
AMS – Electricity Distribution Network

Vegetation Management

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Vegetation Management Strategy

ISSUE/AMENDMENT STATUS

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2	04/11/2009	Initial strategy	Matt Peters	N/A
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4	21/04/2015	Substantial revision to extend to 2020 incorporating vegetation management recommendations	A Ellawala B Nelson T Gowland	J Bridge
5	14/05/2018	Updated legislation and program details. Structural changes to align with other strategies.	A Dickinson	J Dyer

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Vegetation Management Strategy

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Vegetation Management Strategy

1 EXECUTIVE SUMMARY

This document is part of the suite of documents that describe the asset management strategy for the electricity distribution network. The purpose of this strategy is to identify issues and describe the company's approach to vegetation management.

Key performance indicators show a rising trend in the frequency of vegetation related supply interruptions. This rising trend in vegetation related outages is supported by similar rising trends in the number of conductor spans where vegetation management has been required.

Urban sprawl and low-density subdivisions is leading to increased ornamental plantings, the environmental movement is leading to increased revegetation plantings in semi-rural and rural areas and both of these are leading to an increasing volume of spans, which require vegetation management.

AusNet Services will continue its stakeholder management initiatives, including:

- Communicating with stakeholders the environmental impact of clearing versus pruning
- Educational and communication activities focused on 'unsuitable plantings' of trees near power lines

AusNet Services will continue the following vegetation management programs:

- HBRA assessment and cutting
- LBRA assessment and cutting
- Codified area assessment and cutting
- Declared areas assessment and audits
- Hazardous tree removal – the target has been revised and the focus shifted to removal in Codified areas
- Cyclic clearing
- LiDAR assessment of long spans

In situations where vegetation management is causing significant issues, such as escalating outages or fire starts, or where the location of the assets make tree clearing difficult, AusNet Services will consider alternative solutions to deliver a least cost solution.

Vegetation Management Strategy

2 INTRODUCTION

2.1 Purpose

The purpose of this document is to identify issues and describe AusNet Services' approach to vegetation management.

2.2 Scope

This document applies to all spans of conductor within hazardous bushfire risk areas (HBRA) and low bushfire risk areas (LBRA) within AusNet Services' electricity distribution network.

2.3 Asset Management Objectives

AusNet Services' asset management objectives are to:

1. Comply with legal and contractual obligations;
2. Maintain safety;
3. Be future ready;
4. Maintain network performance at the least sustainable cost; and
5. Meet customer needs.

2.4 Definitions

Codified Area	Areas defined as 'electric line construction areas' by the Electricity Safety (Bushfire Mitigation) Regulations 2013
Declared Area	Areas where Councils have responsibility for maintaining clearances between vegetation and electrical assets on public land including road reserves and parks.
Fire Hazard Rating	As per The Electricity Safety Act 1998, section 80 Fire hazard rating: <i>A fire control authority—</i> <i>(a) may assign a fire hazard rating of "low" or "high" to any area of land for the purposes of this Act or the regulations</i>
HBRA	Hazardous bushfire risk area. As per The Electricity Safety Act 1998, hazardous bushfire risk area means an area: <i>(a) to which a fire authority has assigned a fire hazard rating of "high" under section 80, whether or not the area is an urban area; or</i> <i>(b) that is not an urban area (other than an area a fire control authority has assigned a fire hazard rating of "low" under section 80);</i>
LBRA	Low bushfire risk area, as per The Electricity Safety Act 1998
LiDAR	Light Detection and Ranging is a surveying method that measures distances to a target by illuminating the target with pulsed laser light and measuring the reflected pulses with a sensor

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3 BUSINESS ENVIRONMENT

3.1 Network Overview

The AusNet Services electricity distribution area services more than 730,000 customers across 80,000 square kilometres in the eastern half of Victoria as illustrated below in Figure 1.

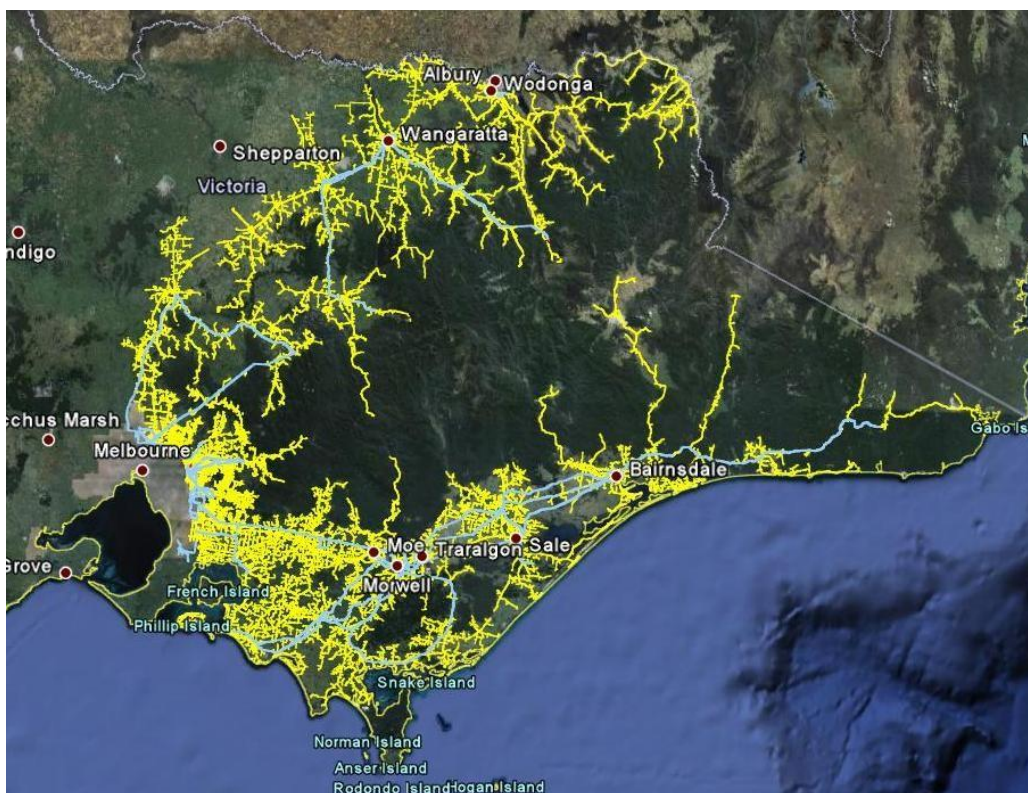


Figure 1: Map of AusNet Services' Electricity Distribution Network Geographical Area

The network comprises of 56 zone substations, over 60,000 distribution transformers, 334,987 poles and 44,908km of overhead lines and underground cables.

There are currently 199,498 spans (conductors between two poles) in the Hazardous Bushfire Risk Area (HBRA) and 121,364 spans in the Low Bushfire Risk Area (LBRA), a total of 320,862 spans requiring vegetation management.

Of these spans, 92,036 spans are within 'declared' areas, where Councils are responsible for maintaining clearances between vegetation and electrical lines on public land.

The AusNet Services electricity distribution network is constantly being augmented and re-arranged to meet customer growth, quality and reliability of supply requirements. The rate of this change has increased in recent years. It is important that vegetation management systems are kept up-to-date with these changes to ensure all network assets are appropriately assessed for vegetation clearances and actioned accordingly.

AusNet Services' distribution network is split into two service delivery regions: South East Region and North Region. The South East Region comprises the previous Central Region and East Region, as shown in Figure 2.

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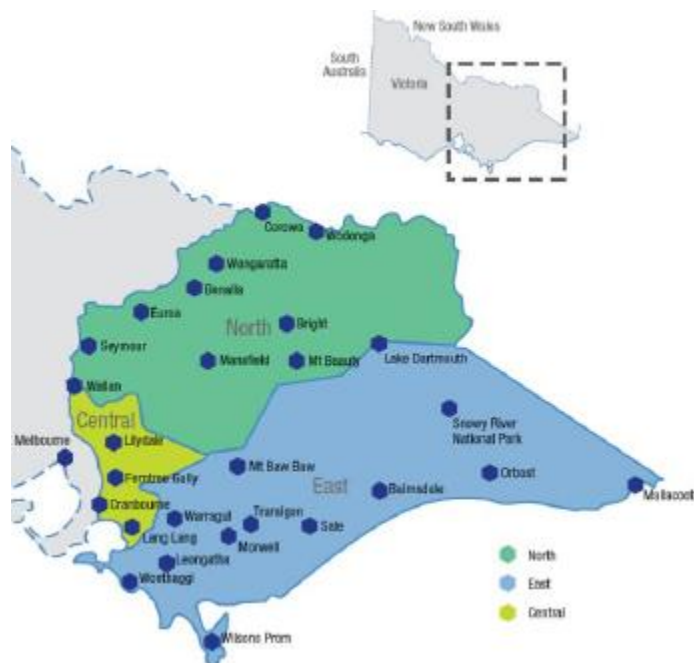


Figure 2: AusNet Services' Service Delivery Regions

The North Region covers north-eastern Victoria with topography ranging from mountainous areas through to pastoral irrigated plains down to open flats. It includes mountainous alpine resorts and forest localities in the east, to flat, dry farming localities to the west of the Hume Freeway. The undulating, heavily treed terrain of the Great Dividing Range to the north and east poses a high bushfire threat.

The East Region covers eastern Victoria with topography ranges from mountainous areas through pastoral irrigated plains down to seaside frontage. The high annual rainfall in West Gippsland results in rapid vegetation regrowth. There is a high prevalence of commercial tree plantations in the East Region, in areas such as Traralgon South, which can present reliability and bushfire risk due to plantations encroaching into electricity line easements.

The Central Region includes extreme fire risk areas of the Dandenong Ranges, Healesville, Warburton, Kinglake, Warrandyte, Eltham, St. Andrews, Emerald, Gembrook and Upper Beaconsfield. This region is especially hazardous due to a combination of poor access roads, dry terrain, heavy timber/scrub cover and high population density. History indicates that bushfires have burnt through many of these areas over the years inflicting heavy losses, including the recent Black Saturday event. There are many areas of particular significance due to tourism value and natural and exotic vegetation. There are many active environmental groups, which necessitates careful negotiation prior to any major vegetation works and tree clearing activities.

3.2 Regulation

Energy Safe Victoria (ESV) is the safety regulator responsible for electrical and gas safety in Victoria. ESV monitors AusNet Services' compliance and performance in terms of electrical network safety.

The primary safety regulation driving distribution vegetation management are:

- The Electricity Safety Act 1999;
- The Electricity Safety (Electric Line Clearance) Regulations 2015; and
- The Electricity Safety (Bushfire Mitigation) Regulations 2013.

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3.2.1 Regulatory Requirements

These include minimum clearances to be maintained between vegetation and electrical lines, which is also known as the (Regulatory) Clearance Space.

This Clearance Space varies depending upon voltage, conductor type, span length and fire risk (HBRA or LBRA).

The required minimum clearance space, in accordance with the *Electricity Safety (Electric Line Clearance) Regulations 2015*, is outlined in AusNet Service's procedure BFM 10-05 Vegetation Management Plan.

Clearance spaces are illustrated below in Figure 3.

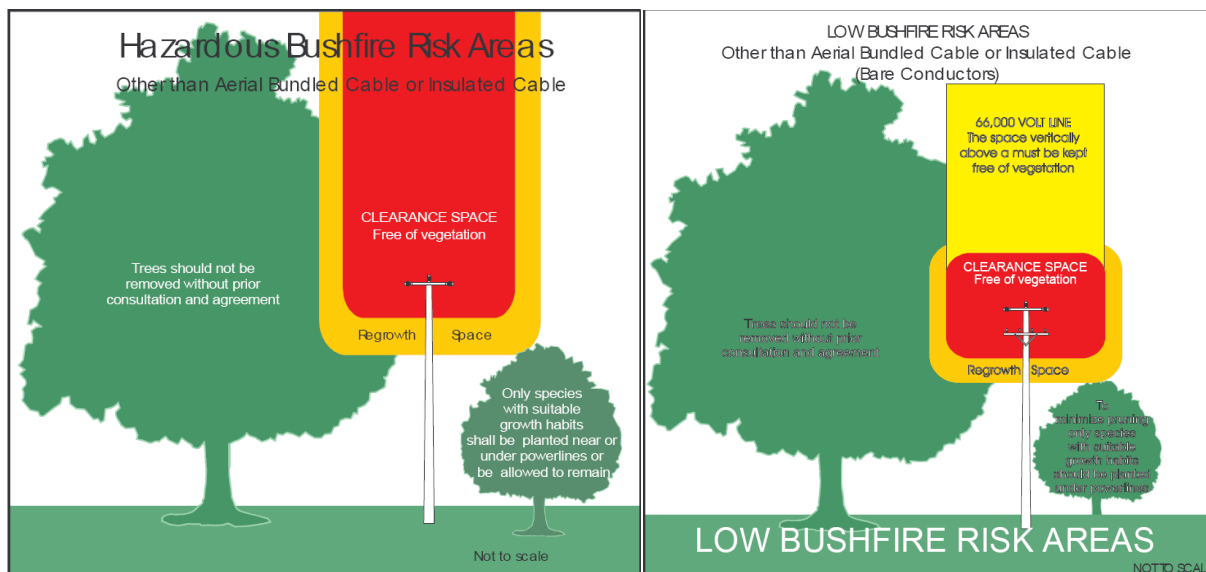


Figure 3: Clearance Spaces

Additionally, the regulations require management of the hazardous space, which is the area outside the Clearance Space in which trees or limbs could potentially fail and contact power lines.

The regulations outline requirements for landowner consultation, notification, consideration of important vegetation and responsible pruning.

The Electricity Safety (Bushfire Mitigation) Amendment Regulations 2016¹ introduced 'electric line construction areas', which correspond to geographical areas identified by the Government with the highest fire loss consequence areas.

Approximately 1,500km of the AusNet Services' network lies within these areas and are referred to internally as 'codified areas'.

3.2.2 Exemptions

AusNet Services previously had an exemption relating to non-compliant overhanging trees, however as all work associated with non-compliant overhanging trees has been completed, an exemption is no longer required.

3.2.3 Review

The Electricity Safety (Electric Line Clearance) Regulations are reviewed and revised every 5 years.

¹ These amendments are now incorporated into the Electricity Safety (Bushfire Mitigation) Regulations 2013

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There were changes in the current regulations (2015) from the previous regulations (2010) with regards to customer notifications, with the addition of a requirement to publish written notice in a newspaper circulating generally in the locality before cutting or removing certain trees.

3.2.4 Other Regulation

Distribution vegetation management is affected by various environmental regulations, including the Planning Scheme Act and the Native Vegetation Act.

There has been some conjecture regarding rights to undertake distribution vegetation management without planning permits.

The Native Vegetation Act includes the following:

No (planning) permit is required for Utility Services to remove, destroy or lop native vegetation if.....the removal, destruction or lopping of the minimum extent of native vegetation necessary to maintain public utility services for the transmission of.....electricity.....

During recent disputes, a number of Councils have claimed that AusNet Services is not entitled to planning permit exemptions when undertaking hazardous tree removals, claiming that tree removal is not 'minimum extent necessary'-type works. AusNet Services has maintained that it is entitled to the exemption under both that clause and the Electricity Safety Act, which includes:

Despite the provisions of any other Act.....the relevant distribution company is not required to obtain any permit under any other Act in respect of any action necessary to keep the whole or any part of a tree clear of an electric line if the action is carried out in accordance with the Code....

AusNet Services continues to maintain this position.

AusNet Services will continue to communicate and consult with Councils regarding hazardous tree removal works, but will not make application for planning permits.

AusNet Services will continue to dispute any 'refusal' during consultation, on the grounds of public safety.

3.3 Business Drivers

Proactive management of the vegetation management program is required to ensure that stakeholder expectations of cost, safety, reliability and environmental performance are met.

In order to achieve this in accordance with legislative and other regulatory instruments, the two key drivers for vegetation management are:

- Maintain compliance with the Electricity Safety Act² and vegetation management regulations
- Reduce vegetation-related outages and vegetation related fires³, whilst maintaining stakeholder relations and the natural environment.

3.4 Vegetation Management Internal Review

In 2013 it was recognised that unless the current vegetation management process is changed, find rates would continue to increase resulting in increased volumes and expenditure. An increase in vegetation in close proximity to spans would result in deterioration of network performance and increased safety risk.

² Electricity Safety Act 1998

³ Bushfire Mitigation Manual

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Vegetation removal can be hindered by a lack of negotiators available to negotiate with Councils and land owners regarding the removal of tree species that are not appropriate to be planted in close proximity to powerlines and hence should be removed.

In 2013, an internal review was conducted to address the issue of increasing find rates.

From this review, the following recommendations were implemented:

1. Fully insource vegetation inspection;
2. Employ internal negotiators; and
3. Increase the number of HBRA spans that have no vegetation.

3.4.1 Recommendation 1: Fully insource vegetation inspection

It was recommended that vegetation assessors be insourced within all regions to gain efficiencies in find rates, which would in turn stabilise the annual vegetation expenditure.

The expectation of internal assessors is that they are required to not just assess which spans require cutting but to make judgement on whether the most cost effective action is to remove vegetation and understand the implications.

3.4.2 Recommendation 2: Employ internal negotiators

It was recommended that four negotiators be employed predominantly to allow the fast reduction of vegetation growth on private land near power lines, which is essential to stabilise find rates.

The regulations regarding removal of vegetation are simplified below in Table 1.

Table 1: Regulation to vegetation removal

Location	Measurement	Requirement
Tree is on a road reserve or crown land	Trunk diameter at breast height (DBH) is greater than 125mm	Negotiator required
Tree is on a road reserve or crown land	Trunk DBH is less than 125mm	Negotiator required
Tree is on private land	Trunk DBH is greater than 125mm	Negotiator required
Tree is on private land	Trunk DBH is less than 125mm	Negotiator not required

Table 1 depicts that for removal of trees, negotiators are required for three of the four conditions.

The absence of negotiators results in low volumes of tree removals which results in:

- Continued vegetation growth requiring pruning hence an increased find rate and increasing operational expenditure.
- Immature trees grow into large trees that eventually become hazardous and cause network incidents.

The employment of negotiators addresses this growing find rate and constrains pruning costs.

3.4.3 Recommendation 3: Increase the number of HBRA spans that have no vegetation

This recommendation involved removing vegetation from 14,431 of the HBRA spans over a five year period to reduce the annual find rate from 28.5% to 25.5% and maintaining this find rate until at least 2019. The selected spans would contain low numbers of immature trees that are economical to remove.

This recommendation reduces annual pruning requirements.

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3.5 Natural Environment

Vegetation growth varies directly with climatic conditions. Warm moist conditions provide ideal growing conditions for a majority of flora species, whilst drought and extreme heat can be detrimental and culminate in vegetation die back.

Vegetation faults and fire starts are also influenced by climatic conditions. There is a distinct correlation between faults/fire starts and extreme weather events, including storms, drought, fire and flood.

Current long term climatic models suggests that South Eastern Victoria is likely to be impacted by elevated numbers of these extreme weather events as compared to historical records, it is expected that vegetation related faults are also likely to trend upwards if we do not continue our hazardous tree and discretionary programs.

3.6 Stakeholder/Performance Expectations

There is increased social awareness and sympathy for natural environment. There are additional factors involved in negotiating vegetation reduction activities with private landowners and public authorities. The effort expended on managing stakeholder expectations and issues has substantially increased over the past 5 years. This level of effort is not expected to reduce into the future.

AusNet Services has strong stakeholder management processes and systems in place. However, continuous improvement is required to address increasing expectations.

Recent initiatives include:

- Creation of dedicated environmental management roles;
- Joint management plans and protocols with key councils;
- Improved customer notification letters/brochures; and
- Height reduction of habitat trees rather than complete tree removal

Further improvements will be necessary, with particular focus to environmental sustainability policy and practices.

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4 PERFORMANCE

This section contains key performance indicator results for vegetation management over recent years.

Vegetation related outages occur when trees or branches come into contact with a line. The Regulated Vegetation and Easement group conduct field investigations of all significant vegetation-related outages, generally where Customer Minutes Off Supply (CMOS) is greater than 20,000 (this threshold may be higher during storm events).

Historically:

- 98% of vegetation related outages are due to trees or branches failing from outside the Clearance Space; and
- 2% of vegetation related outages are due to branches growing into the Clearance Space and within contact distance of lines.

Vegetation related outages vary significantly depending on wind and other climactic weather conditions.

AusNet Services classifies outage days as benign ('business as usual') weather days or volatile weather days represented by blue and green respectively in Figure 4.

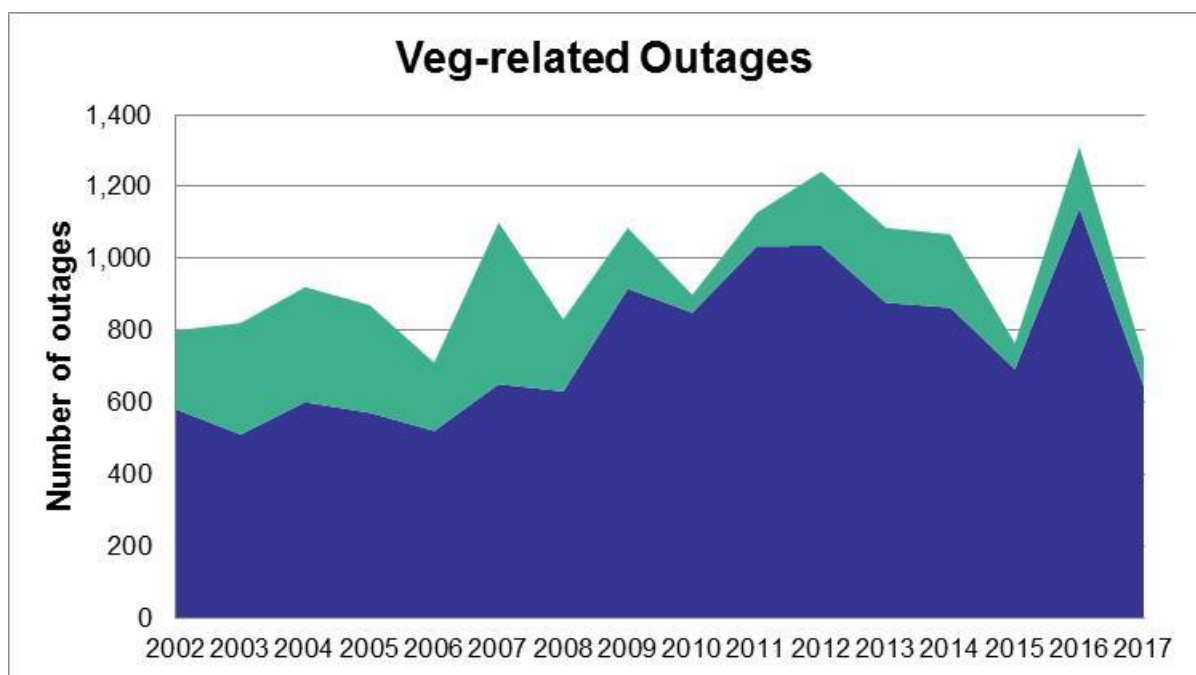


Figure 4: Vegetation related outages

Overall, there is an increasing trend in vegetation related outages predominately occurring on business as usual days as shown in Figure 4.

The two main effects resulting from a vegetation related outage are:

- unserved energy; and
- fire ignition.

The Unplanned System Average Interruption Duration Index (USAIDI) is a measure of unplanned outages.

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Figure 5 illustrates how vegetation related incidents are substantially increasing the USAIDI minutes. Again, the blue represents business and usual weather days and the green volatile weather days.

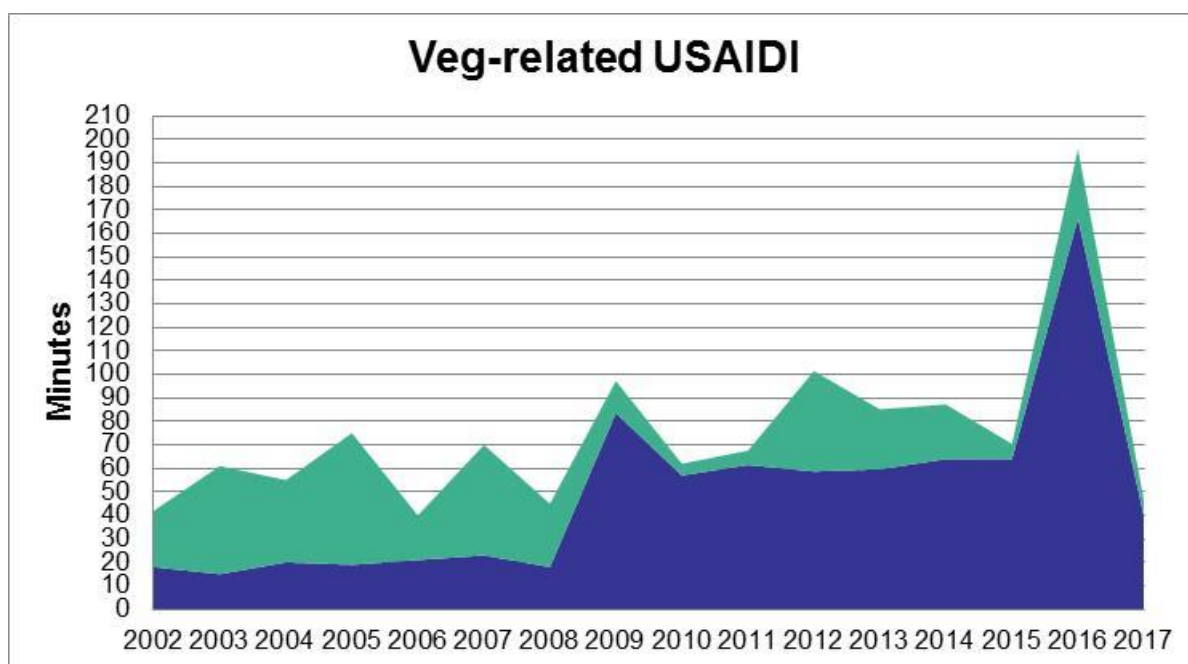


Figure 5: Impact of vegetation related reliability events

In 2011, 'F-Factor' was introduced as a scheme to incentivise Distribution Businesses to reduce the number of asset failures causing fire ignitions.

In December 2016, following a review of the F-factor target setting process, a new target setting process was put in place.

In the new risk based scheme, difference weights are applied to fires based on:

- the location of ignition (geography multiplier); and
- the prevailing fire danger rating in the relevant fire district in which the ignition occurred at the time the ignition occurred (time multiplier).

This combination of geography and time are used to calculate the ignition risk unit (IRU), as shown in Figure 6, with \$15,000 allocated to each IRU under/over the benchmark.

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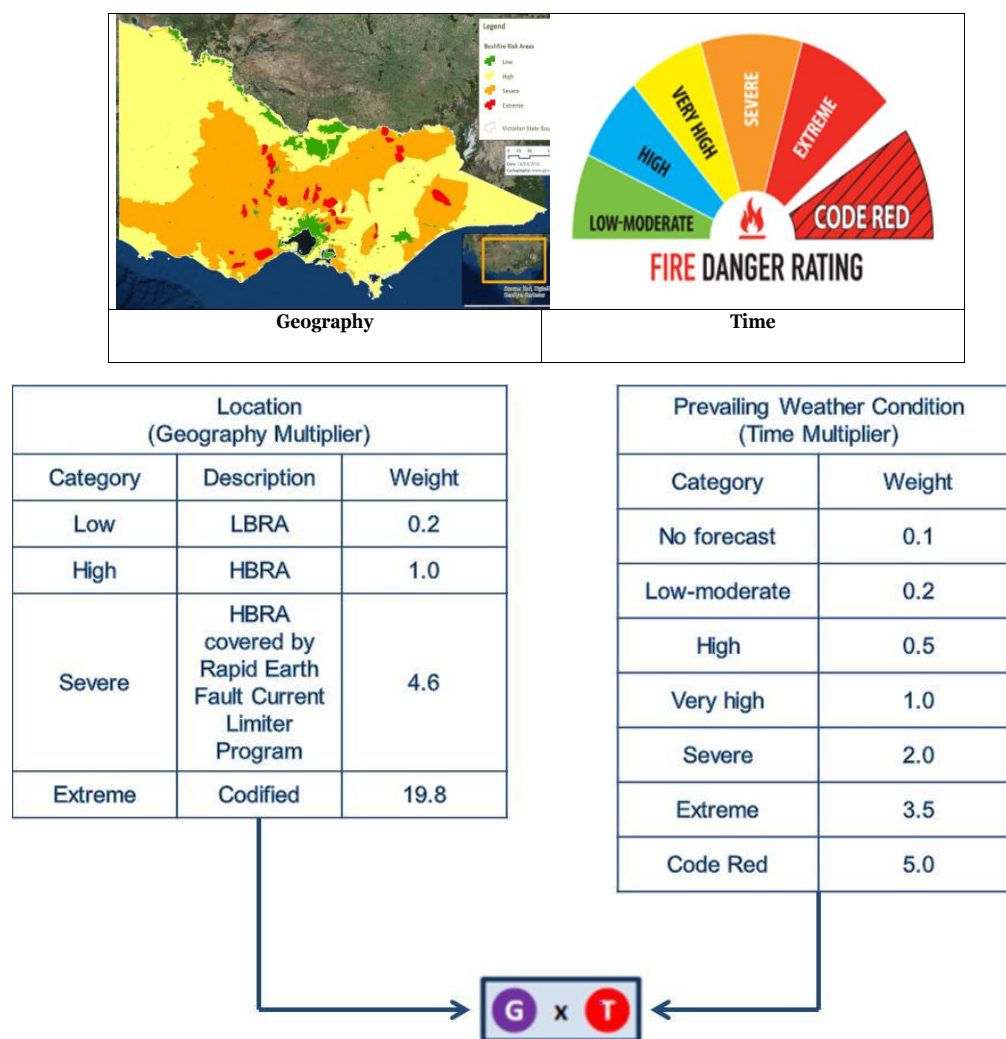


Figure 6: Ignition Risk Unit Input Multipliers

Table 2 gives the IRU targets as published in the Victoria Government Gazette 22 December 2016.

Table 2: IRU Targets

Measure	FY2016/17	FY2017/18	FY2018/19	FY2019/20	FY2020/21	FY2021/22
F-Factor – IRU Target	247.7	247.7	247.7	221.1	221.1	221.1

In 2016/2017 AusNet Services reported an IRU of 148.7 to the AER, outperforming the IRU target.

Figure 7 and Figure 8 show the number of fire starts by location (geography multiplier) and weather conditions (time multiplier).

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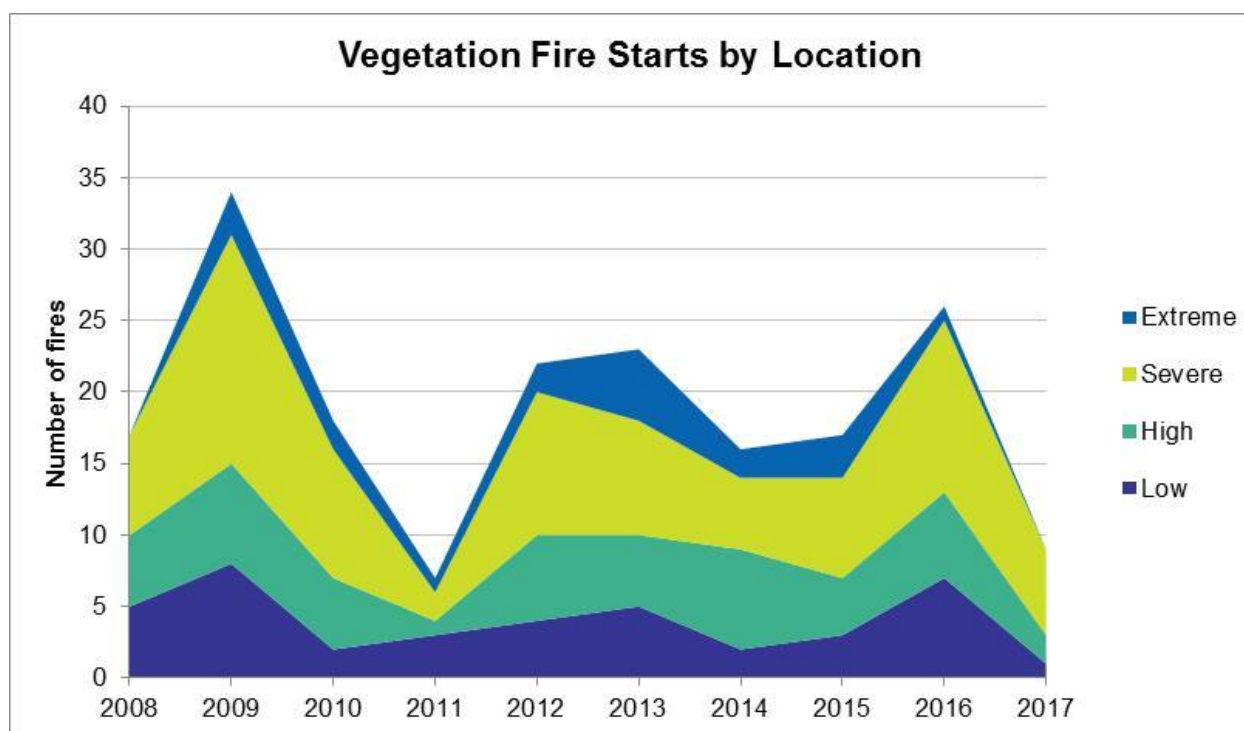


Figure 7: Vegetation fire starts by location

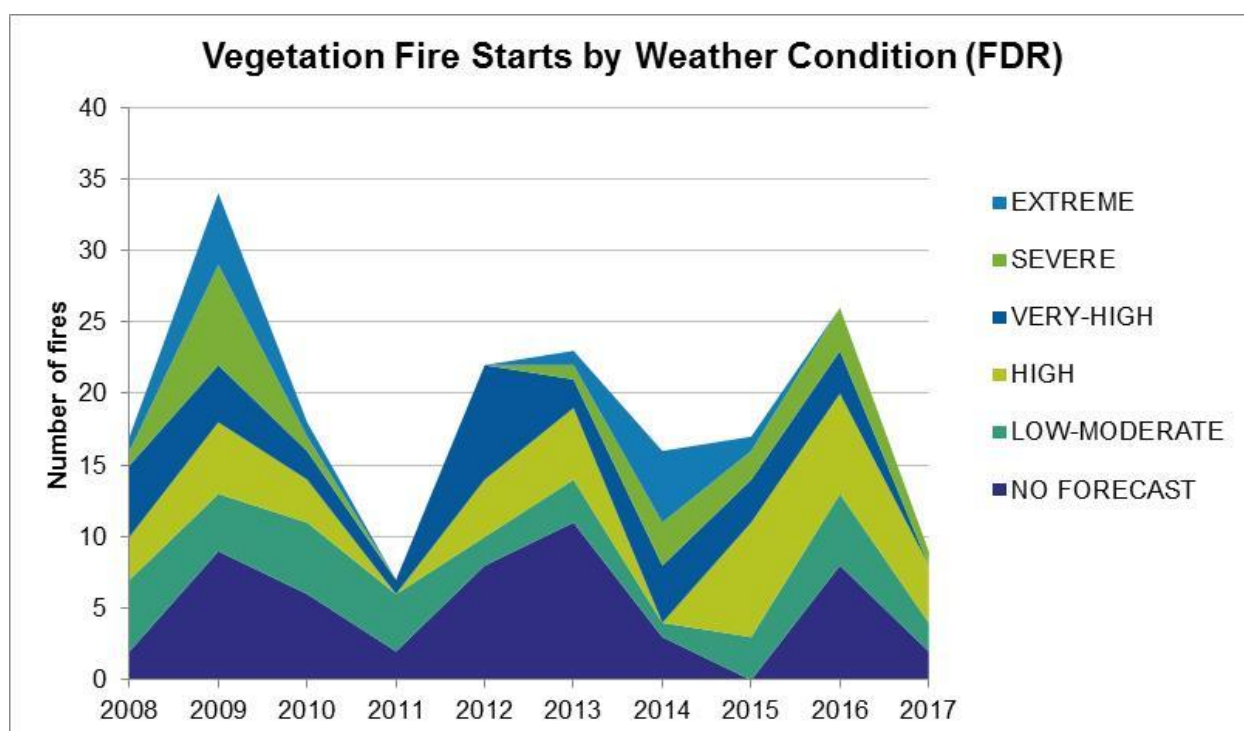


Figure 8: Vegetation fire starts by weather condition

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5 VEGETATION MANAGEMENT APPROACH

5.1 Delivery Model

The delivery model for AusNet Services' vegetation management program has evolved over time through various insourced and outsourced arrangements, striving for process and cost efficiency.

Figure 9 illustrates the high-level business process/delivery model currently employed which includes in-house resources to develop the strategy and program, establish contracts and conduct assessment and audits of work required. The vegetation cutting is outsourced on a competitive tender basis and contracts are structured to provide incentives for effectiveness and efficiency.

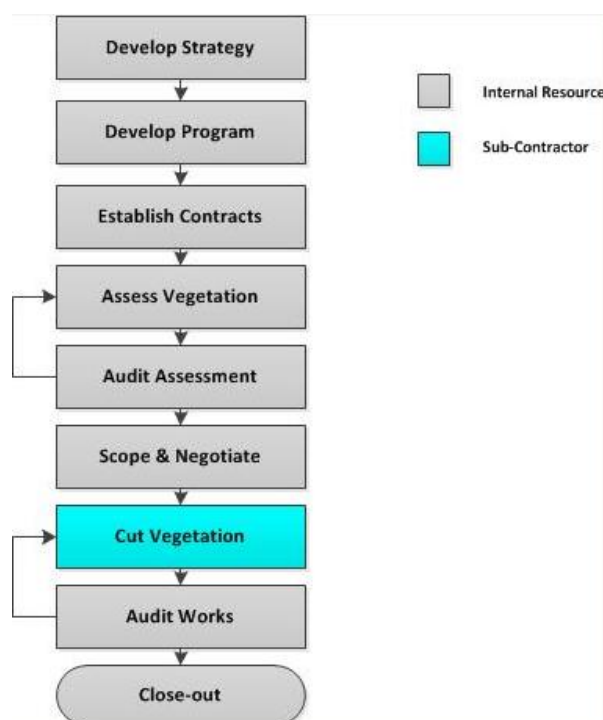


Figure 9: Vegetation service delivery model

To improve consistency of sub-contractor works across the network, AusNet Services requires vegetation cutters to hold UET20312 Certificate II in ESI – Powerline Vegetation Control.

5.2 Business Process

The AusNet Services' vegetation management group develops vegetation management strategies and programs and manages their delivery. The group also manages safety, environmental practices, works practices, regulatory compliance, emergency response, customer enquiries and other stakeholders such as Councils, Energy and Water Ombudsman Victoria (EWOV), and external auditors.

Internal assessors undertake routine vegetation assessments and sub-contractors undertake cutting works. As part of the assessment, the internal assessor scopes the vegetation pruning and removal works to be completed including factors such as equipment requirements and access requirements. Additionally, the assessor notifies the customer and negotiates outcomes, as required. The assessor resolves minor customer issues and escalates major issues/disputes to AusNet Services Stakeholder Manager.

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AusNet Services undertakes comprehensive quality audits at completion of the assessment and cutting stages. This is done on a random sampling basis, with sample sizes dependent upon the number of spans within the particular work-order.

Depending on the results of the sample audit, the sub-contractor may be directed to rectify identified defective works or re-work and resubmit an entire work-order. AusNet Services will reduce the amount of auditing completed if the sub-contractor consistently achieves service level agreement targets.

As of 1 April 2018, AusNet Services has engaged a sole sub-contractor to perform works in all areas of the network.

The sub-contractor is required to self-audit 5% of their works

The sub-contract for cutting is market tested and awarded for specific geographical areas. Currently, there are nine areas, which predominantly align with Customer Service Centre (CSC) boundaries: Wodonga, Benalla, Seymour, South Morang, Lilydale, Beaconsfield, Leongatha, Traralgon and Bairnsdale.

The sub-contracts include non-financial performance metrics related to customer service, management systems, quality of works and health, safety and environmental performance.

A portion of the sub-contract sums is at-risk, depending on performance. The sub-contract period is 5 years, with the current period from 1 January 2018 until 31 December 2023 with the option for a two year extension.

The 5-year period provides some certainty for the service provider and the ability to amortise capital investment over a reasonable period, resulting in reduced unit costs compared to previous shorter-term sub-contracts. Improved consistency, local knowledge, quality and reduced customer issues have also resulted from the longer-term sub-contracts.

Whilst the unit rates give budget certainty, this new contract model incentivises the sub-contractor to negotiate removal of vegetation as an alternative to repeated cutting. This results in reducing future revenue by reducing the need for future cutting.

Lower-level business processes include:

- Significant vegetation and site management
- Hazardous tree management
- Vegetated Private Electric Line (PEL) management
- Quality auditing management
- Extra Services Required (ESR) customer management
- Customer enquiry/call management
- Trouble order management
- Health, Safety, Environment and Quality (HSEQ) auditing.

5.3 Data Management Systems

The core business system is the Vegetation Management System (VMS), which was implemented in 2004 and upgraded in 2017 with improved functionality.

The VMS is a spatial system with Personal Data Assistant capability, which is interfaced to the AusNet Services' geographical information system Spatial Data Management Electricity (SDME).

The VMS manages vegetation condition data, progress reporting, assessment, cutting and auditing.

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The VMS receives a monthly update of asset data from SDME, including pole and line identifiers, status, locations, and bushfire area classifications. The system is hosted by an IT vendor (Geomatic Technologies) and is accessible via the Internet.

Vegetation condition is dealt with at the span level in the VMS, with defect codes assigned to the span based on the condition of the 'worst' or highest priority vegetation in the span.

Figure 10 is an example screenshot from VMS.

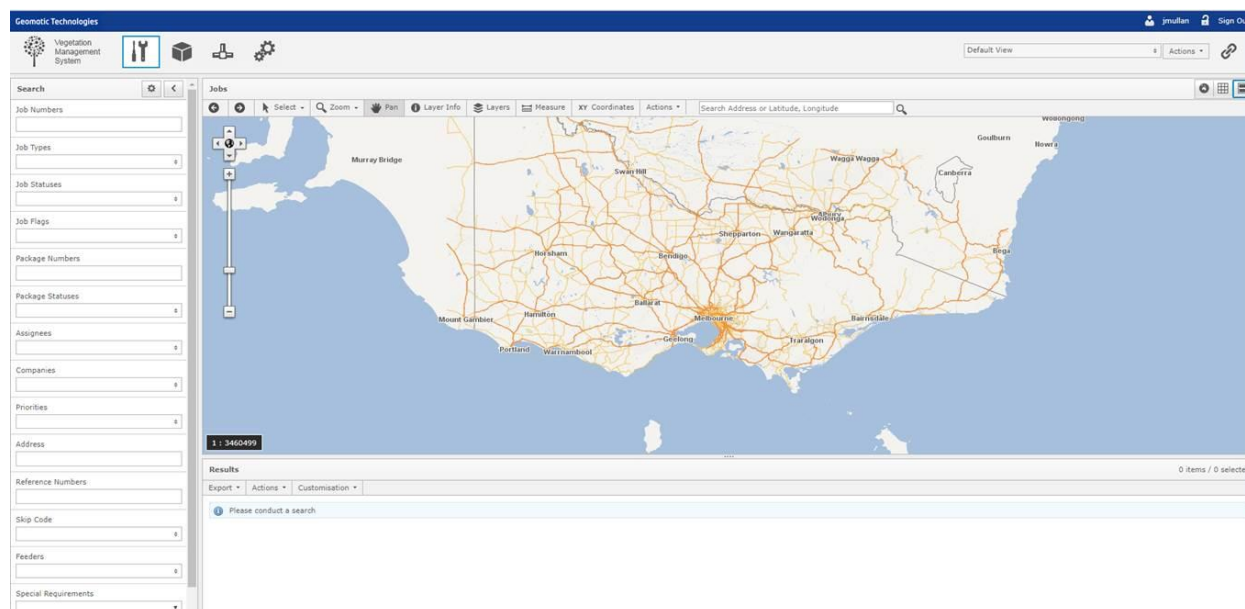


Figure 10: VMS Screenshot

5.4 Programmed Maintenance Approach

5.4.1 HBRA Assessment and Cutting

The entire HBRA network is assessed between February and October annually. Based on vegetation clearances and anticipated growth rates, condition codes are assigned.

Assessors undertake a structured visual assessment to determine the condition of each span considering four factors:

1. Hazard tree rating;
2. Vegetation density;
3. Construction type; and
4. Vegetation proximity.

This assessment provides a relative condition score for all HBRA spans within the network.

All spans with vegetation inside the Clearance Space are subsequently cut before they reach their index period (i.e. PT30 spans are cut within 30 days of assessment).

All spans with vegetation expected to grow into the Clearance Space before the end of the impending bushfire season, are cut in accordance with the program.

It is a requirement on sub-contractors that those HBRA spans which are cut remain outside the Clearance Space for a period of 18 months. AusNet Services undertakes random audits during the bushfire season and any spans with vegetation encroaching into the Clearance Space are referred to the sub-contractor for rectification.

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5.4.2 LBRA Assessment and Cutting

The entire LBRA network is assessed within a 12 month cycle and all priority spans (also known as action spans), which are spans which require action to maintain the minimum clearance, are cut.

It is a requirement on sub-contractors that those LBRA spans which are cut remain outside of the Clearance Space for a period of 12 to 15 months.

5.4.3 Codified Areas Assessment and Cutting

It is a requirement in Codified areas for Assessors to undertake a structured visual assessment to determine the condition of each span considering four factors:

1. Hazard tree rating;
2. Vegetation density;
3. Construction type; and
4. Vegetation proximity.

This assessment provides a relative condition score for all spans within Codified areas.

All spans within Codified areas are required to be assessed and cut prior to 31 December each year.

5.4.4 Declared Areas

In declared areas, Councils have responsibility for maintaining clearances between vegetation and electrical assets on public land including road reserves and parks.

During the AusNet Services LBRA assessment, spans with Council-responsibility trees in the clearance space are identified and recorded. These are referred to Councils for action. Follow-up audits may be done to ensure completion, depending upon the severity of the defects and known Council performance.

Generally, AusNet Services focuses on Council-responsibility trees in high voltage assets, as these represent the greatest network reliability and fire risk.

Historically, Council performance in maintaining vegetation clearances in declared areas has been poor. However, in recent years this has improved considerably, partly due to the introduction of joint management meetings and protocols with key Councils. The increased presence of ESV representatives in the field has also resulted in improved Council performance however many Council responsible trees still remain non-compliant with the regulations.

Investigations by the Vegetation Management group into network outages have identified very few sustained outages due to Council trees in the Clearance Space. However, a more proactive approach by Councils is desirable to reduce intermittent outages; the group will continue to influence Council performance and seek continuous improvement.

5.4.5 Hazardous Trees

Hazardous trees are those in the hazardous space with structural/health issues that are at risk of failure and contact with electrical assets.

During the HBRA and LBRA programs, assessors identify hazardous trees for subsequent removal.

Since 2005, AusNet Services has implemented a targeted hazardous tree program, which involves detailed assessment by a qualified arborist of every tree within the contact space on certain feeder sections. These feeder sections are selected on the basis of fire risk (As per the Fire Loss Consequence Model) and vegetation-related reliability.

As a result, the number of trees identified for action during this program is approximately 5,000 per annum.

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This target has been exceeded in the first three years of the program, with 20,000 trees already removed. As a result, this has allowed the focus to shift to removal in Codified areas (codified areas are areas defined as 'electric line construction areas' by the Electricity Safety (Bushfire Mitigation) Regulations).

5.4.6 Cyclic Clearing

Cyclic clearing is undertaken in rural areas with the objective of ensuring that, at a minimum, the vegetation does not encroach into the clearance and regrowth space for a three year period.

This work establishes and maintains wider clearances than those achieved in the regular HBRA and LBRA programs with the aim of reducing the future find rate for the network.

Cyclic clearing involves removal of mature and semi-mature trees, generally using chainsaws, whilst machinery-mounted slashers and herbicide spraying are methods employed to remove saplings and immature trees.

Depending upon workloads, budgetary constraints and available resources, they are generally targeted to areas where long-term reductions in maintenance cutting are desirable. They are also generally undertaken in rural and low-visibility areas.

5.4.7 LiDAR

LiDAR, which stands for Light Detection and Ranging, is a surveying method that measures distances to a target by illuminating the target with pulsed laser light and measuring the reflected pulses with a sensor.

LiDAR surveys are performed from a fixed wing aircraft or helicopter to allow for higher altitude flying (above 500ft altitude) hence the entire network can be aerially surveyed.

AusNet Services uses LiDAR surveys to complement the ground Vegetation Inspection with a more economic, consistent, accurate and comprehensive survey method particularly for longer spans.

Currently, 5,000 long spans (spans longer than 300m) are surveyed using LiDAR each year as part of a program to capture data on all long spans.

Additionally, LiDAR survey will add value to current distribution line inspection by enabling processes which currently are not feasible to be done for the entire network, including:

- Measurement of vegetation clearance to conductors;
- Volumetric measurement (vegetation density);
- Danger tree spotting/measurement;
- Growth rate measurement;
- Special trees (heritage) identification;
- Clearance to road/railway/water at line crossing over roads, railways and navigable waterways;
- Stockpiling under conductors; and
- Unauthorised construction on easements.

5.4.8 Alternatives to Vegetation Clearing

In situations where vegetation management is causing significant issues, such as escalating outages and fire starts, or where the location of the assets make tree clearing difficult, AusNet Services will consider alternative solutions to deliver a least cost solution.

Vegetation Management Strategy

These alternative solutions may include:

- Covered conductors
- Aerial bundled cables
- Undergrounding of electric cables

5.5 Historical Program Data

As part of the vegetation management program, hazardous tree removal and expenditure was increasing as shown in Figure 11 and Figure 12 respectively. As the hazardous tree removal target was met or exceeded for the first three years of the program, the target has been reduced and the focus shifted to removal in Codified areas.

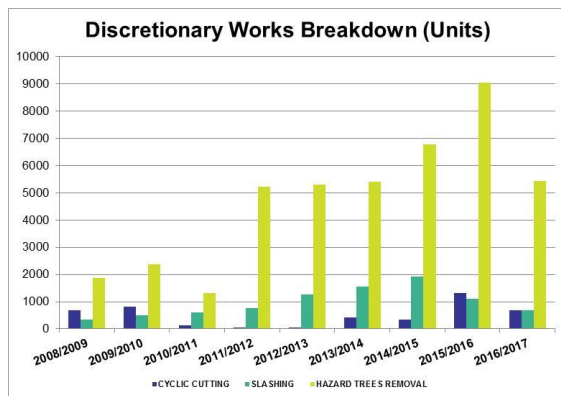


Figure 11: Vegetation management works

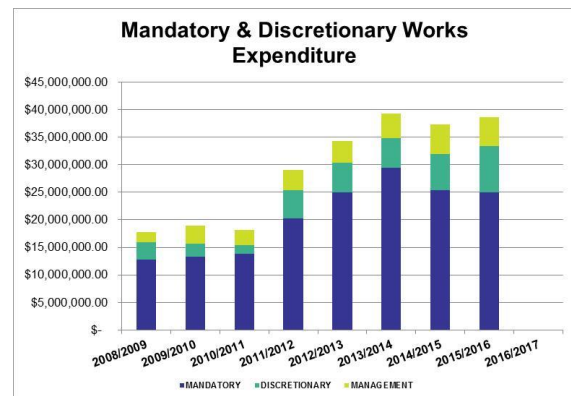


Figure 12: Vegetation management expenditure

Mandatory expenditure is the direct cost of removing vegetation to meet regulatory obligations.

Discretionary expenditure is incurred to proactively manage preventative maintenance outside the regulatory clearance and regrowth space.

Management is the cost of managing all vegetation management activities including items such as contract management.

The quantity of discretionary works has increased over recent years to address find rates and reduce the increase in vegetation density.

Find rates are the percentage of total spans requiring cutting works to maintain the regulatory clearance space.

Based on historical data and a statistically significant field sampling exercise undertaken in 2008, the vegetation profiles are illustrated in Figure 13 and Figure 14.

Figure 13 has an increasing find rate of spans in HBRA that require cutting works, whereas Figure 14 illustrates a slightly declining find rate for LBRA. Vegetation density is an integral factor for these trends. Proactively increasing discretionary works is required to arrest the increasing trend in HBRA.

Vegetation Management Strategy

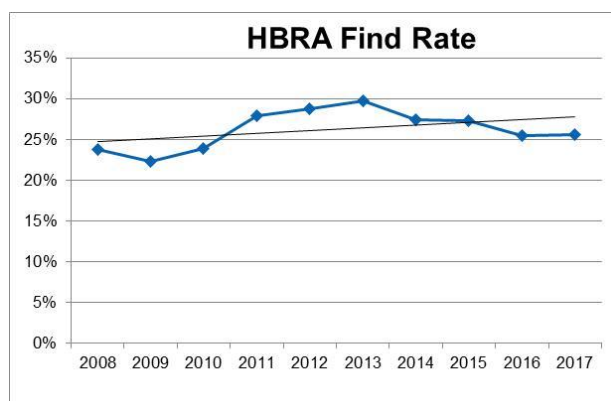


Figure 13: Find rate for HBRA spans

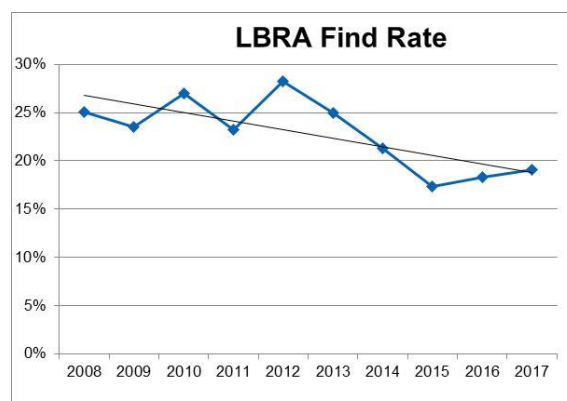


Figure 14: Find rates for LBRA spans

An increasing volume of spans that require vegetation management is due to increased plantings by landowners or land managers. Urban sprawl and low-density subdivisions is leading to increased ornamental plantings, and the environmental movement is leading to increased re-vegetation plantings in semi-rural and rural areas.

The targeted removal of smaller trees to create spans with no vegetation was introduced in 2014 to economically address the projected increased in future find rates.

Vegetation Management Strategy

6 STRATEGIES

6.1 Stakeholder Management

AusNet Services will continue its stakeholder management initiatives, including:

- Communicating with stakeholders the environmental impact of clearing versus pruning
- Educational and communication activities focused on 'unsuitable plantings' of trees near power lines

6.2 Vegetation Management

AusNet Services will continue the following vegetation management programs:

- HBRA assessment and cutting
- LBRA assessment and cutting
- Codified areas assessment and cutting
- Declared areas assessment and audits
- Hazardous tree removal – the target has been revised and the focus shifted to removal in Codified areas
- Cyclic clearing
- LiDAR assessment of long spans

In situations where vegetation management is causing significant issues, such as escalating outages or fire starts, or where the location of the assets make tree clearing difficult, AusNet Services will consider alternative solutions to deliver a least cost solution.