Management Plan

Bushfire Mitigation

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Authorisations

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Responsibilities

This document is the responsibility of the Asset Performance Team, Tasmanian Networks Pty Ltd, ABN 24 167 357 299 (hereafter referred to as "TasNetworks").
Please contact the Bushfire Mitigation Manager with any queries or suggestions.

- Implementation All TasNetworks staff and contractors.
- Compliance All group managers.

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Record of revisions

Section number	Details
	New Document

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1. PURPOSE

The purpose of this management plan is to describe:

- TasNetworks' approach to the asset and vegetation components of bushfire risk mitigation, as reflected through legislative and regulatory obligations and strategic plans;
- The key capital and operational projects and programs underpinning network asset-related bushfire risk mitigation activities; and
- Forecast expenditure for the mitigation of bushfire risk, including the basis upon which these forecasts are derived.

2. SCOPE

This management plan covers bushfire ignition risk mitigation activities for both distribution and transmission network assets owned by TasNetworks. This plan applies to all assets that could cause fire ignition in all areas of TasNetworks' transmission and distribution network.

This management plan makes reference to other plans, manuals, standards, policies, procedures and work instructions which, together with this plan, describe all of TasNetworks' activities that contribute to the reduction of bushfire risk.

Other key documents are shown in Section 20 – References.

3. STRATEGIC ALIGNMENT AND OBJECTIVES

This management plan has been developed to align with both TasNetworks' Asset Management Policy and Strategic Objectives.

It is part of a suite of documentation that supports the achievement of TasNetworks' strategic performance objectives and its vision. TasNetworks' management plans identify the issues and strategies relating to network assets and operations, and detail the specific activities that need to be undertaken to address the identified issues.

Figure 1 represents TasNetworks' document framework that support the asset management system. The figure also outlines how the documents relate to each other. The diagram highlights the existence of, and interdependence between, the Plan, Do, Check, Act components of good asset management practice. The Bushfire Mitigation Asset Management Plan provides guidance to other stakeholders in the preparation of asset management plans, ensuring effective bushfire risk mitigation outcomes are achieved, while also summarising some key bushfire risk mitigation outcomes and commitments made within those asset management plans.

TasNetworks' Bushfire Mitigation position is:

> *"To minimise the risk of fire ignition by at-risk distribution and transmission networks by ensuring our bushfire mitigation strategies and plans are aimed at protecting the lives and property of our employees and members of the community, and are aligned with industry best practice where applicable."*

To achieve this position, TasNetworks will continue to:

- minimise the risk of fire ignitions from distribution network assets that could become a bushfire threatening public safety and property;
- ensure activities undertaken by TasNetworks' staff and contractors minimise the likelihood of fire ignition;
- comply with legislative, regulatory and statutory requirements;

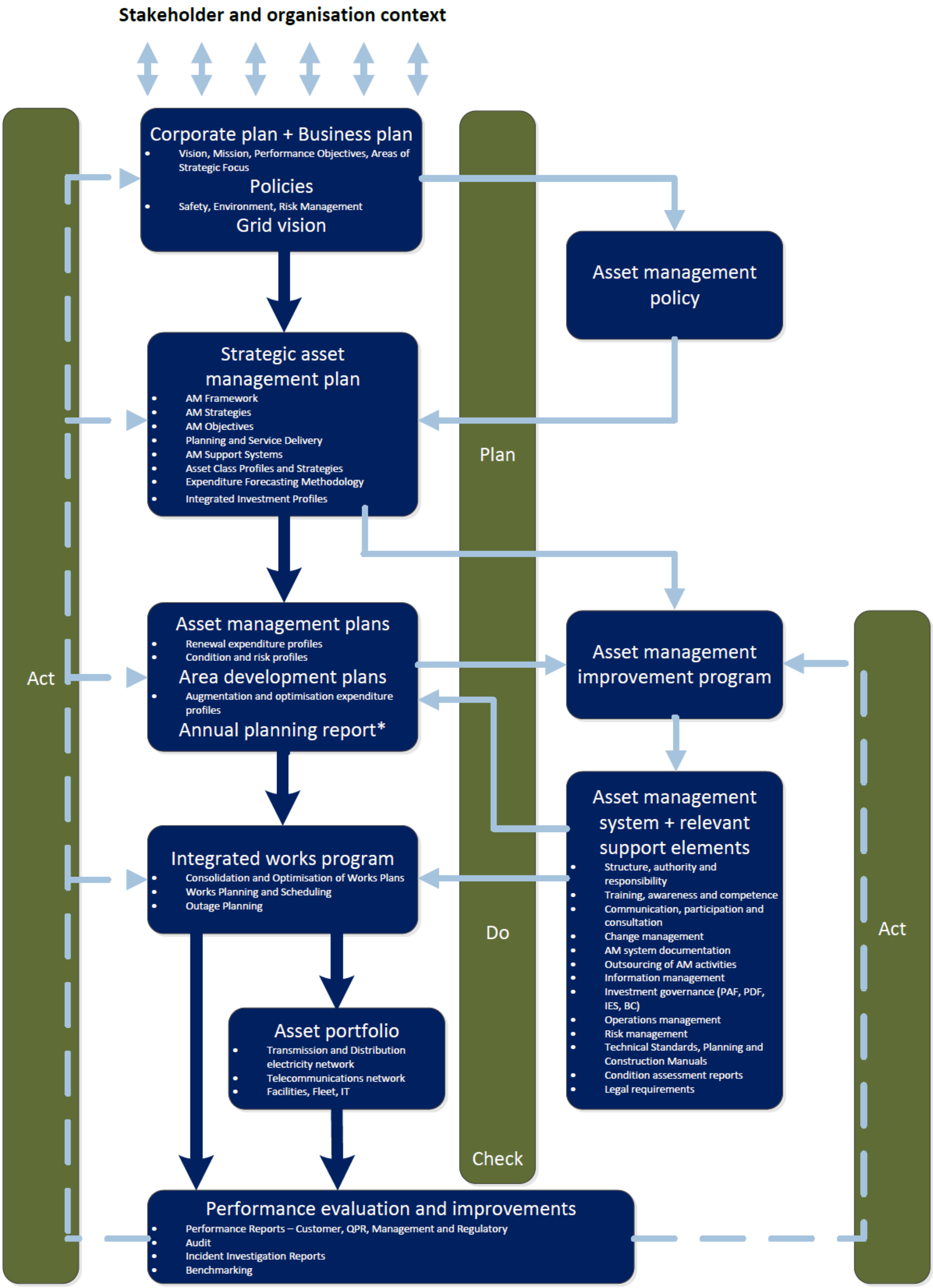
- minimise the frequency and length of disruptions to the general public when responding to bushfires threatening or impacting the distribution network;
- consider the safety of the community as a whole and employees engaged in the provision of services;
- ensure activities are managed in a way that minimises impact on the environment; and
- regularly review and develop management frameworks to ensure compliance with policies at the lowest sustainable cost.

TasNetworks' has identified the risk of bushfires started by TasNetworks' assets or operations as one of the highest risks to the business. The risk of *"Major bushfire start is attributed to TasNetworks assets and/or work practices, leading to fatality or permanent impairment of a member of the public."* is included within TasNetworks' Key Risk Profile as 'Risk 10'.

The key strategic objectives of the Bushfire Mitigation Management Plan are to:

- ensure no significant fires are started by TasNetworks' assets or activities undertaken by TasNetworks' staff and contractors;
- ensure no significant safety or environmental incidents occur as a result of bushfire mitigation activities;
- minimise cost to the community to a sustainable level;
- achieve compliance with the relevant legislative, regulatory and statutory requirements;
- demonstrate commitment in carrying out corporate and community responsibilities;
- ensure procedures are in place for managing liaison with external organisations;
- establish performance measures, targets and reporting framework for bushfire mitigation; and
- ensure a formal, documented management framework is in place for bushfire mitigation that includes mechanisms for review and continual improvement.

Figure 1 – TasNetworks Asset Management Documentation Framework



* The Annual Planning Report (APR) is a requirement of sections 5.12.2 and 5.13.2 of the National Electricity Rules (NER) and also satisfies a licence obligation to publish a Tasmanian Annual Planning Statement (TAPS). The APR is a compilation of information from the Area Development Plans and the Asset Management Plans.

4. STRATEGIC APPROACH

TasNetworks' Risk Management Framework[1] (**the framework**) provides the essential supporting structure for risk management across the organisation. The framework is based on the international standard for risk management AS/NZS ISO3100 Risk Management – Principles and Guidelines.

Risks are assessed considering the potential impacts on:

- Financial performance;
- Business continuity;
- Customer outcomes;
- Regulatory and legal obligations;
- Corporate reputation;
- Environment and community; and
- People and safety.

In the context of Risk 10[2], the inherent risk is rated as Extreme (Likelihood = Almost Certain, Severity = Severe).

TasNetworks' risk appetite is to see the overall risk reduced to Medium by reducing the Likelihood of the risk to Rare (Likelihood = Rare, Severity = Severe).

The most recent risk review sees the risk ranked as High (Likelihood = Unlikely, Severity = Severe).

It is acknowledged that while TasNetworks has many risk controls in place, the majority of the controls are aimed at reducing Likelihood, as TasNetworks' ability to reduce the Severity of bushfires is limited.

Continued program improvements, strategic initiatives and actions are aimed at reducing the risk to as close as possible to the target risk appetite.

TasNetworks also works with other agencies and the community to foster a shared responsibility approach to bushfire risk management. Whilst fire and other emergency services agencies run programs aimed at reducing the consequences of bushfires (eg: community protection plans, community education programs about fire risk, preparedness and survival), and individuals have responsibilities to plan and take appropriate levels of preparedness and survival actions, TasNetworks' bushfire mitigation (**BFM**) activities are focussed principally on reducing the likelihood of fires starting from our assets or activities.

TasNetworks' Risk Management Framework gives the risk management matrix to be used for the assessment of risk and provides guidance for determining the likelihood and severity of risk (Reference 1).

[1] TasNetworks Risk Management Framework (V1.0 March 2015)
[2] See TasNetworks' Key Risk Profile

5. COMPLIANCE WITH REGULATORY AND LEGAL RESPONSIBILITIES

TasNetworks is obligated to comply with a number of regulatory and legal responsibilities. The key obligations are outlined in the following section.

5.1 Electricity Supply Industry Act 1995

The Electricity Supply Industry (ESI) Act exists to:

- Promote efficiency and competition in the electricity supply industry;
- Establish and maintain a safe and efficient system of electricity generation, transmission, distribution and supply;
- Establish and enforce proper standards of safety, security, reliability and quality in the electricity supply industry; and
- Protect the interests of consumers of electricity.

The Act covers high level safety obligations and is implicit regarding bushfire risks.

5.2 Electricity Industry Safety and Administration Act 1997

The Electricity Industry Safety and Administration (EIS&A) Act exists to establish safety standards for electrical articles, to provide for the investigation of accidents in the electricity industry and for related purposes.

The EIS&A Act covers:

- Powers of entry and inspection;
- Powers to order rectification;
- Powers to order disconnection; and
- Emergency powers.

5.3 The Tasmanian Electricity Code (TEC)

The Tasmanian Electricity Code (TEC) provides, inter alia, a statement of the relevant technical standards of the electricity supply industry, an access regime to facilitate new entry, guidance on price setting methodologies, a means of resolving disputes that may arise and establishes advisory committees to assist the Regulator. There has been on-going development and refinement of the Code to ensure that it best meets the needs of the Tasmanian electricity supply industry and customers.

Specifically, Chapter 8A of the TEC includes a framework for the management of vegetation around distribution power lines. This framework is explicit regarding works requirements and practices in various fire hazard categories.

5.4 Occupational Licensing Act 2005

The *Occupational Licensing (Standards of Electrical Work) Code of Practice 2013* set the minimum standards for electrical work in Tasmania.

Incorporated into this Code of Practice are:

- AS 5577;
- AS 2067;
- AS/NZS 3000;
- AS/NZS 7000; and
- Any additional obligations imposed by AS 2067, AS/NZS 3000 and AS/NZS 7000 referring to further Australian Standards or documents, including any amendments or revisions of those Australian Standards or documents from time to time.

6. OPERATING ENVIRONMENT

TasNetworks manages a transmission and distribution network of more than 22,000 km of overhead powerlines, upon which Tasmanians have a very high dependency for contemporary living, wellbeing and business. Over 90% of the network consists of bare overhead high conductor, which cross a variety of terrains varying from built up urban areas through to cultivated farm land and bush.

TasNetworks' network supplies electricity to over 277,000 customer installations throughout Tasmania. Customers include major commercial and industrial customers directly connected to the transmission network, as well as smaller businesses and residential customers connected to the distribution network.

There are also approximately 70,000 privately-owned poles within the network. Inspections and maintenance of private poles are still currently undertaken by TasNetworks by Ministerial direction. This arrangement will continue into the future unless otherwise directed by the Minister.

6.1 Bushfire History in Tasmania

Like all overhead electricity distribution networks in fire prone environments, TasNetworks' network assets have varying degrees of vulnerability to bushfires.

In Tasmania, bushfires usually occur during the warmer months from November to March, with a peak in January and February. They are unusual during the winter months, however major fires have occurred as early as October and as late as April.

As Tasmania has relatively mild summer weather conditions, generally, these fires burn slowly and are controlled by firefighting crews.

There have been a few notable exceptions to this including:

- The 'Black Tuesday' fires around Hobart on 7 February 1967, which killed 62 people, injured 900, and rendered 7,000 people homeless;
- The 2006/2007 East Coast Fire Season where 18 homes were lost at Scamander and around 200 TasNetworks poles were lost; and
- The 'Dunalley Fires' on the Tasman Peninsula on 4 January 2013, which destroyed around 100 homes.

The 1966/1967 summer was preceded by an unusually wet spring (September and October 1966 rainfall was more than twice the long-term average for that period) resulting in prolific grass growth. Conditions then turned very dry, with November 1966 to February 1967 rainfall being little more than a third of the long-term average rainfall for that period. Grasslands cured and forest fuels dried out significantly.

The occurrence of extreme fire weather on 7 February 1967 resulted in numerous fires moving into dry, heavy forest fuels, subsequently merging and forming an extreme forest fire event. This event is a case of a short-term drought contribution to a severe fire event.

In northern and eastern Tasmania, 2006 was a very dry year. In Hobart, 2006 rainfall had been little more than half of the long-term annual average. This longer-term drought situation resulted in very dry forest fuels, including during the spring period. In October 2006, severe fires burnt through areas of Hobart's eastern shore, and in December 2006 large intense forest fires burnt in north-eastern Tasmania, impacting Scamander among other places.

The 2013 Dunalley Fires also occurred during an unusually warm and windy summer, where a total of ten total fire ban days were declared (the average being three in a summer).

Whilst the high impact fire events are more common on the mainland, this illustrates high consequence fires can occur in Tasmania. When drought and severe fire weather combine, and fires start in areas with extensive eucalypt forest cover, fires with fire behaviour at the upper levels of possible severity can occur.

There is no history of powerlines starting catastrophic bushfires in Tasmania. However, the experience in mainland Australia is that powerlines can start bushfires. Whilst the average number of bushfires started by electrical assets across Australia is relatively low (1-4% of all bushfires) (reference 2), inquiries into catastrophic bushfires in Victoria have found that a disproportionate number have been started by electrical assets.

As a result, the risk of TasNetworks’ assets and/or operations starting a bushfire is rated as one of the highest risks to the business (reference 3).

TasNetworks also recognises that there is the potential to lose a significant number of its assets during a bushfire due to the spread of the assets across the state, as occurred during the Dunalley fires when approximately 600 timber poles were destroyed and power was cut off to over 2000 homes for approximately 15 days.

Events of this kind severely impact TasNetworks’ ability to provide continuous electricity supply, which has serious consequences for TasNetworks and for the fire management capability of the emergency services and the safety of the public.

6.2 Reports and Recommendations Following Catastrophic Mainland Bushfires

Following catastrophic fires in Victoria during 1977, 1983 and 2009 bushfires, the Victorian State Government devoted considerable resources to examining systemic factors associated with the reliability and safety of Victoria’s electricity distribution networks. Recommendations from the reports resulted in mandatory changes to policy and procedures within Victoria. These recommendations were also applicable to the Tasmanian distribution and transmission networks, with the vast majority of issues related to distribution networks.

Within Tasmania, TasNetworks compared the composition of the network and asset management practices to those of the distribution and transmission network service providers associated with the bushfires in Victoria. Comparisons to key outcomes and recommendations within the various Victorian reports were also completed. The reports commissioned by the Victorian State Government included:

- 1977 Board of Enquiry (**Barber report**);
- 1992 Electricite de France (**EDF**) report (addressing outcomes from the fires that occurred in 1983);
- 2009 Victorian Bushfire Royal Commission (**VBRC**); and
- 2011 Powerline Bushfire Safety Taskforce (**PBST**) report.

Whilst there is clear evidence that some initiatives within the Barber report and EDF report were adopted within Tasmania, it is unclear as to how much emphasis and rigour was applied at the time to adopt key recommendations.

These recommendations included changes in asset management practices to consider, where appropriate, the installation of conductor spreaders, vibration dampers on long spans and neutral earthing resistors. TasNetworks is currently reviewing its asset management practices, with consideration being given to the outcomes of the Barber and EDF reports, and also within the context of bushfire risk in the Tasmanian environment to ascertain which, if any, of the recommendations are relevant to TasNetworks.

TasNetworks has, where practicable, aligned its asset management practices with outcomes of the VBRC and PBST. A presentation on TasNetworks' compliance to the VBRC was made to the Tasmanian Government Victorian Bushfire Royal Commission Forum in November 2010 (Reference 4).

6.3 Tasmanian Fire Danger Ratings

The expected fire behaviour on a given day will vary depending on factors such as temperature, relative humidity, wind speed, vegetation and drought factors.

The Bureau for Meteorology issues a Fire Danger Index (**FDI**), which is a combination of air temperature, relative humidity, wind speed and drought.

An FDI of 1 means that fire will not burn, or will burn so slowly that it will be easily controlled, whereas an FDI in excess of 100 means that fire will burn so fast and so hot that it is uncontrollable.

In Tasmania, when the FDI is expected to reach or exceed a value of 38 either on any particular day or the next day, the Bureau of Meteorology will issue a Fire Weather Warning, which may result in the Tasmania Fire Service (**TFS**) declaring a day of Total Fire Ban (**TFB**) in all or part of the state. Usually, a Total Fire Ban lasts for 24 hours from midnight to midnight.

The FDI is used to determine the Fire Danger Rating (**FDR**), which provides a classification of the expected fire behaviour on a given day. The relationship between FDI and FDR is given in Table 1 along with a summarised description of the conditions to be expected on each type of day.

Table 1: Relationship between Fire Danger Index (FDI) and Fire Danger Rating (FDR)

FDI	FDR	Description
100+	Catastrophic	• Most fires breaking out a 'catastrophic' day will spread rapidly and be uncontrollable. • There is a high likelihood that people in the path of a fire will be killed or seriously injured. • Many homes are very likely to be destroyed. • Even the best-prepared homes will not be safe.
75-99	Extreme	• Some fires breaking out today will spread rapidly and be uncontrollable. • People in the path of a fire may be killed or seriously injured. • Many homes are very likely to be destroyed.
50-74	Severe	• Some fires breaking out today will spread rapidly and be uncontrollable. • People in the path of a fire may be killed or seriously injured. • Some homes are likely to be destroyed.
25-49	Very High	• Some fires breaking out today will spread rapidly and be difficult to control. • There is a possibility that people in the path of a fire will be killed or seriously injured. • Some homes may be destroyed.
12-24	High	• Fires breaking out today can be controlled.

FDI	FDR	Description
		• People in the path of a fire are unlikely to be killed or seriously injured if they take shelter.
0-11	Low-Moderate	• Fires breaking out today can be controlled easily. • There is little risk to people and property.

On average, Tasmania experiences three TFB days (FDI greater than 38) per annum. FDIs of 75 or greater have only occurred in Tasmania six times in the last ninety years (approximately once every 15 years).

Table 2 is an extract of the historical analysis performed by Hennessy et al (reference 5) in 2005 of the occurrence of fire danger days at different locations across Australia between 1974 and 2003.

Table 2: Historical Analysis of Fire Danger Occurrence (1974-2003)

Location		Number of Days with FDI 25-49 per year	Number of Days with FDI >50 per year
Tasmania	Hobart	3.4	0.3
	Launceston	1.5	0.0
Victoria	Melbourne	9	0.6
	Bendigo	17.8	1.6
	Mildura	79.5	10.4

This indicates that extreme fire weather events are far less common in Tasmania than on the mainland; however they are still possible.

6.4 High Bushfire Consequence Area Model

In 2011-12, TasNetworks (then Aurora Energy) undertook a review of its bushfire mitigation strategy in view of the outcomes of the 2009 VBRC and reports presented by the PBST released in 2011. One of the key strategic initiatives identified and endorsed by the Board was the development of new bushfire consequence areas relative for the distribution network.

Recent works undertaken by Dr Kevin Tolhurst in bushfire risk management and fire behaviour prediction through the University of Melbourne (initiated through the Victorian Bushfire Royal Commission, and with the Bushfire Cooperative Research Centre) has been acknowledged throughout the industry as leading edge technology in this field.[3]

TasNetworks engaged Dr Kevin Tolhurst as a consultant to work with TFS and Parks and Wildlife Service (PWS) and determine appropriate bushfire consequence areas throughout Tasmania, specifically for TasNetworks to target its bushfire mitigation programs. The high bushfire consequence area (HBCA) defined through this work is shown in Figure 2.

The fundamental difference between the previous bushfire risk areas, and that delivered by Dr Tolhurst, is the basis of what they are indicating. The pre-1995 bushfire risk areas were derived from typical vegetation types and seasonal climatic conditions across the state, and was an

[3] Section 3.3, Page 44 of PBST states..."*The Taskforce has identified Phoenix as the best available tool to assess fire loss consequence at this time...*"

indication of the likelihood of a fire being sustained. The new model specifically looks at the potential loss (consequence) caused by a fire starting at a known point near the network, on an extreme day of localised climatic predictions (TFB day).

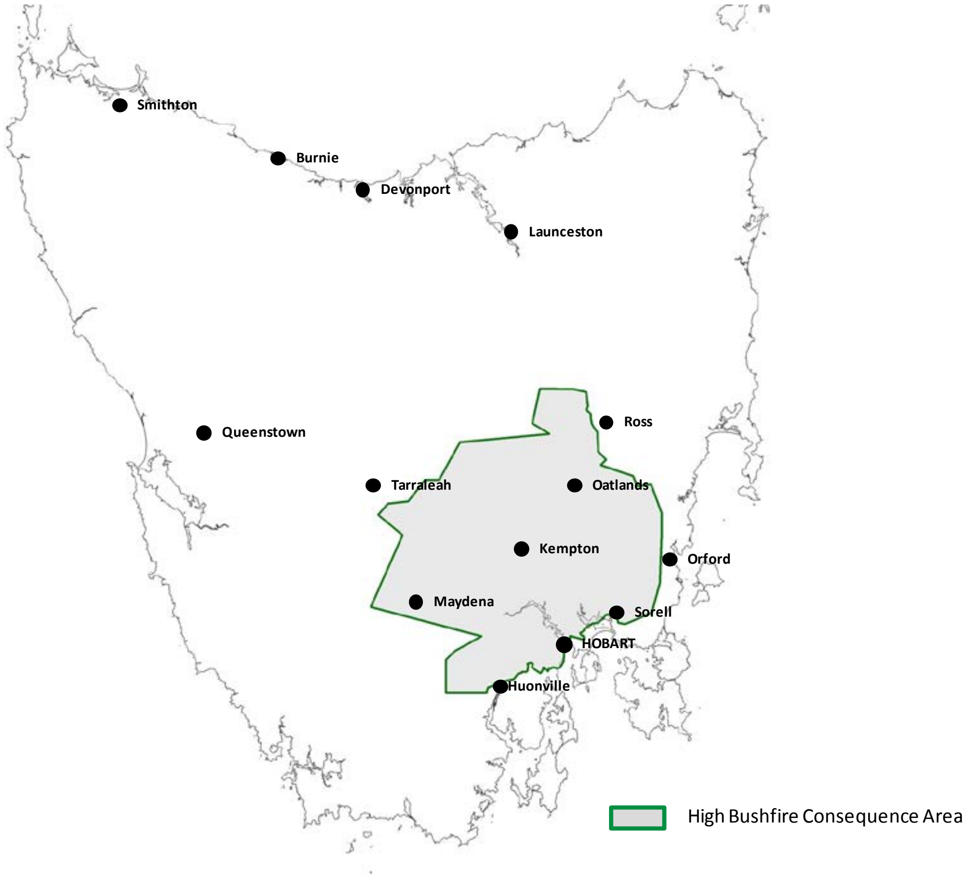
Having defined HBCA's allows more effective application of asset and vegetation management strategies and supports TasNetworks' strategic objective of ensuring prudent risk management programs.

TasNetworks has adopted the VBRC approach of including the highest 80 per cent of the state's fire loss consequence into our defined High Bushfire Consequence model.

The highest 80 per cent of the state's fire loss consequence is associated with fire risk from approximately 3,300 kilometres of powerlines (around 15 per cent of total rural powerline length).

Whilst the defined HBCA can be applied to transmission lines, at the time modelling was undertaken, only distribution lines were included in the project. It is planned to include transmission lines into the model in the near future.

Figure 2 - TasNetworks' High Bushfire Consequence Area (80% Model)



7. RISK MANAGEMENT PROCESS

An integral aspect of TasNetworks' bushfire mitigation programs is the overarching concept of risk management.

TasNetworks' Risk Management Model provides the essential supporting structure for risk management in TasNetworks. The Risk Management Model is based on the international standard for risk management AS/NZS ISO 31000 Risk Management – Principles and Guidelines. Risks are assessed considering the potential impacts on:

- Financial performance;
- Business continuity;
- Customer outcomes;
- Regulatory and legal obligations;
- Corporate reputation;
- Environment and community; and
- People and safety.

TasNetworks Risk Management Framework provides an overview of the TasNetworks approach to risk management.

The framework contains two primary components – the strategic framework elements and the risk management process (or model).

Appendix A gives the risk management matrix used for the assessment of risk.

7.1 Risk Identification

Following the most recent reviews of bushfire risks (April 2014), TasNetworks identified the following risks:

- Network asset starts fire (Inappropriate asset design)
- Network asset starts fire (Inadequate asset replacement and/or maintenance strategies)
- Network asset starts fire (Inadequate quality/ workmanship/delivery of programs)
- Vegetation contact with network asset starts fire
- Work practice starts fire
- Fire started by third party
- Business potentially implicated in fire start
- Bushfire recovery work exacerbates the impact of a bushfire

The above risk review included both transmission and distribution lines.

The next detailed review of network bushfire risks is scheduled for 2016.

7.2 Risk Analysis

Following the risk identification process, risk records are developed for each risk which includes risk narrative regarding inherent risk, potential causes and consequence, current controls and current control effectiveness.

7.3 Risk Evaluation

The risk evaluation process includes key stakeholder input in determining whether it is believed that the current controls in place are adequate in reducing inherent risks to a point whereby residual risk meets the business' risk appetite.

7.4 Risk Treatment

Where residual risks rank above the business appetite (particularly those ranking as ‘High’ or ‘Extreme’), risk treatment plans are to be created to ensure additional risk treatment controls are developed and implemented within appropriate time frames in order to further reduce the risk to a point that is acceptable.

Risk treatment controls can take many different formats including development or changes to process, procedures, projects, or works programs.

Refer to TasNetworks Risk Management Framework for further detail regarding risk management.

Appendix B presents a summary of outcomes of the 2014 risk review process.

8. TASNETWORKS' PERFORMANCE

The following sections provide an assessment of TasNetworks' historical bushfire mitigation performance, typically consisting of an analysis of fire starts, reflecting the effectiveness of the bushfire mitigation asset management plan.

8.1 Fire Start Analysis

To prevent network assets from starting fires, it is critical that TasNetworks understands how its assets start fires.

8.1.1 Transmission Fire Start Analysis

Fires started by the transmission system will usually be the result of an unplanned fault outage. Except in the case of some minor transient faults (not resulting in outages), all faults are investigated by post-fault patrols or during subsequent asset inspections. TasNetworks' incident investigation and outage databases show that since 2004 TasNetworks has not initiated any fires due to either transmission assets or vegetation. Anecdotal evidence indicates that there have been fires associated with transmission system faults although these are very rare occurrences and occurred prior to 2004.

8.1.2 Distribution Fire Start Analysis

For distribution assets, an analysis of records from TasNetworks' outage management system and incident reporting system was conducted between July 2012 and March 2015 to quantify the number and cause of ground fires initiated by TasNetworks' assets (Reference 6).

Figure 3 presents a summary of causes of overhead distribution network initiated ground fires.

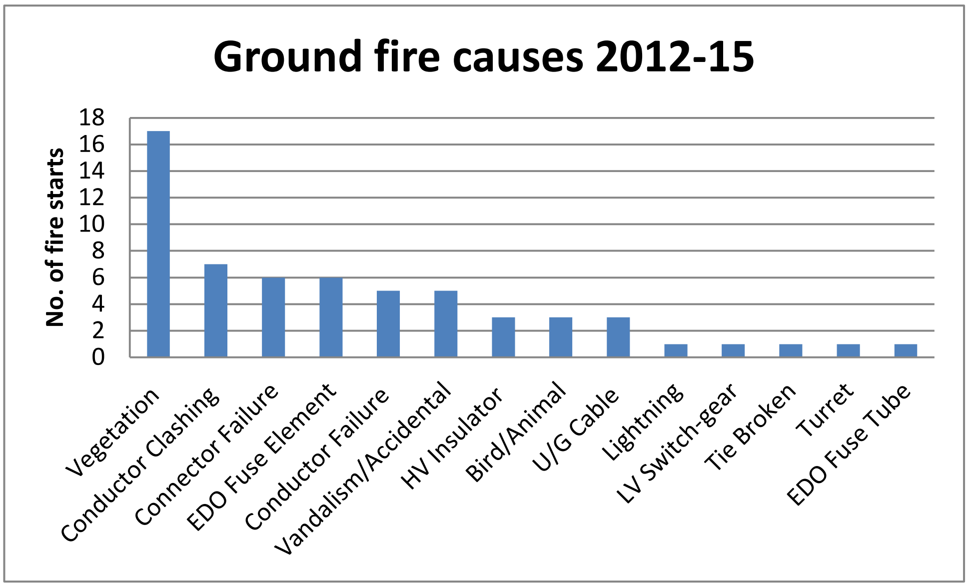


Figure 3: Causes of fires initiated by overhead distribution network assets

TasNetworks continues to analyse fire start data, however the collection of this data is still largely a manual process and, due to relatively small number of fires per annum, the conclusions drawn from it tend to be subjective. The data analysis relies on a query of outage data searching for fire related words (e.g. spark, flame, burn) and then each extracted entry is examined and a cause and effect manually assigned.

Due to improvements in analysis, data from July 2012 onwards is considered to be more reliable than earlier extracts and is the most comprehensive analysis done to date. Whilst data post 2012 shows an increase in fire starts, this is thought to be an outcome of improved data rather than a real increase of fire start incidents. Pre-2012 data is thought to be unreliable and therefore is not included within any ongoing statistical or modelling analysis.

With the introduction of mobile computing and field closeout of jobs, further improvements in data integrity and analysis are expected.

8.2 Benchmarking

TasNetworks is continually improving the tools and processes by which it collects fire start data. The data collected then allows TasNetworks to benchmark results with other local and interstate counterparts or agencies. These benchmarking exercises are critical to ensure ongoing improvement.

It is important that performance and outcomes of bushfire mitigation strategies and plans are monitored and measured to ensure compliance and enable continuous improvement opportunities.

TasNetworks' suite of bushfire mitigation performance indicators are aligned with the BFM strategic objectives of:

- minimising fire starts;
- achievement of compliance;
- establishing measurements and targets, and
- mechanisms for review and continuous improvement.

The indicators have been developed to enable TasNetworks to measure:

- preparation leading into each bushfire season
- performance throughout the bushfire season, as well as
- review and benchmarking performance for each year against interstate distribution businesses and long term trends within Tasmania.

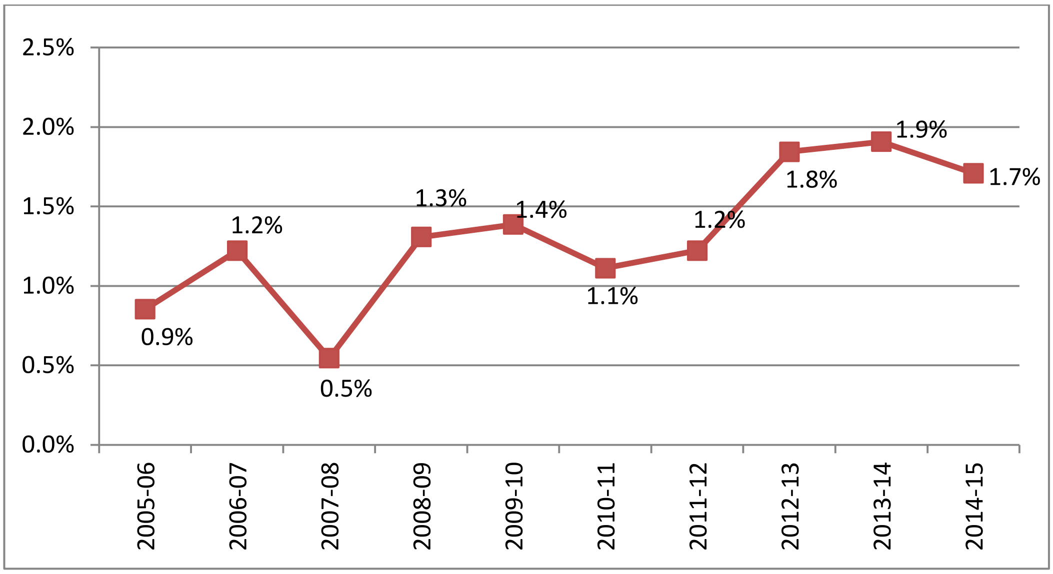
The indicators are developed through four main sources, being:

- the Bushfire Mitigation Preparedness Index (BPI);
- TasNetworks' asset register 'WASP' (which incorporates InService fault data);
- Australian Incident Reporting System (AIRS data), via the Tasmanian Fire Service; and
- Victorian DNSP F-Factor reporting to the Australian Energy Regulator (AER).

8.2.1 Fires caused by electrical assets as % of total vegetation fires attended by TFS

The Australian Incident Reporting System (**AIRS**) data provided by TFS shows all fires started by TasNetworks' distribution assets as well as TFS bushfire attendances (distribution asset fire data is also cross referenced with WASP data). This data enables TasNetworks to measure the ratio of bushfires started by distribution assets in Tasmania as a percentage of all bushfires started within Tasmania. Figure 4 shows the percentage of vegetation fires attended by TFS that were caused by distribution electrical infrastructure.

Figure 4: Fires caused by electrical assets as % of total vegetation fires attended by TFS



As this indicator compares against the total number of bushfires attended by TFS annually, it also includes the usual seasonal variations seen from year-to-year whereby extended periods of drought or wetter than usual years will have a positive or negative impact upon the total number of bushfires experienced across the State.

Monthly, annual, and long term (10 year) averages allows TasNetworks to analyse bushfire starts by distribution assets within the Tasmanian context.

The national average for number of vegetation fires started by distribution power lines is quoted as between 1% to 4% of all vegetation fires, (reference from VBRC). Using the data provided by the TFS, TasNetworks has averaged 1.3% over the last ten years, which is good compared to the national average.

8.2.2 TasNetworks fires caused by electrical assets compared to Victorian distribution network service providers

The Victorian Government legislated an ‘f-factor scheme’ which began in 2012. The purpose of the scheme is to provide an incentive for Victorian distribution network service providers (DNSPs) to reduce the risk of fire starts and to reduce the risk of loss or damage caused by fire starts. The DNSPs are required to provide reports of the fires they start each year.

Under the scheme, the AER sets an annual target number of fire starts for each DNSP against which its actual performance is compared. The AER determines the actual number of fire starts for each DNSP based on fire start reports provided by the DNSPs’ and other information collected by the AER.

TasNetworks reviews’ its own performance against some of the VIC DNSPs by arranging network related fire incidents in the same classification formats to extrapolate several key high level benchmarks such as:

- % Ground fires per 1000 km route length;
- % Ground fires per 10,000 poles;
- % of asset failures causing ground fires; and,
- % of fires started by asset category.

Benchmarking against Victorian DNSPs is beneficial to TasNetworks, as they are viewed throughout the industry as leading in the field of bushfire mitigation given recent scrutiny and outcomes of Victorian Bushfire Royal Commission following the 2009 Black Saturday bushfires. Benchmarking against industry best practices assists in driving continuous improvement initiatives' ensuring TasNetworks keeps pace with industry developments. An on-going challenge for TasNetworks will be keeping up with the benchmark established by Victorian DNSPs. This is largely due to the additional capital that the Victorian Government provides to the businesses outside of the AER revenue allowance. This capital investment is significant and will result in improvements to asset management practices and reduction in fire starts as a direct result.

Whilst 2014 data is not available at this time for comparative analysis, Table 6 shows TasNetworks' ground fire performance as compared to Victorian DNSPs in 2013.

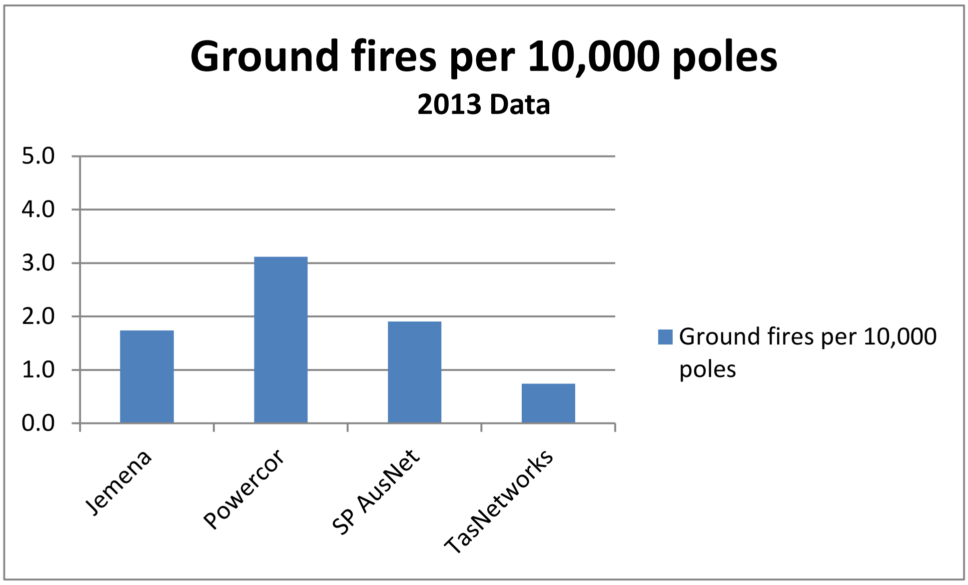


Figure 5: Electricity Caused Ground Fires Compared to Victorian Distribution Network Service Providers

TasNetworks will continue to benchmark performance with Victorian DNSPs (and others where possible) as and when new data becomes available.

8.3 Reporting

The monthly bushfire mitigation report enables managers to maintain a consolidated overview of critical activities that are carried out as part of the annual program of works.

A summary of the bushfire mitigation report and the bushfire preparedness index is also reported to executive management leading into and during the bushfire season.

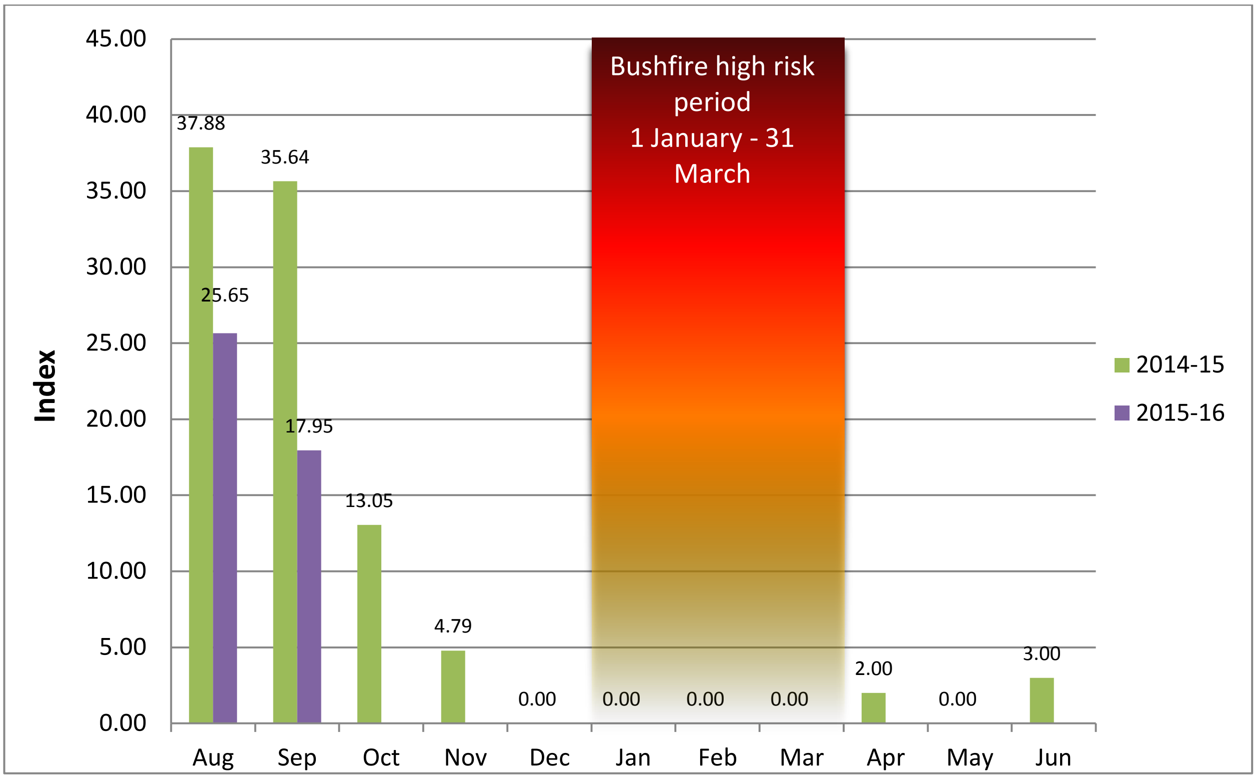
8.3.1 Bushfire Preparedness Index (BPI)

The BPI is an index of preparedness measured against key elements of the bushfire mitigation program that are scheduled to be completed prior to the bushfire high risk period (1 January to 31 March).

The objective is to reduce the index to zero by the start of the bushfire high risk period and to maintain the BPI at zero throughout the period.

An example of the bushfire preparedness index is shown in Table 6

Figure 6: Bushfire Preparedness Index



It should be noted that there is no requirement for the BPI to be zero past 31 March.

9. BUSHFIRE MITIGATION PROGRAMS OF WORK

There are various mitigation programs that TasNetworks implements on its Networks to mitigate the risk of bushfire or more specifically fire ignition. These programs are outlined in the following section.

Greater detail relating to the programs can be found within each relevant management plan.

9.1 Vegetation Management

Contact between vegetation and energised transmission or distribution network assets can:

1. Cause an electric shock:
    a. If the vegetation is damp and a person touches it; or
    b. If the contact causes the conductors fall to the ground;
2. Start a fire:
    a. Through clashing conductors causing sparking; or
    b. Conductors in contact with dry vegetation, either in the air or on the ground, igniting the vegetation;
3. Interrupt power supply as a result of the faults caused by phase/phase or phase/earth contacts; and
4. Cause damage to the powerline through falling branches.

On low voltage distribution networks the issues typically experienced as a result of vegetation contact are:

1. Clashing conductors causing phase to phase faults; and
2. Broken conductors causing phase to earth faults or phase to phase faults.

On transmission and distribution networks direct contact may not be required to receive a fatal electric shock or start a fire, simply being too close can be a danger.

The issues typically experienced on transmission and distribution networks as a result of vegetation contact are:

1. Clashing conductors causing phase to phase faults;
2. Branches bridging across two or more lines causing phase to phase faults;
3. Vegetation contacting (or coming near to) a single conductor causing phase to earth faults; and
4. Broken conductors causing phase to earth faults or phase to phase faults.

Photo 1: High voltage distribution conductor clash

Photo 2: High voltage distribution phase/phase fault

Photo 3: High voltage distribution phase/earth fault

Photo 4: Multiple broken conductors on distribution network

Injuries can result to anyone climbing the vegetation in proximity to powerlines as it may allow them to come within the danger zone and receive an electric shock.

If the damage to the powerline causes the conductor to break, this may result in:

1. Live wires falling to the ground or on to fences which may:
    a. Cause electric shock to the public; or
    b. Start a fire;
2. Live wires falling on to other conductors below them causing power surges which may:
    a. Damage equipment; and
    b. Cause electric shock to people touching the equipment.

As wind, temperature, the weight of the conductor and the distance between the poles can cause overhead conductors to swing and sag, the clearance zone between vegetation and conductors needs to take into consideration the dynamic nature of the conductors.

As the fault level (the current expected to flow in a fault scenario) and the danger zone around a conductor vary with the voltage of a powerline, different vegetation management practices are required when managing the risks associated with vegetation around transmission and distribution conductors.

On average, TasNetworks records approximately 500 instances of vegetation related outages every year with an average of 6 fire starts per year resulting from vegetation. Typically these outages occur on the distribution network, with only seven vegetation related outages occurring on the transmission networks within the last 10 years.

Due to the types of asset failures that it causes, vegetation related fire starts are considered an extreme fire risk to TasNetworks. Accordingly, a specific vegetation management program has been developed and operated by a dedicated team within TasNetworks.

TasNetworks conducts a vegetation clearing program that is aimed to achieve code compliance as required by Chapter 8A of the TEC and as defined within the Transmission Lines Easement Asset Management Plan..

In addition to the clearing program, on an annual basis between 1 September and 31 December, 3,300km of rural distribution feeders within the HBCA are patrolled and cleared of vegetation that has grown too close to powerlines.

The annual pre-summer inspection process is designed to ensure unseasonal re-growth events that may occur between cycles are identified and cleared prior to the onset of the bushfire season. The pre-summer program also acts as an additional check of programmed works that occurred within the HBCA throughout the year.

Further detail regarding TasNetworks' vegetation management program can be found within the Vegetation Asset Management Plan (VAMP) and the Vegetation Operational Management Plan (VOMP) (References 7 and 8).

9.1.1 Proposed OPEX Plan

Table 7: Vegetation Management OPEX Spend

Network	2014-15	2015-16	2017-24
Distribution	$10,950,000	$10,950,000	$10,950,000 pa
Transmission	$3,100,000	$3,100,000	$3,100,000 pa

9.1.2 Proposed CAPEX Plan

Table 8: Vegetation Management CAPEX Spend

Network	2014-15	2015-16	2017-24
Distribution	$235,000	$0	$500,000 pa
Transmission	na	na	na

Distribution CAPEX includes identified programs where relocation or undergrounding of assets will deliver improved risk and performance outcomes.

There are no CAPEX programs specifically targeting vegetation management for the transmission network.

9.2 Asset Management Risk Treatment Trade-Offs

There is a fundamental requirement for TasNetworks to periodically inspect its assets to appropriately and effectively target preventative maintenance programs and to ensure the physical state and condition of the asset does not represent a hazard to the public.

Other than visiting the assets, there is no other economic solution to satisfy this requirement as online condition monitoring techniques are not economically feasible for OH system assets.

Land based inspection is the only practical way to monitor transmission tower footings and decay rates in poles, but there are various monitoring techniques can be utilised for other OH system assets. Aerial and land based surveys of conductors, fixtures and switchgear are both possible.

Corrective maintenance on poles (i.e. replacing a pole after it has failed) incurs a considerably higher cost than preventative maintenance (i.e. replacing or staking a pole prior to failure) and can impact consumer service levels significantly. Given that weather conditions exceed design standards from time to time, a portion of corrective maintenance is always expected. The key trade-off TasNetworks monitors is the cost incurred inspecting poles versus the premium incurred from corrective maintenance, and more importantly the level of impact on consumer service levels.

For some assets such as surge arrestors and overhead LV ABC cables, deterioration of components are very difficult to identify and/or provide preventative maintenance strategies. In these situations corrective maintenance and/or asset replacement is considered a viable alternative (subject to assessing fire and other risk factors).

9.3 Equipment and Design Standards

While routine and non-routine maintenance activities can significantly reduce the likelihood of fire ignition for existing assets, a significant strategy in the mitigation of bushfire risk is to ensure that the network is initially built to a standard that will minimise the risk of TasNetworks' assets initiating fires.

To drive operational efficiencies, selection of the best available assets and standardisation across the network is a key element to driving down TasNetworks' operating costs. In addition to achieving purchasing savings through economies of scale, if a structured approach is taken spares management, maintenance practices and operating procedures can all be simplified.

TasNetworks maintains a set of technical specifications to control the nature and type of assets being purchased for deployment into the network. These specifications include 'fire-safe' alternatives to be used in fire danger areas.

TasNetworks' design and construction standards and planning manuals provide details on how this equipment is to be deployed in the network.

9.4 Asset Management (Distribution)

In addition to asset related failure that cause fires (as shown in Figure 3), there are also a number of asset related failures that have the potential to cause fires, but did not necessarily cause a fire at ground level. These failures are identified through the data query which searches for fire related words such as 'spark', 'flame', 'burn', etc.

During the period July 2012 to March 2015, 635 instances were recorded where the data search returned positive for these related fire words.

Figure 7 shows the percentage of asset related issues identified as potential ground fire starts.

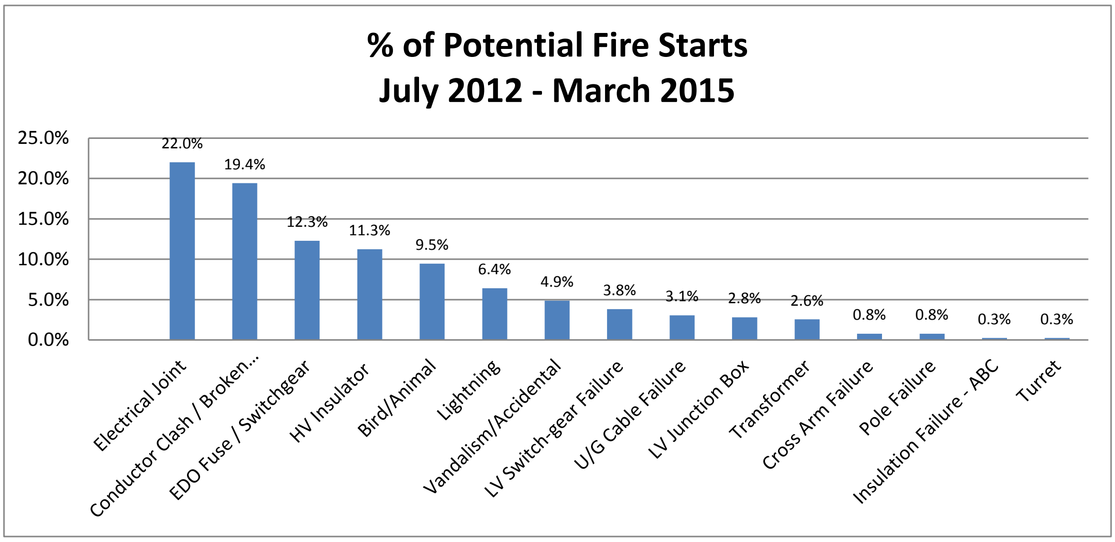


Figure 7 – Potential fire starts July 2012 to March 2015

Approximately 70% of all asset failures (omitting vegetation) that resulted in, or had potential to result in, a fire at ground level can be attributed to the five main categories of:

- Electrical Joints
- Conductor (clash / broken / tie)
- EDO (fuses / unspecified HV switchgear)
- HV insulators (broken / damaged)
- Birds / Animals

By working through the risk management process (as described within Section 7) these specific assets and failure modes have been assessed to determine whether appropriate risk treatment controls are in place.

Table 9 below describes mitigation measures in place for each of the major distribution asset categories relating to potential fire starts.

Table 9: Summary of Causes and Fire Risk (Distribution Assets)

Cause	Fire Risk	Mitigation Measures	Routine or non-routine maintenance	Program Ref
HV Loops and Links	Very High	Defects detected through routine inspection program (AIOHS) and repaired through non-routine Asset Repair (AROCO)	non-routine	AIOHS AROCO
HV Fittings	Very High	Identified through Thermal Imaging Inspections (AIOTI)	routine	AIOTI
Clashing Conductors	Very High	Addressed through a range of programs including Asset Repair (AROCO) and Replace/Relocate HV (REHVE)	non-routine	AROCO REHVE SIFIC
Clashing Conductors	Very High	LV Spreader programs addressed through retrofit program	non-routine	SIFIC
Conductor Failure	Very High	Address conductor failure through vibration by retrofitting vibration dampers	non-routine	SIFIC
Conductor Failure	Very High	Addressed indirectly through a number of non-bushfire specific programs such as VEGEM, SIWES, etc (refer relevant AMPs) as well as general asset repair such as AROCO. Most failure prone conductors targeted under REMCU, REMGI replacement programs (primary driver for these is safety rather than specifically fire mitigation).	non-routine	AROCO
Conductor Tie Failure	Very High	Defects detected through routine inspection program (AIOHS) and aerial inspection program (AIOFD) repaired through Asset Repair (AROCO)	non-routine	AIOHS AIOFD AROCO
HV Fuses	High	Program developed to install Boric Acid fuses in place of Emulsion Drop Out (EDO) fuses	non-routine	SIFIC
Air Break Switches	High	Air break switch replacement program	non-routine	REOHS
HV Insulators	High	Defects detected through routine inspection program (AIOHS) and repaired through Asset Repair (AROCO)	routine & non-routine	AIOHS AROCO
Bird and Animals	High	Addressed indirectly through Wildlife Endangered Species Protection (SIWES - not specifically a bushfire mitigation program) and AROCO	non-routine	AROCO

For further detail relating to each of the asset categories, please refer to the appropriate asset management plans:

- Asset Management Plan – Structures (Reference 9)
- Asset Management Plan – Conductors (Reference 10)
- Asset Management Plan – Switchgear (Reference 11)
- Asset Management Plan – Transformers (Reference 12)

A summary of asset failure modes presenting a fire ignition risk can be found in Appendix D.

9.4.1 Routine Maintenance (Distribution)

There are several routine inspection programs relevant to bushfire mitigation which all aim to detect defects before they develop into major faults. These preventive maintenance strategies have been created within the asset management system. This system generates time based work orders for inspection and maintenance planning. A summary of routine distribution maintenance programs can be found within the Overhead System Structure Asset Management Plan.

All programs are supported by the Network Procedure (**NP R AM 03**) Identification and Management of Overhead Line Defects (Reference 13) which describes defect management procedures for asset component defects.

NP R AM 03 covers:

- identification;
- recording;
- assigning of priorities; and
- timeframes for repair.

It also lists those defects that present a fire risk, which are then assessed against predetermined criteria to determine their risk and prioritised for remedial action. These are presented in Appendix D.

9.4.2 Non-routine Maintenance (Distribution)

TasNetworks' general asset repair program covers the repair of minor defects that have been identified and have the potential to cause asset failure in the future or shorten the expected life of the asset. Public risk and reliability are the main drivers.

The majority of these defects are reported through the routine line inspection program and include minor work involving asset repair such as re-fixing loose material, replacing possum guards, removing operating platforms, as well as repairs of defects linked to high fire risks.

In addition TasNetworks' Fault/Call Centre receives ad hoc asset and vegetation defect reports from employees and the public that are managed as per the defect priority in NP R AM 03.

More details of these programs can be found within the Overhead System and Structures Management Plan (Reference 9).

9.4.3 Proposed OPEX Plan (Distribution)

Table 11: Asset Fire Mitigation OPEX Investment

Category Code	2014-15	2015-16	2017-22 (pa)
AIOHS	$ 2,205,000	$ 2,360,000	$ 3,186,000
AIOFD	$ 422,000	$ 460,000	$ 389,000
AIOTI	$ 430,000	$ 430,000	$ 126,000
AROCO	$ 3,890,000	$ 3,860,000	$ 2,800,000
Total	**$ 6,947,000**	**$ 7,110,000**	**$ 6,501,000**

Note, all bushfire related programs with the exception of Aerial Inspections (AIOFD) include non-fire related work also.

The differences in OPEX between years are due to:

- expansion of inspections into three separate programs (standard pole inspections, the new aerial inspections, and full rollout of the thermal imaging inspections);
- increase of the pole inspection aspect of AIOHS due to increased aerial patrols; and,
- longer term decrease in general repair program AROCO.

9.4.4 Proposed CAPEX Plan (Distribution)

Table 12: Overhead System CAPEX Investment

Category Code	2014/15	2015/16	2017/22 (pa)
SIFIC	$ 150,000	$ 50,000	$ 2,000,000
REHVE	$ 256,000	$ 250,000	$ 500,000
REOHS	$ -	$ -	$ 970,000
Total	**$ 406,000**	**$ 300,000**	**$ 3,470,000**

Changes in CAPEX expenditure are due to:

- bushfire mitigation program (SIFIC) expenditure has increased due to recent risk reviews;
- replace/relocate HV (REHVE) expenditure has increased due to recent risk reviews and,
- HV switchgear replacements are now included in REOHS program.

9.5 Asset Management (Transmission)

Transmission assets are designed and constructed to higher levels of security and reliability than distribution assets. For this reason vegetation inspections and subsequent clearing or removal (Section 9.1) of vegetation from around transmission assets is the primary form of bushfire risk mitigation employed by TasNetworks.

However, several transmission asset management programs are in place that ensure safety and supply reliability, while also providing some level of mitigation against bushfire ignition.

There are no operational or capital programs of work applied to the transmission network specifically for the purposes of bushfire risk mitigation.

Programs that assist in risk mitigation include:

- wood pole replacements with steel poles;
- K-pole replacements;
- renewal of conductor assemblies;
- renewal of insulator assemblies;
- renewal of support assemblies;
- tower foundation refurbishment and renewal; and
- routine asset inspections.

9.5.1 Proposed OPEX Plan (Transmission)

Table 13: Transmission OPEX Investment

Program	2014-15	2015-16	2016-19 (pa)
Conductor Assemblies	$ 156,468	$ 369,106	$ 369,106
Insulator Assemblies	$ 703,974	$ 437,795	$ 437,795
Support Assemblies	$ 483,869	$ 488,512	$ 488,512
Foundations	$ 157,559	$ 580,509	$ 580,509
Routine Inspections	$ 748,044	$ 868,770	$ 868,770
Total	**$ 2,149,914**	**$ 2,744,692**	**$ 2,744,692**

9.5.2 Proposed CAPEX Plan (Transmission)

Table 14: Transmission CAPEX Investment

Program	2014-15	2015-16	2016-17	2017-18	2018-19
K-Pole renewal program	-	-	-	-	$ 6,825,510
Wood pole renewal programs	$ 398,366	-	$ 1,269,000	$ 1,425,000	-
Total	**$ 398,366**	**-**	**$ 1,269,000**	**$ 1,425,000**	**$ 6,825,510**

10. NEW TECHNOLOGIES/ INITIATIVES

10.1 External

TasNetworks has been actively involved with the Energy Networks Association (ENA) bushfire workshops and various other industry groups that have exposed TasNetworks to new and emerging technology and management processes throughout the industry.

Some technologies have already been trialled and implemented within TasNetworks (such as PHOENIX bushfire modelling and ‘Fuse Saver’ protection systems).

Other emerging technology and management processes currently implemented or under trial by interstate DNSPs include:

- Light Detection And Ranging (LiDAR) technology;
- new insulated conductors (Hendrix cable);
- faster acting protection systems;
- improved asset inspection techniques;
- benchmarking initiatives; and
- Improved management processes on TFB days.

TasNetworks will continue to monitor the progress of these developments and continue trials in areas where it is thought such technology could benefit TasNetworks’ circumstances.

10.2 Internal

A process of continuous improvement within TasNetworks has identified a number of aspects of its bushfire mitigation strategy that requires review and potential improvement. These include:

- considering high soil dryness experienced on the central east coast in recent years, review HBCA boundaries and underlying modelling;
- assess the likely impact of El Niño conditions on the Tasmanian bushfire risk outlook;
- verify appropriateness of FDI triggers to ensure that the approach adopted interstate on total fire ban days is still relevant to the Tasmanian environment;
- review whether there is a need for additional bushfire risk mitigation activities for vegetation/assets in the vicinity of transmission lines in the HBCA;
- review the BPI reporting framework to ensure bushfire preparedness continues to be reported in the most effective manner.

11. LIAISON WITH OTHER ORGANISATIONS

Several meetings between TasNetworks and other key agencies (including TFS, SES, DEIR and BoM) highlighted the requirement for formal pre-bushfire season meetings to:

- discuss relevant developments within each agency;
- to ensure each agency understands the high level strategies that will be applied during the bushfire season; and,
- to confirm communication methods and processes to be utilised during the bushfire season.

Meetings have been occurring annually in September and are scheduled into TasNetworks' Bushfire Mitigation Calendar of Events.

12. OPERATIONAL AND SYSTEM ACTIVITIES TRIGGERED BY DECLARATION OF A TOTAL FIRE BAN DAY

The Control Room Procedure for Days of Total Fire Ban (NP R NO 16) details the actions to be taken by the Control Room in the event of the declaration of a Day of Total Fire Ban.

The procedure includes detail regarding:

- pre bushfire season SCADA testing for communication devices;
- communications with TFS;
- internal notification and advice;
- TFB day initiation/cancellation of activities;
- flow chart of activities; and,
- responsibilities.

13. INCIDENT CONTROL SYSTEM (ICS) PROCESS AND BUSHFIRE PREPAREDNESS

TasNetworks has a well-defined ICS process in place to manage incidents in real time, such as a major bushfire in the vicinity of powerlines. For example, the ICS process will not currently be implemented within TasNetworks on a Total Fire Ban day unless a fire ignites and threatens TasNetworks' infrastructure.

This process has been reviewed and now integrates the existing ICS process into days of increased bushfire risk through the introduction of a 'pre-ICS phase' on days of Total Fire Ban.

14. PROACTIVE DISCONNECTION OF POWERLINES

Section 4.5 of the Powerline Bushfire Safety Taskforce (PBST) report discusses the concept of deliberately turning of powerlines on a temporary basis and concluded that, "under most circumstances, the potential impact on the community that may result from the deliberate turning off of powerlines on a temporary basis outweighs the risk of leaving them in service". The PBST also acknowledged that "There will only be limited circumstances where deliberate turning off of powerlines on a temporary basis is warranted on a lowest overall risk basis. However, this precaution may be reasonable and practicable in those limited circumstances".

Proactive disconnection of powerlines may occur in circumstances where safety is a major concern or in the event where urgent maintenance (that could result in a bushfire) exists on a day forecast to see elevated Fire Danger Ratings.

TasNetworks' Bushfire Mitigation Preparedness Index is designed to ensure planned maintenance activities are monitored and completed prior to the summer period and therefore avoid this situation; however it is possible that such a maintenance item could be identified throughout the bushfire season.

There is no previous history of TasNetworks proactively disconnecting a powerline on a day of Total Fire Ban due to outstanding maintenance posing significant bushfire risks.

15. CONTROLS FOR FIELD BASED EMPLOYEES RESPONDING TO BUSHFIRE THREATS

TasNetworks has developed workplace health and safety processes for field crews acting in response to bushfires, including the requirements for risk assessments to be completed prior to entry into high bushfire risk areas. (Work Practice GE-WP-014 Total Fire Ban Response Plan - Reference 16)

16. CUSTOMER IMPACT OF TOTAL FIRE BAN DAY PROTECTION SETTINGS

Auto reclosers exist in the distribution system as part of a protection system designed to achieve a balance between protection reliability and protection security.

Protection reliability and protection security are opposing drivers in the design of power system protection.

Bushfire mitigation objectives can also be in opposition to reliability.

Whilst an initial asset related fault may cause ignition of vegetation in close proximity to the faulted asset, the continued attempts at reclosing onto the HV system due to operation of on auto-recloser will increase the risk (likelihood) of ignition.

For this reason, the auto-reclose facilities on all protection devices supplying areas within the total fire ban area defined by TFS are disabled on days of total fire ban.

A recent review of the effect of this strategy over the previous three years has found that the maximum potential contribution to system SAIDI and SAIFI of this disabling of auto-reclose functionality is approximately 0.5 per cent. Actual contribution to system SAIDI and SAIFI would be somewhat less than the maximum potential, as it is reasonable to assume that some of these outages would have occurred regardless of the auto-reclose facility being disabled.

Table 15: Potential contribution to system SAIDI and SAIFI as a result of disabling auto-reclose functionality on TFB days

Potential contribution to system SAIDI & SAIFI as a result of disabling auto reclosers on TFB Days					
Year	**TFB Days**	**Sum of system SAIDI**	**Sum of system SAIFI**	**% of total annual SAIDI**	**% of total annual SAIFI**
2011/12	3	0.79	0.01	0.3%	0.5%
2012/13	11	2.24	0.02	0.5%	0.7%
2013/14	8	1.37	0.01	0.4%	0.4%
3 yr Average	7	1.47	0.01	0.4%	0.5%

It is determined that the positive impact of this policy decision (reducing the likelihood of causing bushfires) outweighs the relatively minor negative impacts on customer reliability (0.5% increase to SAIDI & SAIFI).

17. COMMUNITY AWARENESS

TasNetworks implements an annual media campaign aimed at ensuring public awareness of potential bushfire risks associated with powerlines. The current awareness campaign is targeted at increasing the community awareness of growing trees too close to powerlines and highlights risks associated with private powerlines.

The campaign generally runs from October to January and includes various types of mediums including:

- television;
- radio;
- pamphlets;
- website advertisements;
- Facebook; and,
- Twitter.

Additional commentary and interviews are conducted as required and coincides with other scheduled events that occur (such as 'bushfire awareness week').

18. PROGRAM OF AUDITS

TasNetworks applies an audit regime that has been documented within the HSEQ Audit Plan and Schedule. The audit plans are to be reviewed and updated annually.

Audits are designed to ensure acceptable levels of compliance and quality are achieved. Audits are carried out via resource from program managers as well as from TasNetworks' HSEQ Quality Assurance & Risk Management Team.

Audit results are reviewed by the HESQ/QARM Audit Review Committee for effectiveness and any recommendations for improvements.

The audit plan may be adjusted depending upon the results of audits and additional audits may be carried out to ensure identified risks are adequately addressed.

Additional to routine audits, TasNetworks carries out independent audits of management plans and strategy for compliance and control effectiveness. Internal Audit plans to engage an independent third party to audit the bushfire mitigation asset management plan during the last quarter of 2015.

The office of the Tasmanian Energy Regulator (OTTER) will also carry out a compliance audit in relation to the TEC during the first quarter of 2016. This audit will focus specifically on compliance of Chapter 8A (Distribution Powerline Vegetation Management) of the TEC.

19. RESPONSIBILITIES

Maintenance and implementation of this management plan is the responsibility of the Asset and Performance Team Leader.

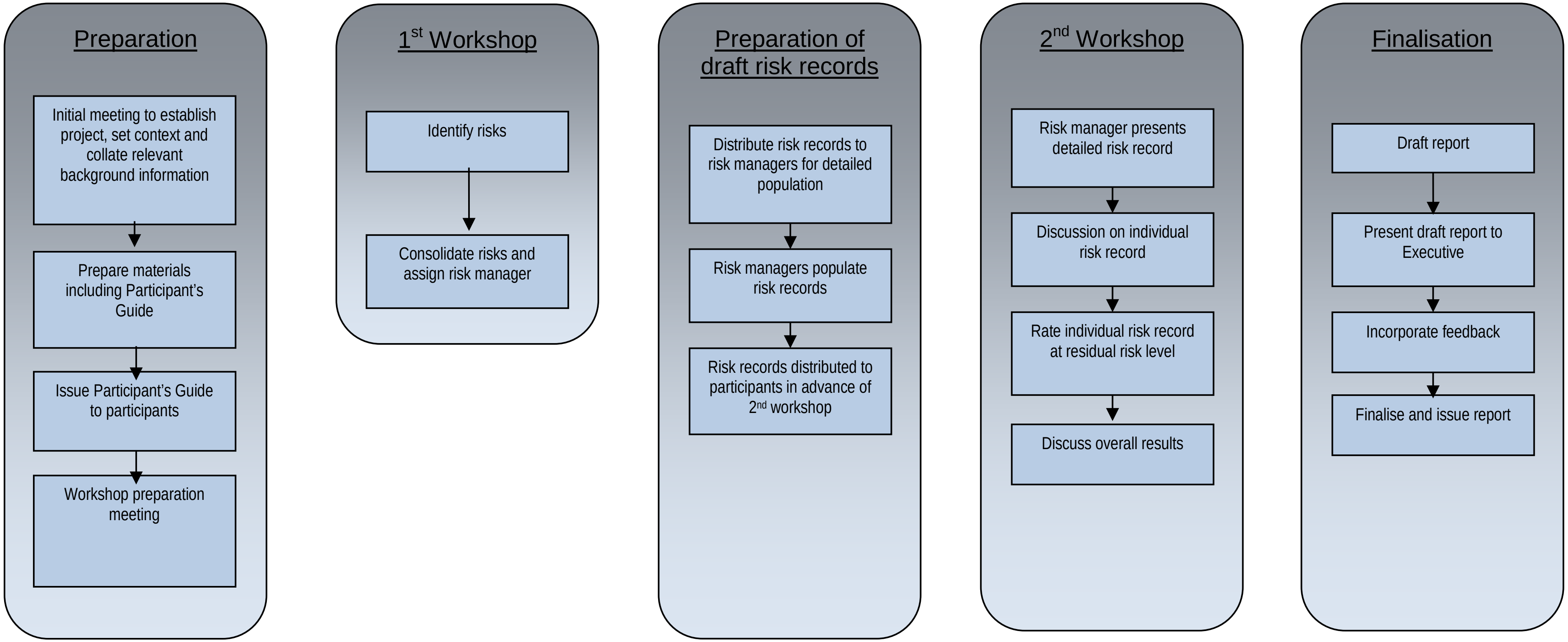
Approval of this management plan is the responsibility of the Leader Asset Strategy and Performance Team.

20. REFERENCES

1. TasNetworks Risk Management Frameworks
2. Powerline Bushfire Safety Taskforce – Final Report 30 September 2011 http://www.esv.vic.gov.au/Portals/0/About%20ESV/Files/RoyalCommission/PBST%20final%20report%20.pdf
3. TasNetworks' Key Risk Profile

4. Tasmanian Government Victorian Bushfire Royal Commission Forum presentation (NW# 30152341)
5. CSIRO – Climate Change Impacts on Fire-Weather in South Eastern Australia - Hennessy et al 2005 http://laptop.deh.gov.au/soe/2006/publications/drs/pubs/334/lnd/ld_24_climate_change_impacts_on_fire_weather.pdf
6. Fire Starts 2012 2013 Onwards (181820)
7. Vegetation Asset Management Plan (VAMP) (168300)
8. Vegetation Operational Management Plan (VOMP)
9. Asset Management Plan – Structures (R260425)
10. Asset Management Plan – Conductors (R260427)
11. Asset Management Plan – Switchgear (R181933)
12. Asset Management Plan – Transformers (R260428)
13. NP R AM 03 - Identification and Management of Overhead Line Defects
14. Transmission Line Easements Asset Management Plan (R32687)
15. Distribution Overhead Line Design and Construction Standard (R207584))
16. Work Practice GE-WP-014 Total Fire Ban Response Plan

APPENDIX A – RISK REVIEW PROCESS



APPENDIX B – RISK REVIEW SUMMARY (2014)

Description	Inherent Risk	Target Risk	Current Controls	Residual Risk	Additional Risk Treatment Controls	Status
Distribution network asset starts fire (Inappropriate asset design)	Extreme	Medium	• Specifications based on standards, guidelines and good industry practice • Assets built to design standards based on good industry practice • Fire start reporting and analysis for continual improvement • Involvement in ENA and other industry bodies • Insurance	High	• Conduct review of fault data, causes and controls • Develop operational plan • Develop longer term tactical and strategic plan • Conduct gap analysis between transmission and distribution bushfire documentation	• Complete
Distribution network asset starts fire (Inadequate asset replacement and/or maintenance strategies)	Extreme	Medium	• Reliability Centred Maintenance (RCM) assessment conducted for overhead assets • Asset replacement and maintenance strategies based on good industry practice • Fire start reporting and analysis for continual improvement • Involvement in ENA and other industry bodies • Insurance	High	• Conduct additional review of fault data, causes and controls • Develop operational plan • Develop longer term tactical and strategic plan • Conduct gap analysis between transmission and distribution bushfire documentation • (NOTE: Controls for this risk, and the previous risk, will be developed concurrently)	• Complete
Distribution network asset starts fire (Inadequate quality/ workmanship/delivery of programs)	Extreme	Medium	• Audits of work practices and quality of work • Monitoring of compliance to asset management strategies • Fire start reporting and analysis for continual improvement • Total Fire Ban Response Plan, GE-WP-014	High	• A process review to be undertaken with relevant groups regarding end to end work flow process • Inter-group discussion to develop/assess the requirement for additional control actions	• Complete

Description	Inherent Risk	Target Risk	Current Controls	Residual Risk	Additional Risk Treatment Controls	Status
Vegetation contact with distribution network asset starts fire	Extreme	Medium	• Vegetation management strategy and plans developed • Vegetation management program based on good industry practice • Audits of work practices and quality of work • Monitoring of compliance to management strategies • Involvement in ENA and other industry bodies	High	• Development of a vegetation management information technology system • Review of KPI's • Vegetation Management Plan finalised	• Partially complete – on track
Work practice starts fire	Extreme	Medium	• Restricted work practices and Adverse Weather procedure on Total Fire Ban Days • Practices aligned with good industry practice • SMS alerting workers to Total Fire Ban Days • Fire Extinguishers on Operational Vehicles • Fire Season promotion ahead of time each year • Total Fire Ban Response Plan, GE-WP-014	High	• A summary of emergency safety advice added to GE-WP-014 Total Fire Ban Response Plan. • Reiterate field staff other key aspects of GE-WP-014 Total Fire Ban Response Plan	• Complete
Fire started by third party	Extreme	High	• Community awareness / media campaigns • Alterations to operation of network on days of Total Fire Ban (TFB) • Networking with other utilities and fire authorities	High	• Review of business processes and procedures to ensure currency	• Complete
Business potentially implicated in fire start	Extreme	Medium	• Inter-agency liaison (TFS, ESS, Etc.) • Process for notification of defects to responsible authority/person • Community awareness / media campaigns • Networking with other utilities	High	• Undertake fault data cleanse (check alignment to cause codes) • Undertake fault data analysis into cause/mode/material/area & equipment	• Complete

Description	Inherent Risk	Target Risk	Current Controls	Residual Risk	Additional Risk Treatment Controls	Status
Bushfire recovery work exacerbates the impact of a bushfire	High	Medium	• Feeder patrols prior to re-energising • Control Room Procedure for Days of Total Fire Ban	High	• Reinforce the message to operators for crews to ensure faults found are most likely the cause of outages, if unsure, ensure further line patrols are carried out. • Complete and test the new fire-ban script in new SCADA system • Discuss with Asset Team the possibility of engaging sensitive earth fault protection on reclosers before attempted feeder livening on fire-ban days.	• Partially complete – on track

Note: The risk of bushfires occurring as a result of works or defects associated with private overhead power lines was not included within this review, because at the time of the review it was understood that TasNetworks would not be responsible for works associated with private power lines. Further analysis of risks associated with aspects of ongoing inspection of private power lines will be undertaken by a working group, with outcomes from this analysis incorporated and prioritised within the broader bushfire risk mitigation framework as appropriate.

APPENDIX C - BUSHFIRE MITIGATION CALENDAR OF EVENTS

Key Milestones	Milestone Dates
Review the bushfire mitigation calendar of events	Early June
Review and finalise the 'critical activities', 'denominators' and 'weightings' that will be used in the formation of the Bushfire Prevention Index.	Early August
Review bushfire mitigation plan (BFM)	Early August
Confirm target dates to complete specific fire prevention programs if changes are required from the target dates below: • Pre-summer inspection completion - 31 November annually; • Completion of all maintenance items outside policy in HBCA - 31 December annually; • Aerial inspection of transmission lines - 30 November annually; and, • Completion of all vegetation pruning in HBCA - 31 December annually. At this time contingency plans are to be developed to ensure the resources are available to complete potential outstanding works.	Assessed from August and then monthly thereafter
Arrange fire risk prevention media and brochures.	End August
Arrange TFS seasonal outlooks, liaise closely with TFS officials on expected bushfire season and adjust programs as required.	Mid-September
Attend inter-agency briefing on expected bushfire season	End September
Begin communication of fire risk prevention media and brochures.	End September
Develop Board report on bushfire mitigation for the 2015–16 bushfire season.	Early October
Provide BPI updates to the Board through the monthly performance report.	Monthly (Oct-Mar)
Review Emergency Management Plan	End October
Ensure applications have been made for total fire ban day permits from TFS.	Early November
Complete briefing of senior Leaders.	Mid-December
Complete, or have reassessed, outstanding maintenance within the HBCA.	Mid-December
Provide opportunity to TasNetworks' Senior Leadership team and/or Board members to view outcomes of bushfire risk mitigation activities in the field	End December
Complete pre-summer pruning program, or reassess priorities, within the HBCA.	End December

Key Milestones	Milestone Dates
Produce summer auditing schedules for the HBCA summer audit program.	End December
Begin auditing via the HBCA summer audit program.	Early January
Review effectiveness of fire prevention systems including: • assessing the implementation of the Bushfire Mitigation Plan (BFM); • identifying any deficiencies in the BFM or the plan's implementation through a risk review process; • improving the BFM and the plan's implementation if any deficiencies are identified.	After end of fire season
Conduct inter-agency bushfire post-season review	Mid-May

APPENDIX D - DEFECTS PRESENTING FIRE RISKS ON THE DISTRIBUTION NETWORK

Asset	Failure Modes		
Conductor	HV ABC insulation damaged	Conductor damaged by machinery/vehicles	Corroded GI conductor
	LV ABC insulation damaged	Conductor loop broken/ damaged	Corroded steel wrap
	LV spreader loose	Conductor over tensioned	Corroded tie
	ABC conductor deteriorated due to UV	Conductor rubbing on insulator	HV loop not supported
	ABC rubbing on vegetation	Conductors clashing	Live line clamp directly attached
	Birds striking conductors	Copper conductor annealed	
	Broken tie	Corroded aluminium wrap	
Earthing	Earth cable stolen/broken/damaged	Earth stake/ connection corroded	
Electrical joint	Hot joint	Transformer connections loose	Transformer connections made incorrectly
Fuse	ABB V-series EDO	EDO damaged	
Insulator	Insulator damaged	Old style pole cap with insulator attached	Polluted insulator
	JD (Disk) insulator incorrect installation split pin not installed		
Poles	Natural timber pole decayed	Railway iron pole condemned	Treated pole decayed
	Pole burnt due to fire	Spun concrete, steel and steel concrete pole condemned	Treated pole decayed
	Pole footing undermined		
Stake	Pole stake bolts loose	Livestock rubbing on stay	Stay damaged by 3rd party
	Stake deteriorated	Screw-In-Stay failure	Stay not securely attached to pole
Stay	Bow stay failed		
Steelwork	Bolt loose	Corroded steel cross arm	Nut or bolt missing/ corroded
	Bolts not double nutted	King/ strap bolts corroded	Transformer hung directly on wooden crossarm
Surge diverter	Surge diverter dirty		
Switchgear	Switchgear blade misaligned	Electrical connection u-bolts too tight	Switchgear handle bolts loose
	Electrical connection u-bolts loose	Switchgear faulty	

Asset	Failure Modes		
Timber crossarm	*Timber cross arm decayed*		
Transformers	*Arcing horns*	*Transformer leaning*	
Vegetation	*Tree fallen on pole or stay*	*Vegetation inside clearance zone*	*Vegetation near insulated conductor*
	Vegetation clashing with the conductor	*Vegetation near bare conductor*	