Transformation Roadmap 2025 publication (June 2017) for transition to the future that have synergy with this project are as follows:

- Voice of the customer: We anticipate and respond to your changing needs and market conditions.
- Network and operations productivity: We'll improve how we deliver the field works program, continue to seek cost savings and use productivity targets to drive our business.
- Electricity and telecoms network capability: To meet your energy needs and ensure power system security, we'll invest in the network to make sure it stays in good condition, even while the system grows more complex.
- Predictable and sustainable pricing: To deliver the lowest sustainable prices, we'll transition our pricing to better reflect the way you produce and use electricity.

4. Current Risk Evaluation

Do nothing is not an acceptable option to TasNetworks' risk appetite. The level of risk has been assessed as High in accordance with TasNetworks' Risk Management Framework and as such a treatment plan is required to reduce the risks to a tolerable level, in line with TasNetworks' Risk Management 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 as follows:

Risk Category	Risk	Likelihood	Consequence	Risk Rating
Environment and Community	Damaged conductor from contact with vegetation is at risk of failure and/or clashing that	Unlikely	Severe	High

	could initiate a fire.			
Network Performance	Damaged conductor from contact with vegetation is at risk of failure and/or clashing that leads to poor supply reliability.	Possible	Moderate	Medium
Reputation	Conductor asset failure results in catastrophic bushfire or injury with significant media coverage.	Unlikely	Moderate	Medium
Safety and People	Conductor asset failure results in a bushfire with a fatality or permanently impairs a persons life.	Unlikely	Severe	High

Section 2 (Gated Investment Step 2)

5. Preferred Option:

Replace or relocate bare wire conductors with alternative engineering or technical solutions to minimise exposure to problematic vegetation areas. This program prioritises work within the HBLCA first before other parts of the state due to the potential high consequence of loss to the Tasmanian community within the area if a bushfire start occurs as the result of vegetation contacting bare wire HV conductors.

5.1 Scope

Replace or relocate bare wire conductors with alternative engineering or technical solutions to minimise exposure to problematic vegetation areas.

The scope has been developed through assessment of vegetation and hazard tree data captured as part of a statewide vegetation audit. The aim of the program is to reduce the risk of hazard trees contacting bare wire conductors and causing a bushfire with a reduction in sites impacted by hazard trees across the entire network expected to be in the vicinity of three per cent per annum. Prioritisation of sites within the HBLCA will occur as described in the Vegetation Management Plan.

5.2 Expected outcomes and benefits

The expected benefits of this program are to:

- Reduce community environmental damage and safety risk;
- Reduce Bushfire ignition risk with priority given to the HBLCA first before extending across the state; and
- Reduce operational expenditure of annual vegetation management program.

5.3 Regulatory Test

A Regulatory Investment Test will not be required for this program.

6. Options Analysis

6.1 Option Summary

Option description	
Option 0	Do nothing
Option 1 (preferred)	Replace or relocate bare wire conductors with alternative engineering or technical solutions to minimise exposure to problematic vegetation areas.
Option 2	Intensify vegetation management programs to annually in order to minimise the bushfire risk
Option 3	Underground feeders in problematic vegetation areas

6.2 Summary of Drivers

Option	
Option 0	<p>Advantages:</p> <ul style="list-style-type: none">• Lowest capital expenditure; and• TasNetworks has capability to continue delivery of the program. <p>Disadvantages:</p> <ul style="list-style-type: none">• Ongoing operational expenditure for vegetation management is high (providing vegetation management is permitted, i.e. not a World Heritage Area);• High risk of vegetation interfering with bare wire conductors and igniting a bushfire still exists;• High risk of vegetation interfering with bare wire conductors contributes to poor supply reliability; and• Does not address Zero Harm risk appetite for worker and public safety from electrical shock risk from fallen damaged conductor, or bushfire risk from failed conductors.

Option 1 (preferred)	<p>Advantages:</p> <ul style="list-style-type: none"> • Reduced risk of starting a bushfire due to vegetation impacting bare wire conductors; • Reduced risk of public and employee safety from fallen conductors; and • Reduced impact upon supply reliability; and • Reduced operational expenditure for vegetation management. <p>Disadvantages:</p> <ul style="list-style-type: none"> • Large capital expenditure compared to option 0.
Option 2	<p>Advantages:</p> <ul style="list-style-type: none"> • No initial capital expenditure; • Reduced risk of starting a bushfire due to vegetation impacting bare wire conductors; • Reduced impact upon supply reliability; and • Reduced risk of public and employee safety from fallen conductors; <p>Disadvantages:</p> <ul style="list-style-type: none"> • High ongoing operational expenditure; • Vegetation management to the standard required may not be permitted if line passes through reserved land (e.g. World Heritage Area); and • May not be appropriate where intrusive vegetation management is not permitted (e.g. World Heritage Sites, etc).
Option 3	<p>Advantages:</p> <ul style="list-style-type: none"> • Risk of bushfire ignition from vegetation is significantly reduced; and • Reduced impact upon supply reliability. <p>Disadvantages:</p> <ul style="list-style-type: none"> • Highest capital expenditure; and • Increased fault restoration times due to fault finding difficulties after future outages.

6.3 Summary of Costs

Option	Total Cost (\$)
Option 0	\$0
Option 1 (preferred)	\$10,215,000
Option 2	\$13,087,799
Option 3	\$30,645,000

6.4 Summary of Risk

Option 0 - Do Nothing:

The associated risk of this option remains unchanged at high and is therefore not an acceptable option for TasNetworks. This assessment is driven by the risk of starting a bushfire with subsequent public safety and environmental risks, as well as risks associated with supply reliability.

Option 1 - Replace or relocate bare wire conductors with alternative engineering or technical solutions to minimise exposure to problematic vegetation areas (preferred option):

The preferred option is the proactive risk based replacement or relocation of bare wire conductors. This option reduces safety, supply reliability, community and environmental risk associated with vegetation impacting conductors to low and is the lowest cost option to achieve this outcome.

Option 2 - Intensify vegetation management programs to manage bushfire risk:

Whilst this option reduces the safety, supply reliability community and environmental risk associated with vegetation impacting conductors, the cost is prohibitive and TasNetworks does not have capability to deliver the increased vegetation maintenance program.

Option 3 - Underground feeders in problematic vegetation areas:

Whilst this option reduces the safety, supply reliability community and environmental risk associated with vegetation impacting conductors, this is the highest cost option and therefore assessed as unviable.

6.5 Economic analysis

Option	Description	NPV
Option 0	Do nothing	\$0
Option 1 (preferred)	Replace or relocate bare wire conductors with alternative engineering or technical solutions to minimise exposure to problematic vegetation areas.	-\$9,605,885
Option 2	Intensify vegetation management programs to annually in order to minimise the bushfire risk	-\$11,626,257
Option 3	Underground feeders in problematic vegetation areas	-\$42,760,462

6.5.1 Quantitative Risk Analysis

A quantitative risk analysis has not been completed for this program.

6.5.2 Benchmarking

Following the Black Saturday bushfires in Victoria in 2009, and subsequent Victorian government funding as outcomes of the Powerline Bushfire Safety Taskforce recommendations, Victorian Distribution Network Service Providers are in the process of investing approximately \$200 million (over 10 years between 2012 to 2022) for undergrounding/relocating powerlines in high bushfire loss consequence areas.

Whilst TasNetworks cannot justify investment to the same degree as Victoria (due to the lack of similar funding provided by the Tasmanian state government), it is acknowledged throughout the electricity utility industry that a level of investment in undergrounding powerlines in high bushfire loss consequence areas is prudent. Hence, the existence of this program to ensure that high risk feeders in problematic vegetation areas are replaced with insulated conductors, relocated, or hybrid undergrounded.

6.5.3 Expert findings

Nil.

6.5.4 Assumptions

Related Projects

The vegetation management operational maintenance program will identify sites that require inclusion into this program. (ie: areas that cannot be manually cleared for a variety of reasons). A similar program (with investment proposal of \$100,000 per annum) also exists to cover problematic vegetation in areas where bushfire mitigation is not the primary driver (listed as: '*GENERAL O/H - Replace/relocate High Voltage Overhead due to Vegetation Issues*').

Material Specifications

A variety of methods will be used within this program that will be determined by specific site requirements including:

- HV ABC;
- Spacer (Hendrix) cable;
- Hybrid HV underground;
- LV ABC; and
- Insulating bare conductors.

Program Development

The unit volumes (spans) have been derived from assessment of identified hazard trees with the current strategy to address 3 per cent of hazard spans per annum under this program. The vegetation management operational maintenance program will continue to manage risk associated with the remainder of the identified sites.

Annual volumes are a derivative of total program unit volumes (as identified during vegetation audits) divided by program timeframes.

Program values have been determined using historical unit costs where available. Where historical unit costs are unknown, estimates have been used based upon design estimates.

Unit costs are applied to annual program volumes to determine annual costs.