Asset Management Plan

Vegetation

Record Number: R282674

Version Number: 1.0

Date: October 2015

Authorisations

Action	Name and title	Date
Prepared by	Michael Emmett, Bushfire Mitigation Manager	31/07/2015
Reviewed by	Andrew Strikis, Asset Performance Team Leader	11/09/2015
Reviewed by	Tony Etherington, Major Works Deliver Team Leader	28/08/2015
Authorised by	Nicole Eastoe, Asset Strategy and Performance Leader	12/10/2015
Review cycle	2.5 years	

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 Asset Performance Team Leader with any queries or suggestions.

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

Disclaimer

UNCONTROLLED WHEN PRINTED

This document has been prepared and made available solely for information purposes. Whist care was taken in the preparation of the information in this document, and it is provided in good faith, TasNetworks make no representation or warranty (express or implied) as to the accuracy, reliability, or completeness of the information contained in this document, or its suitability for any intended purpose.

TasNetworks (which for the purposes of this disclaimer, includes all their related bodies corporate, officers, employees, contractors, agents and consultants, and those of their bodies corporate) shall have no liability for any loss or damage (including without limitation, liability to any person by reason of negligence or negligent misstatement) for any statements, opinions, information or matter (expressed or implied) arising out of, contained in, or derived from, or for any omissions from, the information in this document, except to the extent that liability under any applicable statute cannot be excluded.

In all cases, anyone proposing to rely on or use the information in this document should independently verify and check the accuracy, completeness, reliability and suitability of that information and the reports and other information relied on by TasNetworks in preparing this document, and should obtain independent and specific advice from appropriate experts or other sources.

Record of revisions

Section number	Details
	New Document

Table of Contents

1 Purpose

The purpose of this document is to describe to both internal and external stakeholders:

- TasNetworks' approach to vegetation management, as reflected through its legislative and regulatory obligations and strategic plans;
- The key projects and programs underpinning TasNetworks' vegetation management activities;
- Forecast vegetation management CAPEX and OPEX, including the basis upon which these forecasts are derived, and
- Standards and practices that are adopted to manage vegetation near powerlines.

2 Scope

TasNetworks recognises the value of vegetation and its importance to our environment. However, vegetation must be managed near distribution and transmission powerlines to maintain zero harm to individuals, the community and the environment. This must be balanced with maintaining the quality and reliability of the electricity supply. To achieve the balance between maintaining zero harm requirements, protecting infrastructure and minimising the environmental impact is a significant challenge for TasNetworks. TasNetworks commits considerable resources to undertake vegetation management.

This document covers vegetation management within the vicinity of all TasNetworks owned distribution and transmission powerlines.

3 Legislative Framework

Key legislation that requires TasNetworks to implement programs relating to vegetation management includes:

- Electricity Supply Industry Act 1995 (ESI Act);
- Electricity Industry Safety and Administration (ESI&A) Act (1997); and
- The Tasmanian Electricity Code (TEC).

3.1 Electricity Supply Industry (ESI) 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 ESI Act covers safety aspects at a high level and is implicit regarding vegetation management risks.

3.2 Electricity Industry Safety and Administration Act 1997

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

The ESI&A Act covers:

1. Powers of entry and inspection;
2. Powers to order rectification;
3. Powers to order disconnection; and
4. Emergency powers relevant to TasNetworks' vegetation management activities.

3.3 The Tasmanian Electricity Code (TEC)

The Tasmanian Electricity Code (TEC) provides, among other things, 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 TEC 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 powerlines. This framework is explicit regarding works requirements and practices in various fire hazard categories.

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

4 Compliance with the Tasmanian Electricity Code (Chapter 8A)

Chapter 8A of the TEC applies only to distribution lines; with transmission line clearing specifications un-legislated. Transmission line clearing standards are contained within the Transmission Lines Easement Management Plan.

Due to the legislative requirements to comply with Chapter 8A, and the high level of detail contained within it, this section has been developed specifically to provide clarity on how TasNetworks plans to achieve compliance with the TEC.

Compliance will be achieved through the ongoing implementation of initiatives and programs across the business, as documented within TasNetworks' strategic, tactical and operations plans and procedures throughout the organisation.

Table 1 serves as a summary as to where key components of Chapter 8A are addressed throughout TasNetworks' suite of documents in order to achieve compliance.

Table 1 – TasNetworks documentation for the achievement of compliance with TEC 8A

Clause	Title	Requirement	Reference
8A.3	Distribution Powerline Clearance Standards	Compliance with fire risk categories	Bushfire Mitigation Management Plan
8A.5.1 (a)	Maintenance of the Clearance Space	Implement a management plan that specifies an inspection cycle and/or pruning and clearing cycle which is designed to achieve, under normal growth conditions, the relevant clearance space prescribed in clause 8A.3.4. The management plan must include the Distribution Network Service Provider's risk assessment approach	Vegetation Asset Management Plan Vegetation Operational Management Plan Service Provider Contract Technical Specification
8A.5.1 (b)	Maintenance of the Clearance Space	Decide which method to adopt to ensure that the clearance space remains free of vegetation taking account the potential risk to the public, conservation and other values, and avoided costs associated with the alternatives	Vegetation Operational Management Plan Service Provider Contract Technical Specification
8A.5.1 (c)	Maintenance of the Clearance Space	If the method adopted is pruning or clearing, determine the regrowth space, hazard space and the pruning and clearing cycle	Vegetation Operational Management Plan
8A.5.1 (d)	Maintenance of the Clearance Space	Ensure that the pruning or clearing is done responsibly	Vegetation Operational Management Plan
8A.5.1 (e)	Maintenance of the Clearance Space	Give special attention to how the clearance space is maintained at important locations and the sites of important vegetation	Vegetation Operational Management Plan
8A.5.2	Assistance to the	Assist and inform the public	Vegetation

	Public with Vegetation Matters	on vegetation related matters and so that pruning or clearing activities near distribution powerlines can be undertaken safely	Operational Management Plan Service Provider Contract Technical Specification
8A.5.3	Notification, Consultation and Negotiation	Notify the occupiers of land, giving reasonable notice and consult with land owners	Vegetation Operational Management Plan Service Provider Contract Technical Specification
8A.5.6	Training	A Distribution Network Service Provider should ensure that any of its employees undertaking vegetation management in the vicinity of its powerlines, and any contractors it engages to carry out vegetation management, are appropriately trained and competent for that task.	Vegetation Operational Management Plan Service Provider Contract Technical Specification

5 Strategic Alignment and Objectives

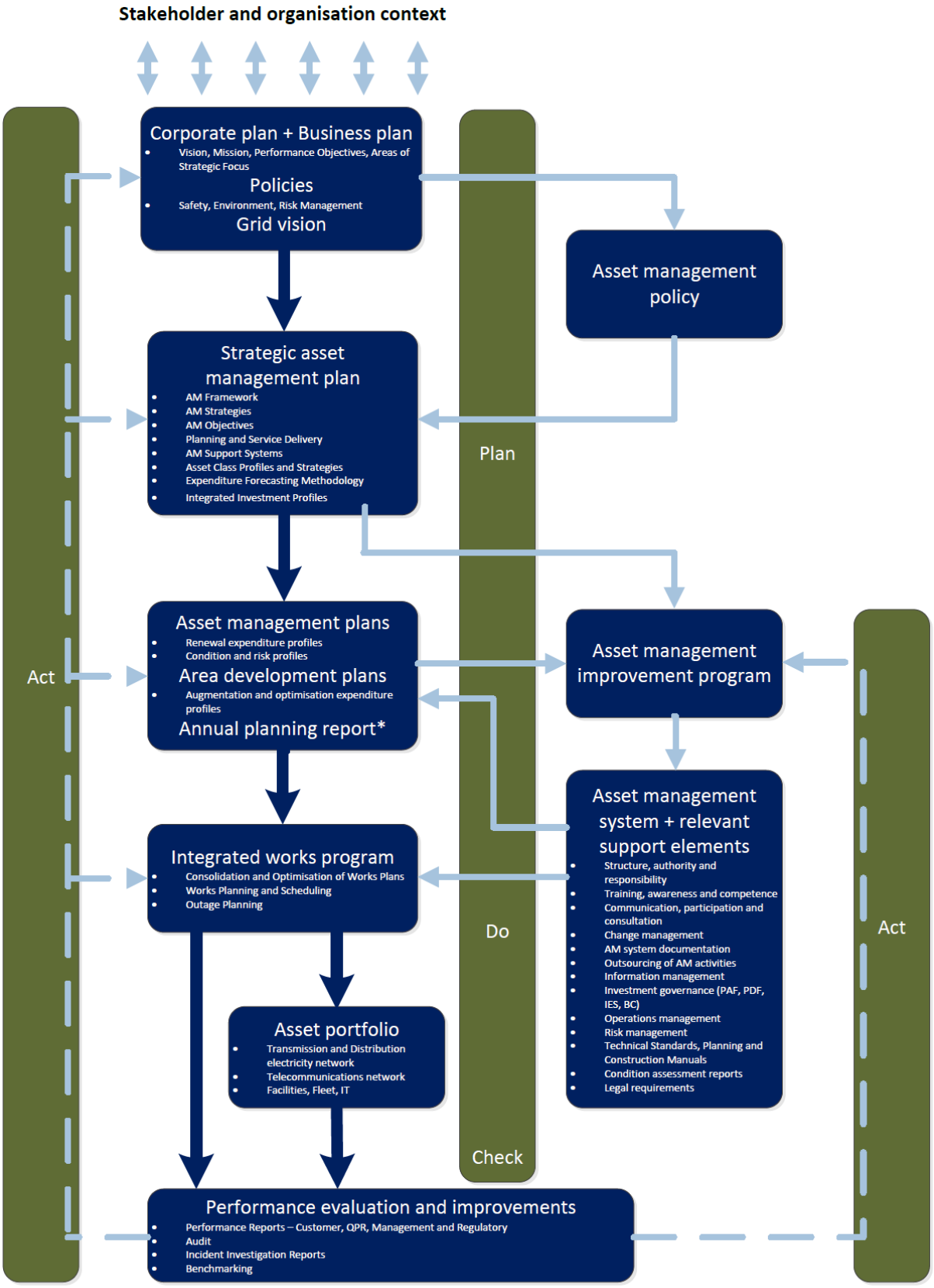
This asset management plan has been developed to align with both TasNetworks' Asset Management Policy and Strategic Objectives.

It is part of a suite of documentation that supports the achievement of TasNetworks' strategic performance objectives and, in turn, its mission. The asset management plans identify the issues and strategies relating to network system assets and details either the strategic approach, or the appropriate activities that need to be undertaken to address the identified issues.

Figure 1 represents TasNetworks' document framework that supports 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 Vegetation Asset Management Plan is a key strategic asset management plan within the asset management document framework. There are a number of documents within the asset management document framework that ensure TasNetworks is able to achieve its asset management objectives. Of these, the Vegetation Operational Management Plan (VOMP) is critical in translating the strategic requirements of the VAMP into tactical and operational activities that are not only deliverable, but will achieve the business objectives.

Figure 2 – 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.

The Vegetation Asset Management Plan (VAMP) will:

- Establish the business and operating context for TasNetworks' vegetation management program;
- Establish position and objectives to mitigate risk to acceptable levels, and
- Establish the suite of programs and strategic initiatives (projects) to be planned and implemented to achieve the objectives

The Vegetation Operational Management Plan (VOMP) will:

- Provide detail on multiyear and annual vegetation management programs;
- Detail of what work is to be done within the program period;
- Outline the resource commitments (including responsibilities);
- Specify the compliance standards (quality) for work to be done;
- Stipulate timeframes for work to be done;
- Outline the budget and other financial management processes, and
- Outline the auditing and reporting regime

Vegetation management operational documentation will include documents that aid in the delivery of the works, such as:

- Standards;
- Guidelines;
- Contract Technical Specifications; and
- Procedures

5.1 Vegetation Management Position Statement

TasNetworks' vegetation management position statement reflects the vision for a resilient network that delivers low cost, sustainable energy to an engaged and knowledgeable customer base.

The Business Strategies outlined in TasNetworks' Corporate Plan are designed to achieve the Business Strategic Objectives. Implied in these strategies are the business imperatives of maintaining safety, reliability and sustainability.

In accordance with this, TasNetworks will:

1. Maintain network performance;
2. Minimise the risks of interaction between vegetation and overhead powerlines, namely;
    a. Safety of the public and employees;
    b. The potential for fire ignition; and
    c. The potential for asset damage;
3. Comply with legislative, regulatory and statutory requirements;
4. Consider the safety of the community as a whole and employees engaged in the provision of services;

5. Ensure activities are managed in a way that minimises impact on the environment; and recognises community expectations;
6. Regularly review and develop management frameworks to ensure compliance with policies at the lowest sustainable cost; and
7. Ensure the skills, tools and processes within the business are of sufficient quality so as to facilitate the effective implementation of the strategies outlined in this document.

5.2 Vegetation Management Objectives

The following vegetation management objectives have been developed to align with TasNetworks' Strategic Plan and the vegetation management position.

The objectives of the Vegetation Asset Management Plan are to:

1. Cause no significant safety or environmental incidents as a result of vegetation management activities;
2. Minimise the cost of vegetation management to a sustainable level;
3. Maintain risk such that the residual risks posed by vegetation is 'As Low As Reasonably Practicable', taking into consideration any expressed or implied duty of care;
4. Promote collaboration with both state and national regulatory bodies in collectively improving our vegetation management efficiency and effectiveness;
5. Achieve compliance with the relevant legislative, regulatory and statutory requirements;
6. Promote a vegetation management contracting framework that is sustainable in the long term, and that delivers value to Tasmanian customers;
7. Demonstrate commitment in carrying out corporate and community responsibilities;
8. Establish performance measures, targets and reporting framework for vegetation management; and
9. Have a formal, documented management framework in place for vegetation management that includes mechanisms for review and continual improvement.

6 Risk Management

TasNetworks' Integrated Risk Management Model provides the essential supporting structure for risk management in TasNetworks. The Risk Management Model is based on the Australian/New Zealand Standard for risk management AS/NZS ISO31000 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.

The two highest risks associated with vegetation management have been assessed as:

1. The risk of a bushfire starting as a result of vegetation coming into contact with TasNetworks assets, and
2. The risk of TasNetworks asset failures causing injury or death to members of the public as a result of vegetation coming into contact TasNetworks assets.

6.1 Risk of bushfire caused by vegetation contact

In the context of a vegetation related fault starting a bushfire, the inherent risk is rated as Extreme (Likelihood = Almost Certain, Severity = Severe).

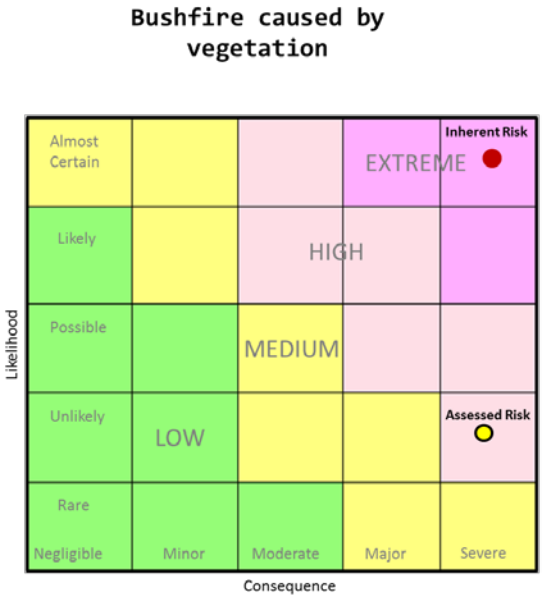
TasNetworks' risk appetite is to see the overall risk reduced to Medium by reducing the Likelihood of the risk to Rare (Likelihood = Rare, Severity = Severe).

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

It is acknowledged that in the context of bushfire mitigation, whilst TasNetworks has many risk controls in place, the majority of the controls are aimed at reducing Likelihood of a bushfire occurring, 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 a level that is as low as is reasonably practicable.

Figure 2 shows the inherent and assessed risk of bushfire caused by vegetation.

Figure 2 – Risk matrix for bushfire caused by vegetation contacting TasNetworks' assets



6.2 Risk of vegetation related asset failures causing injury or death

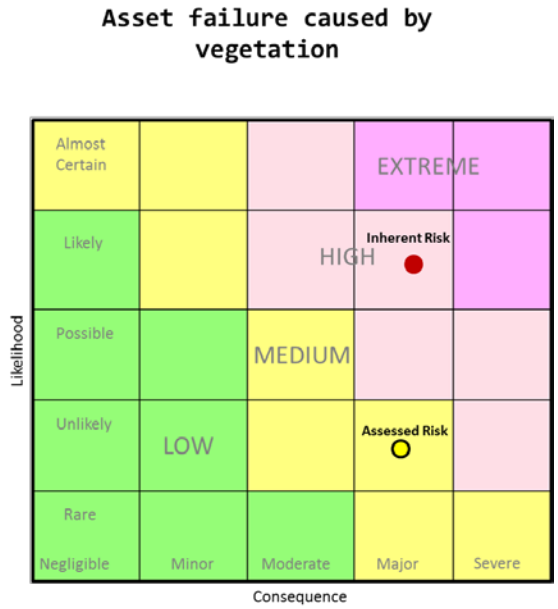
In the context of a vegetation related fault causing an asset failure resulting in injury or death, the inherent risk is rated as High (Likelihood = Likely, Severity = Major).

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

The most recent risk review sees the risk ranked as High (Likelihood = Unlikely, Severity = Major). Continued program improvements, strategic initiatives and actions are aimed at reducing the risk to as low as reasonably practicable.

Figure 3 shows the inherent and assessed risk of asset failure caused by vegetation.

Figure 3 – Risk Matrix for asset failure caused by vegetation causing injury or death



7 Vegetation Profile

TasNetworks' electrical network extends across the state of Tasmania. The electrical infrastructure crosses land with multiple tenures and uses, however native vegetation is predominant across the state in areas such as state forest reserve, national parks and local government areas.

By overlaying a GIS vegetation classification thematic (Provided by the Department of Primary Industries, Parks, Water and Environment) that separates Tasmania into different vegetation classifications; it is possible to determine the types of vegetation and resultant exposure of TasNetworks' infrastructure throughout the State.

Figure 4 shows the different classes and distribution of vegetation across Tasmania. The GIS overlay breaks the vegetation into eleven main categories.

Figure 4: Vegetation Classification Thematic (GIS overlay developed by Kirk et al)

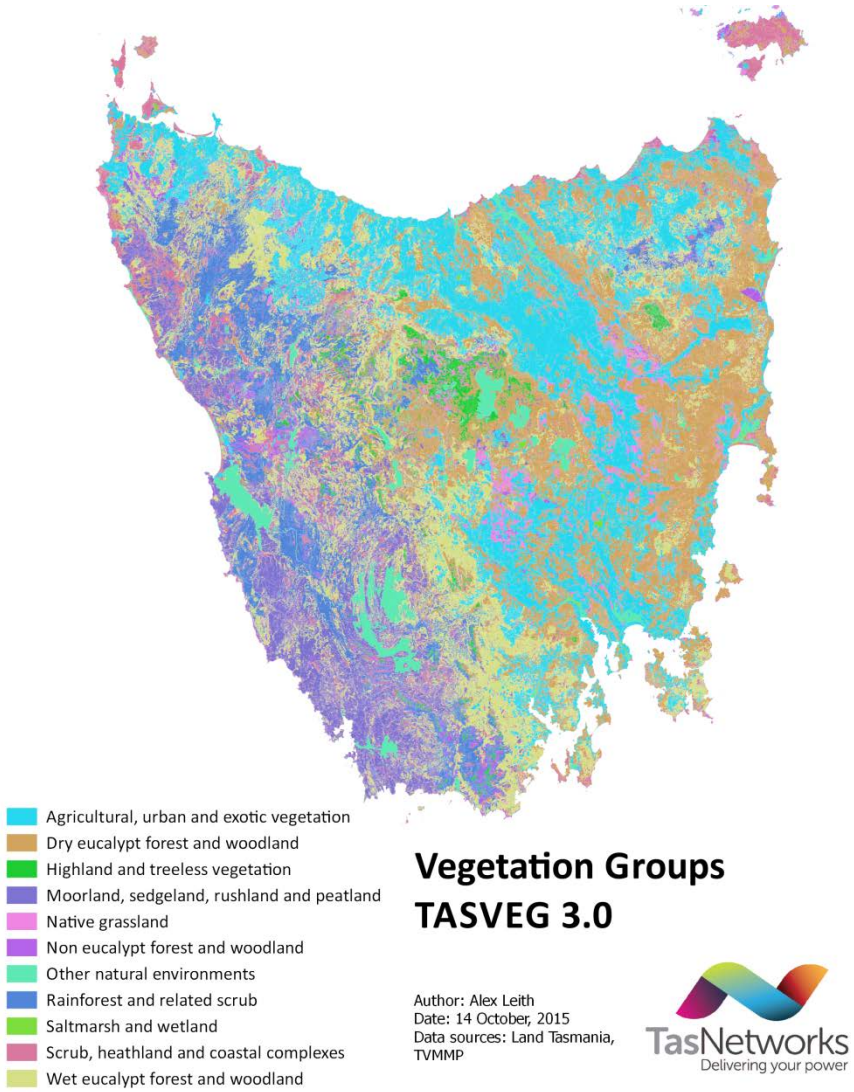


Table 2 shows the percentage of TasNetworks' assets within the various vegetation classifications.

Table 2 – Percentage of TasNetworks' overhead assets within various vegetation classifications

Vegetation classification	Percentage of TasNetworks' overhead assets within classification
Post European Cleared	56.2%
Grassland	0.6%
Urban (Cleared)	13.7%
Moorland/Heathland	3.2%
Lake	0.2%
Wetland	0.01%
Woodland Wet	6.8%
Rainforest	0.3%
Woodland Dry	18.9%
Scrub	0.3%

Existing within the classifications listed above are numerous sites and regions listed as 'important locations'. Important locations include:

- sites of historically or culturally important remnants or artefacts;
- sites of historically or culturally important events;
- areas of geo-conservation significance as identified in the Tasmanian Geo-Conservation database;
- sites of outstanding aesthetic value or landscape or streetscape values; or
- sites of ecological significance.

Before commencement of pruning and clearing, TasNetworks identifies where the maintenance of the clearance space, the regrowth space and the hazard space may be detrimental to an important location. TasNetworks will seek advice from the relevant authorities, for example the Department of Primary Industries, Parks, Water and Environment and local government, as well as community groups as advised by the relevant authorities, to identify 'important locations'.

Alternative distribution powerline routes, construction methods or pruning and clearing methods may be implemented help to preserve important locations. The manner in which this may be done is decided in consultation between TasNetworks and the person or body responsible for the location.

8 Vegetation and powerlines

Contact between vegetation and powerlines on transmission and distribution networks can:

1. Cause an electric shock:
    d. If the vegetation is damp and a person touches it; or
    e. 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 vegetation.

On the Low Voltage (LV)1 distribution network 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 the High Voltage (HV)2 and Extra High Voltage (EHV)3 networks, direct contact by vegetation to energised lines may not be required to receive a fatal electric shock or start a fire, as simply being in close proximity can be a danger.

The issues typically experienced on HV and EHV networks as a result of vegetation contact include:

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.

Examples of these issues are presented in Photos 1 to 4 below.

[1] LV includes any assets energised at <11kV, and associated support infrastructure
[2] HV includes any assets energised at, or between, 11kV and 33kV, and associated support infrastructure
[3] EHV includes any assets energised at or greater than 110kV, and associated support infrastructure

Photo 1: Conductor clash

Photo 2: Phase-to-phase fault

Photo 3: Phase-to-earth fault

Photo 4: Multiple broken conductors

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 support structures 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 (EHV) and distribution (HV and LV) conductors.

9 Vegetation program compliance zones

Both transmission and distribution assets have defined clearance zones that detail minimum encroachment distances between powerline assets and vegetation.

Clearance distances are defined by voltage, conductor size and span length (used to derive conductor sag and sway). Typically the clearances required around transmission lines are far greater than distribution lines.

Clearances for distribution lines are listed within Chapter 8A of the TEC.

Clearances for transmission lines are listed within the Transmission Lines Easement Management Plan.

10 Vegetation impact

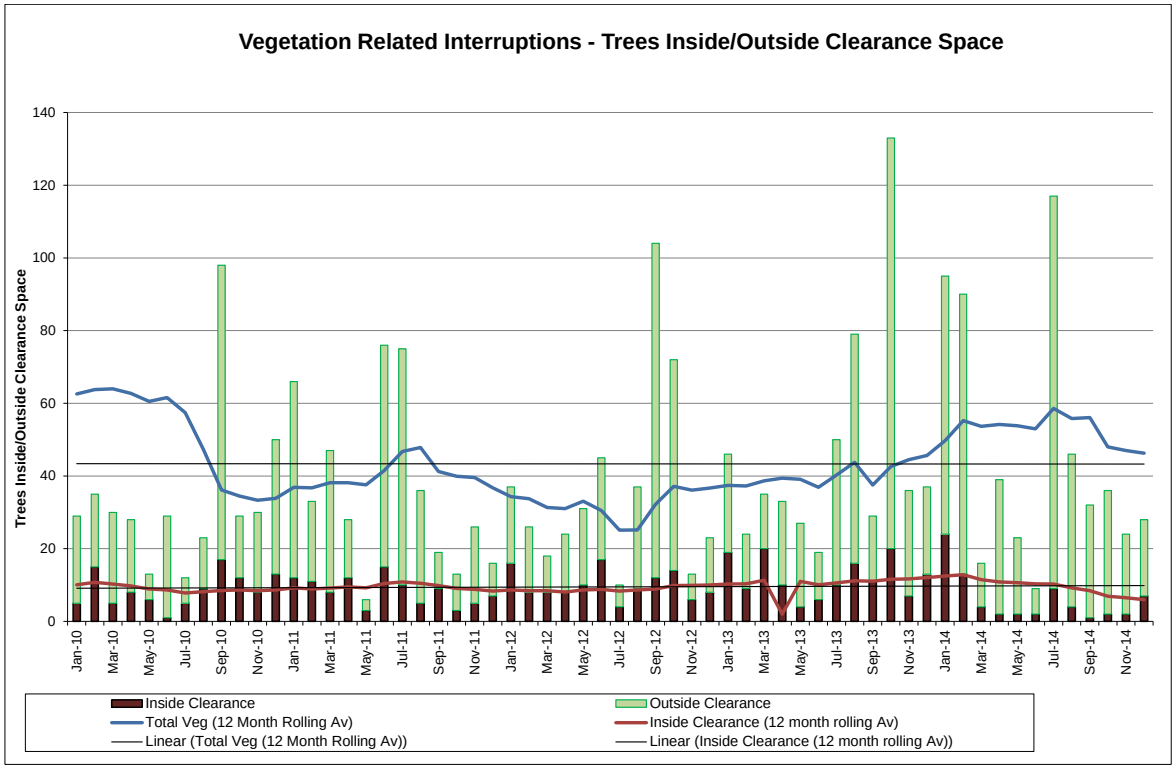
Vegetation management is undertaken to maintain zero harm and to ensure quality and reliability of supply is maximised. Despite comprehensive vegetation management programs in place on both of the transmission and distribution networks, interruptions on the network are still experienced as a result of vegetation coming into contact with powerlines (although less common on transmission lines). The vast majority of interruptions are caused by vegetation blowing or falling onto powerlines from outside prescribed clearance spaces. In certain circumstances and conditions this vegetation contact has the potential to start fires.

10.1 Distribution Network

10.1.1 Outages caused by vegetation

TasNetworks experiences approximately 480 vegetation related outages per annum. Vegetation related outages are recorded as either being ‘Inside’ or ‘Outside’ the regulated Clearance Space (as prescribed within Chapter 8A of the TEC). The interruptions relating to vegetation inside or outside the clearance zone are shown in Figure 5 below.

Figure 5: Vegetation inside/outside clearance space (Jan 2010 – Dec 2014)



TasNetworks measures the impact of system outages in terms of duration and frequency. Both duration and frequency are expressed as a calculated index. The two performance indices are referred to as:

- System average interruption duration index (SAIDI), or the average number of minutes a customer will be without electrical supply per year; and,
- System average interruption frequency index (SAIFI), or the average number of interruptions to electrical supply a customer will experience per year.

SAIDI and SAIFI are recorded to monitor trends and to be used as a performance indicator of program effectiveness. Interruptions to electricity supply on the distribution network as a result of vegetation and the impact on SAIDI and SAIFI are outlined in figures 6 and 7 respectively.

Figure 6: Vegetation interruption contribution to system SAIDI (Jan 2010 – Dec 2014)

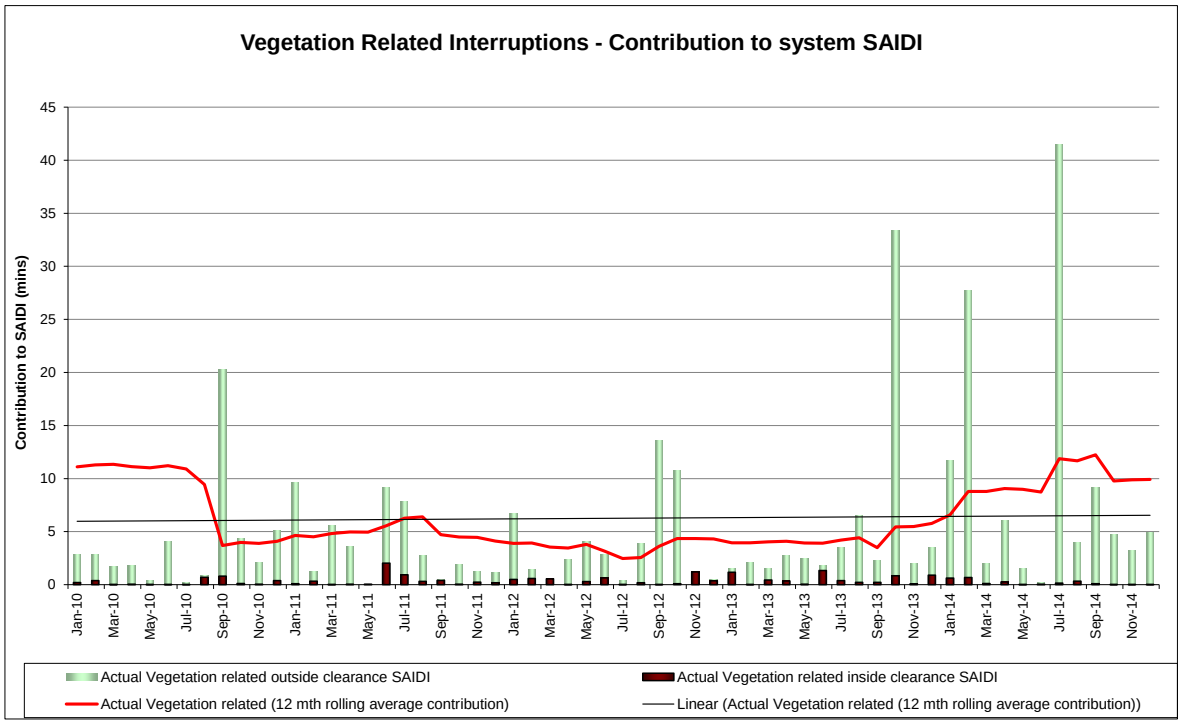
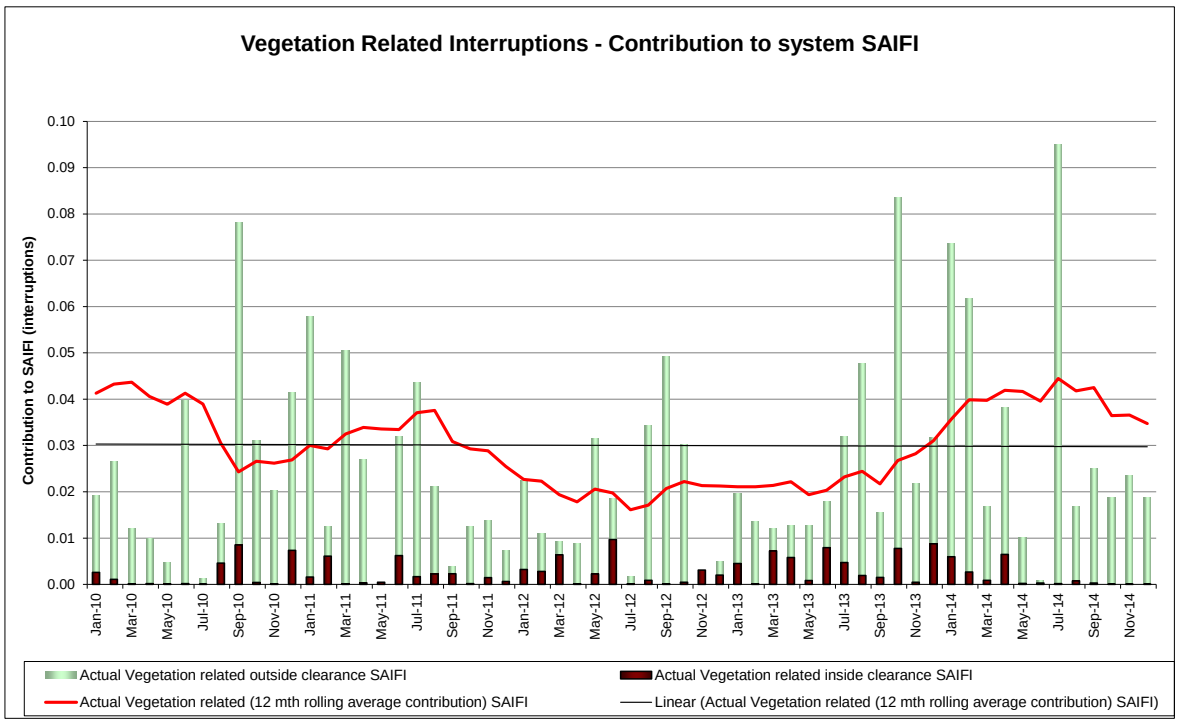


Figure 7: Vegetation interruption contribution to system SAIFI (Jan 2010 – Dec 2014)



Major storm events throughout winter and spring can cause significant occurrences of trees falling from outside the clearance space resulting in widespread damage to the distribution network and unplanned outages. Both SAIDI and SAIFI are impacted by these events due to the number of occurrences from windborne debris being blown in from significant distances outside the

clearance space and the size of the trees that tend to fall (typically large trees). Large trees falling over powerlines can cause long delays in power restoration and have a much greater effect on SAIDI.

Whilst vegetation related outages are generally less frequent during summer and autumn, the risk of bushfire starts are increased due to drying out of the landscape and factors associated with what is considered Tasmania's bushfire season.

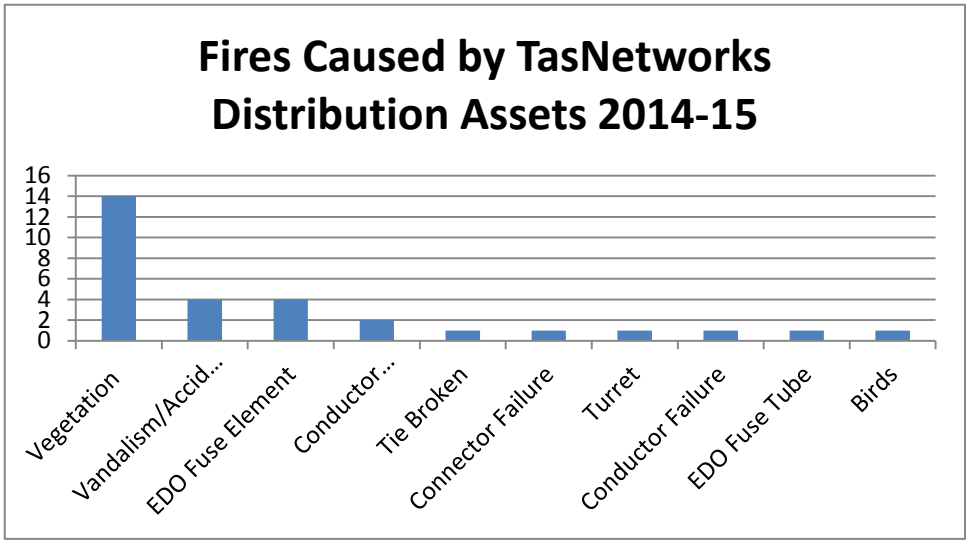
Due to the potential for increased loss associated with causing a bushfire, greater clearances between vegetation and powerlines are required in areas designated as having the highest potential consequence in order to minimise this risk.

It is noted that an increase in vegetation related interruptions and associated SAIDI and SAIFI has been observed since midway through 2012. Strategies to address this trend are discussed within TasNetworks preferred management strategy and funding options within Section 10.

10.1.2 Fire caused by vegetation contact with the distribution network

Vegetation coming into contact with overhead powerlines remains the single largest cause of powerline related fires. Figure 8 below shows that during 2014-15, 14 fires were started as a result of vegetation contacting powerlines (out of a total of 30).

Figure 8 – Fire caused by TasNetworks' assets 2014-15



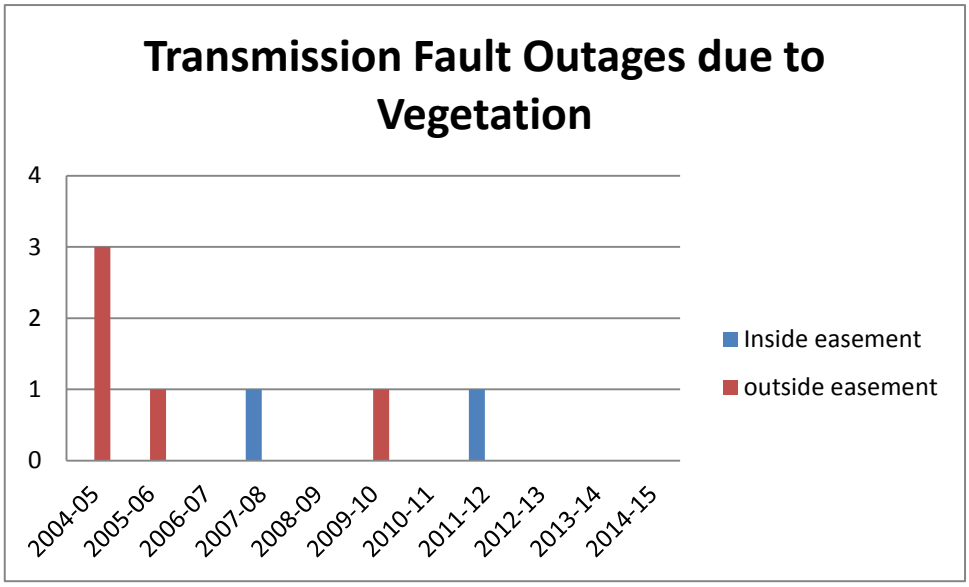
10.2 Transmission Network

10.2.1 Outages caused by vegetation

TasNetworks measures the service performance of its vegetation management by the number of fault outages caused by vegetation.

The figure below summarise the fault outage performance due to vegetation over the last ten years, and whether the outage has resulted from vegetation within easements or from trees falling from outside easements.

Figure 9 – Transmission outages caused by vegetation 2004-05 to 2014-15



Since the transition from ground-based to aerial vegetation inspections in 2000, TasNetworks has experienced very good vegetation performance on the transmission network. The conclusions that can be drawn from this include:

- TasNetworks' 'within easements' management regime has been sufficient to virtually eliminate vegetation as a cause of fault outages; and
- 'Out of easement' vegetation issues are uncommon. As TasNetworks does not have direct control over the management of vegetation outside its easements, the improvement in this aspect of easement performance is difficult to achieve and requires close communication and consultation with landowners.

10.2.2 Fire caused by vegetation contact with the transmission network

There are no recoded instances of vegetation causing fires in relation to transmission line over the last ten years.

11 Vegetation Management Strategy

Vegetation around both transmission and distribution lines is programmed and managed at a strategic/tactical level internally via dedicated vegetation management teams. Operational identification and clearing of vegetation is carried out via external service providers equipped and trained in the various specialised disciplines required to undertake the work.

Vegetation inspections for distribution assets are predominantly undertaken by ground based assessors, although the use of aerial inspections in high bushfire risk areas has recently been utilised to check for vegetation during programmed asset inspections.

Vegetation inspections for transmission assets are predominantly undertaken by annual aerial inspections.

Both transmission and distribution vegetation clearing works are carried out by our service providers using a variety of techniques. Techniques range from individuals with chainsaws to 400hp tractor mounted mulchers and 30 tonne excavators with specialised grabbing/cutting head attachments. Each location where work is required is assessed to ensure that the most efficient and effective techniques are employed.

All external service providers are engaged through a competitive tender process to ensure that the required quality and value for investment are maximised.

Specific operational works practices for vegetation management in the vicinity of distribution assets are detailed within the Vegetation Operational Management Plan.

Specific operational works practices for vegetation management in the vicinity of transmission assets are listed within the Transmission Lines Easement Management Plan.

11.1 Distribution network vegetation management strategy

Vegetation management is traditionally a ‘business as usual’ program conducted to minimise the risk of vegetation coming into contact with powerlines and causing issues relating to safety, supply reliability and bushfire ignition.

During mid-2013, TasNetworks (then Aurora) increased the funding profile above that allowed by the AER for the 2012-2017 regulatory period (see Figure 10) in order to ensure risk was managed to an acceptable level.

The altered profile allowed TasNetworks to:

- Ensure the rural clearing cycle moved closer to compliance with target risk profiles by June 30 2017;
- More effectively manage contractor resource levels, preventing higher rates with ramp up for short periods; and
- Provide a sustainable cost base and improved risk profile.

11.1.1 Routine Maintenance - VEGEM

As described in the TEC and as required by TasNetworks’ risk management objectives, it is a requirement for TasNetworks to periodically inspect and clear vegetation to ensure proximity to powerlines does not represent a hazard to the public. A routine maintenance program is planned and executed. The work category code assigned to the routine maintenance program is VEGEM.

The diversity, dynamic nature of vegetation, and the costs associated with differing treatment options offer a wide variety of choices when clearing vegetation from around powerlines. Each treatment option chosen for a particular site will result in a different outcome that will affect the cost and future options of ongoing clearing requirements.

The objective of the vegetation management program is to achieve an ongoing clearing regime that initially reduces, and then maintains risk at an acceptable level.

The key characteristic of the regime is the achievement over time of sufficient removal rates of vegetation to ensure decreasing workloads (and therefore costs) into the future. While the workload will never decrease to zero, it will reach a level that ensures its maintenance and outcomes are sustainable in the long term ensuring TEC compliance can be achieved at all times at minimal cost.

The timeframe of achieving this objective is determined by the amount of vegetation that can be removed from within powerline corridors over a series of visits such that the removal rate of at-risk vegetation is greater than the rate at which it can regenerate and grow back over the same time period.

The strategy that has been developed for the period 2015/16 onwards will require an annual inspection of all vegetation to ensure risks are recorded and ultimately minimized through a shortening of the 'time to intervention' between site visits.

This strategy sees a move away from the traditional two year cyclic cutting program whereby cutting crews were programmed to cut each span (if required) every two years. Recent analysis suggests that the cost of maintaining such a cyclic cutting regime is beyond that which is budgeted or allowed for by the AER, and therefore would not meet TasNetworks' objective of ensuring sustainable customer pricing. Furthermore, the risks associated with program slippage can compound to a point whereby the risks become greater than the corporate risk appetite.

This strategy will maintain current investment values while addressing more immediate risk priorities, while the business works towards achieving a sustainable ongoing vegetation clearing regime and associated risk profile.

The vegetation management expenditure for the 2017/19 regulatory period was developed using data from two key sources:

- The field recorded scoped work from vegetation management IT systems; and
- Historical work volume and costing information from contractor timesheets.

From these sources a unit pricing approach can be applied to predict future expenditure requirements.

Current routine programs include works associated with:

1. An annual state-wide inspection and clearing program aimed at achieving compliance with Chapter 8A.3.4 of the TEC;
2. A pre-summer clearing program designed to ensure designated high consequence bushfire areas will remain clear of vegetation during Tasmania's bushfire season;
3. Customer initiated vegetation management requests;
4. Defect Reporting (identified by field staff and Asset Inspectors), and
5. Fault and emergency procedures to manage identified high risk tasks.

The competitive tender process used by TasNetworks ensures prices are market tested and are the best available. Additionally, the contracting model chosen ensures contractors are motivated to deliver maximum value for money though delivering guaranteed unit rates under a performance based contract.

Note: There is an assumption underlying this VAMP that an integrated condition and risk based vegetation management system (VMS) will be developed prior to 2017 in order to provide better quality data for ongoing management capability to ensure predictable and sustainable pricing models are developed and adhered to.

11.1.2 Replace/relocate HV OH (Vegetation) - REHVE

Clearance requirements for vegetation growing within heavily vegetated / high growth areas may not be achievable through the contemporary tree clearing regimes of routine maintenance due to legislative requirements, environmental impacts or community expectations. In instances such as these, line re-design options may be the only viable alternative to meet TEC requirements. Line re-design can take the form of relocating or undergrounding assets, or replacing bare overhead conductors with insulated alternative.

A program is planned and executed for the replacement or relocation of overhead assets due to high vegetation risks. The work category code assigned to this program is REHVE.

In many instances required clearance distances between vegetation and electrical assets cannot be achieved via tree clearing techniques due to issues such as:

- Threatened and endangered species;
- Trees of historical significance;
- High bushfire consequence areas;
- Organic farming;
- Weed management issues;
- Street tree amenity issues;
- Areas of significance (e.g. World heritage areas, National Parks, Wet lands, etc.); and
- Avenues of Honor, etc.

In these situations, options for TEC compliance may be limited to items such as:

- Overhead line de-design (relocate open wire route);
- Overhead line de-design (convert open wire to covered conductor);
- Overhead line de-design (convert overhead line to underground); and
- Overhead line de-design (convert to hybrid underground/covered overhead options).

The actual costs for each re-design option will vary depending upon a variety of inputs, however budget estimates for undergrounding overhead high voltage show an average cost of approximately $400,000 per kilometer.

A budget allocation of $500,000 per annum has been developed for this work category (REHVE) beyond 2016/17. This figure equates to approximately 1.25km of overhead high voltage lines to be converted to underground per annum. This figure is seen as extremely conservative, with initial estimates of greater than 100km of powerline route length meeting the broad criteria for re-

design requirements. Accordingly, work tasks identified for action within this are done so on a risk based priority, with consideration also being made for the level and timing of financial return on investment (ie. NPV).

Further work continues in this area to more accurately identify and prioritise works requiring line re-design.

11.2 Transmission network vegetation management strategy

The vegetation management strategy comprises the following activities:

- aerial and ground patrols to identify any vegetation and easement access issues within and adjacent to the transmission line corridor, primarily between October and December, prior to the commencement of the bushfire season;
- hand and mechanical clearing assisted with herbicide application to control vegetation regrowth; and
- maintenance and development of specific tools and processes to utilise asset information in driving efficiencies in all of the above activities.

Vegetation inspections classify growth under transmission lines and within easements according to the degree of severity and reports on defects by priority. Defects are addressed within timeframes as determined by the defect priority (see the Transmission Line Easement Vegetation Prioritisation standard for more detail).

The vegetation management regime seeks to ensure that vegetation activity within easements is always kept to an acceptably low level of intensity.

Due to the specialised nature of the aerial inspection program, this program is undertaken by an external service provider and is subject to a competitive tendering process.

A period contract is then established with the successful aerial service provider.

Emergency inspections are locally sourced from helicopter companies in Tasmania.

12 Support Systems

Recent RIN data collection activities and resulting benchmarking outcomes, and a review of information systems and the associated processes used by TasNetworks in managing the risk, cost and performance associated with vegetation has revealed that there are a number of improvement opportunities in this area.

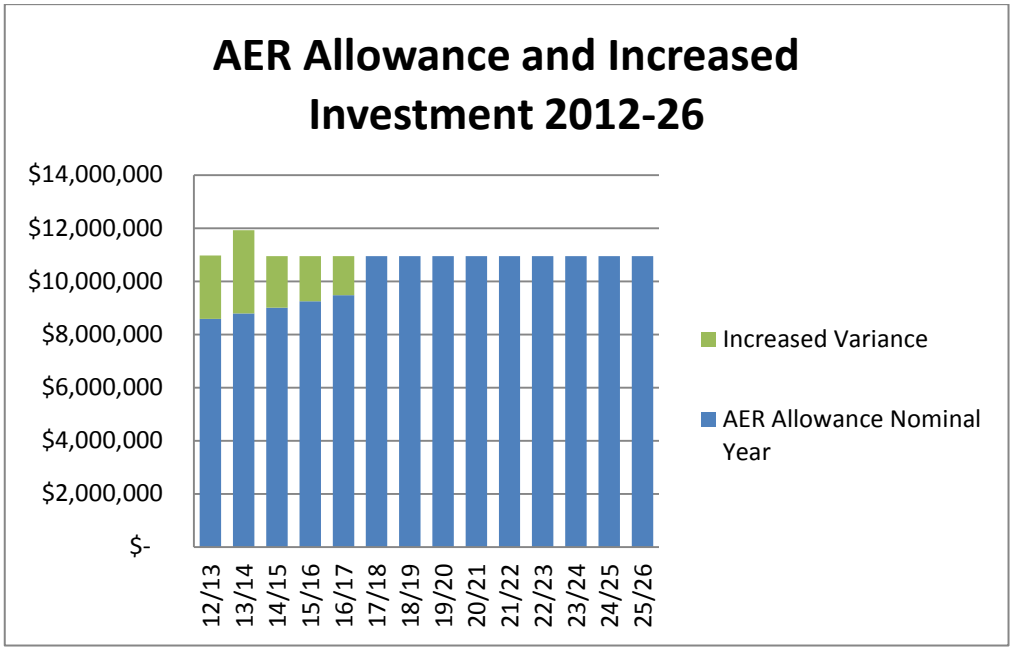
During 2015-17, TasNetworks will develop and implement an improved vegetation management system (VMS) that will capture and quantify workloads and forecasting data for both distribution and transmission network. This information will be used to more accurately match funding and resourcing strategies to workloads, meeting TasNetworks' goal of achieving a sustainable maintenance cycle.

An investment in such a specialised asset management system (ultimately with integration into SAP) will achieve best practice by bringing TasNetworks into alignment with other Australian NSPs, and will also significantly improve TasNetworks' ability to continue to leverage the value provided by the RIN benchmarking process.

13 Financial summary

13.1 Distribution operational expenditure

Figure 10 – Distribution operational vegetation management investment 2012-13 to 2025-26



Note: Data from 15/16 onwards is a forecast.

TasNetworks total operational expenditure for 2015/16 to 2016/17 is forecast to be $21.9 million ($3.2 million above the current AER determination allowance for the period).

TasNetworks proposes a total operational expenditure of $109.5 million over the next 10 years (2017-27), with an average expenditure of $10.95 million per annum.

Benchmarking of TasNetworks' historical operational expenditure[4] against that of its peers has found that TasNetworks 'OPEX per overhead km' is below that of its peers, and below the industry average when normalised against both customer density and the weighted average trimming cycle.

13.2 Distribution capital expenditure

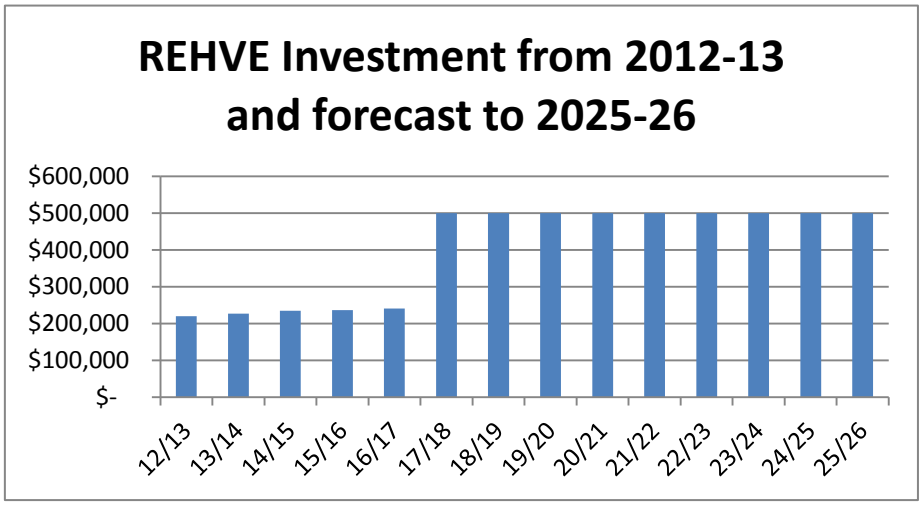
The capital programs and expenditure identified in this management plan are necessary to manage operational and safety risks and maintain network reliably at an acceptable level. All capital expenditure is prioritised expenditure based on current condition data, field failure rates and prudent risk management.

TasNetworks total capital expenditure for 2015-16 to 2016-17 is forecast to be $0.477 million as per the AER determination allowance.

[4] TasNetworks Opex Benchmarking, Huegin - 17 June 2015

TasNetworks proposes a total capital expenditure of $5 million over the next 10 years (2017-26), with an average expenditure of $0.5 million per annum.

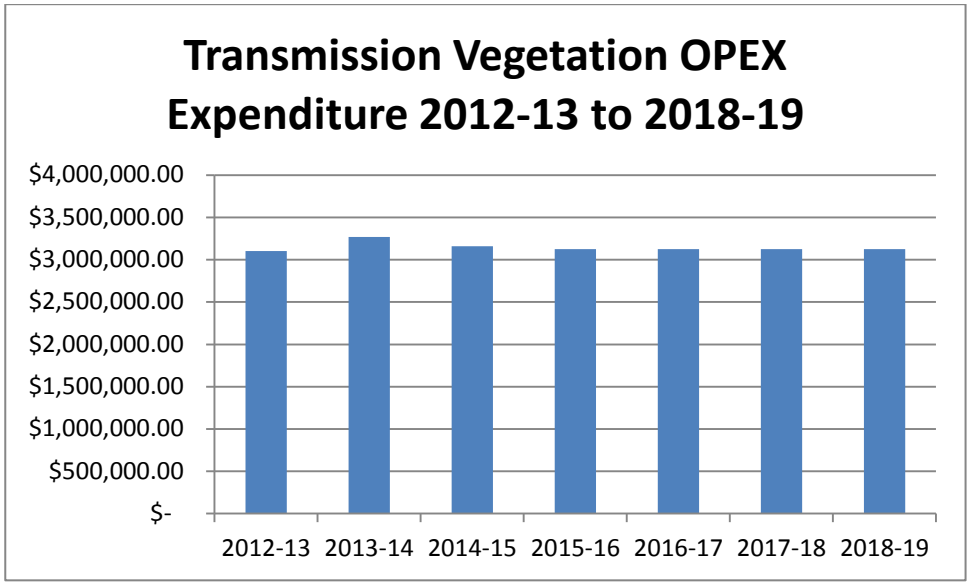
Figure 11 – Distribution capital vegetation management investment 2012-13 to 2025-26



13.3 Transmission operational expenditure

Transmission easement operational funding includes vegetation inspection and clearing. Historically, vegetation clearing costs have remained relatively steady since 2012-13 and no significant increases are forecast in the near future.

Figure 12 – Transmission operational vegetation management investment 2012-13 to 2025-26



Notes:

1. Financial years beyond 2015/16 are forecast figures.

2. Transmission forecast timeframes are planned to align with distribution forecasts beyond 2018-19 when the two pricing determination timeframes are planned to be combined.

13.4 Transmission capital expenditure

There are currently no planned capital programs relating specifically to vegetation management for transmission lines.

14 Responsibilities

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

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

15 Related Standards and Documentation

The following documents have been used to either in the development of this management plan, or provide supporting information to it:

1. Electricity Supply Industry Act 1995
2. Electricity Industry Safety and Administration Act 1997
3. Tasmanian Electricity Code (Chapter 8A)
4. TasNetworks Risk Management Framework (R209871)
5. Bushfire Mitigation Asset Management Plan (R303735)
6. Transmission Lines Easements Asset Management Plan (R32687)
7. Distribution Vegetation Operational Management Plan