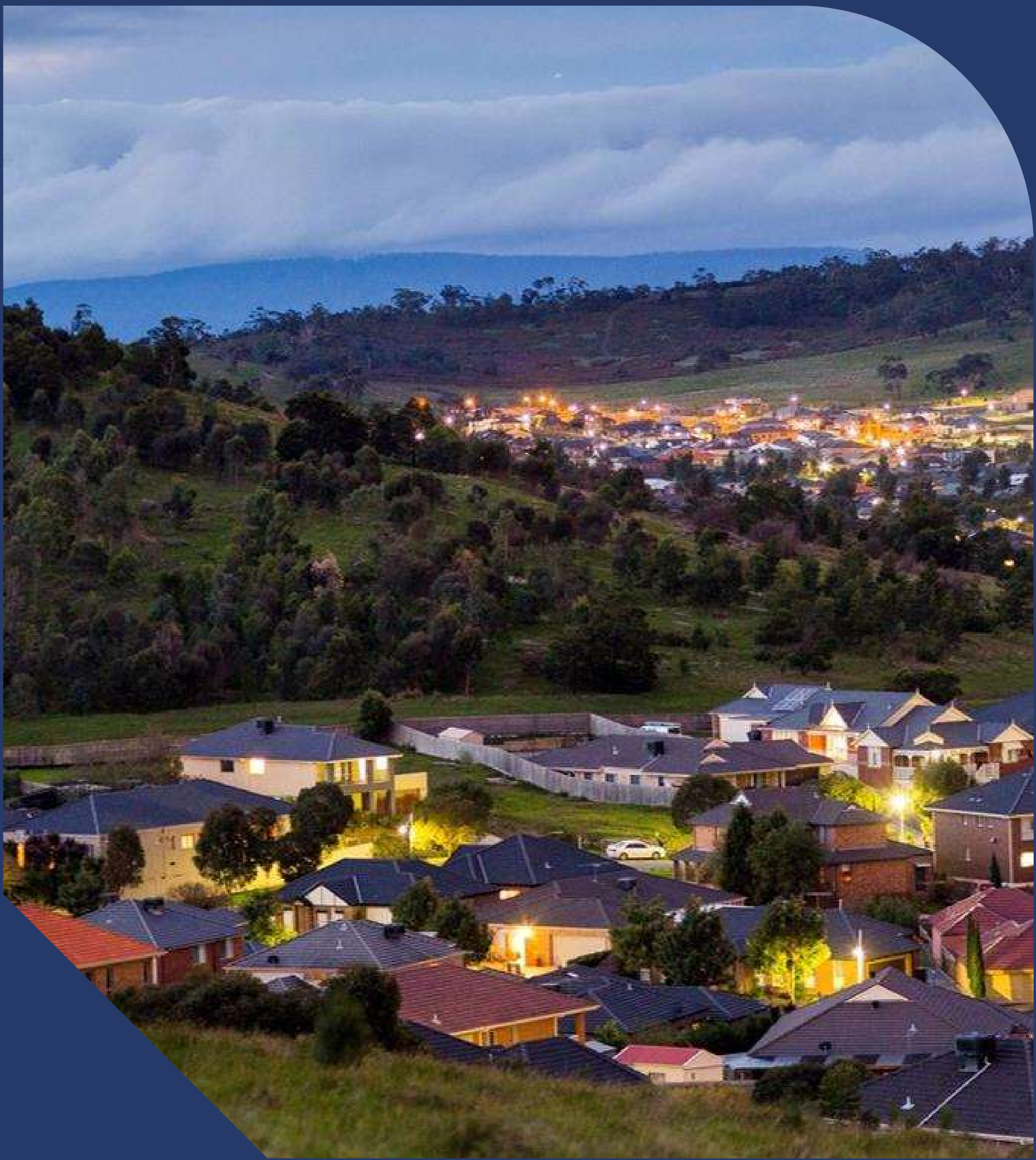
AusNet

Electricity Distribution Price Review (EDPR 2026-31)

Business case: Hazard tree program

Date: 31 January 2025



AusNet

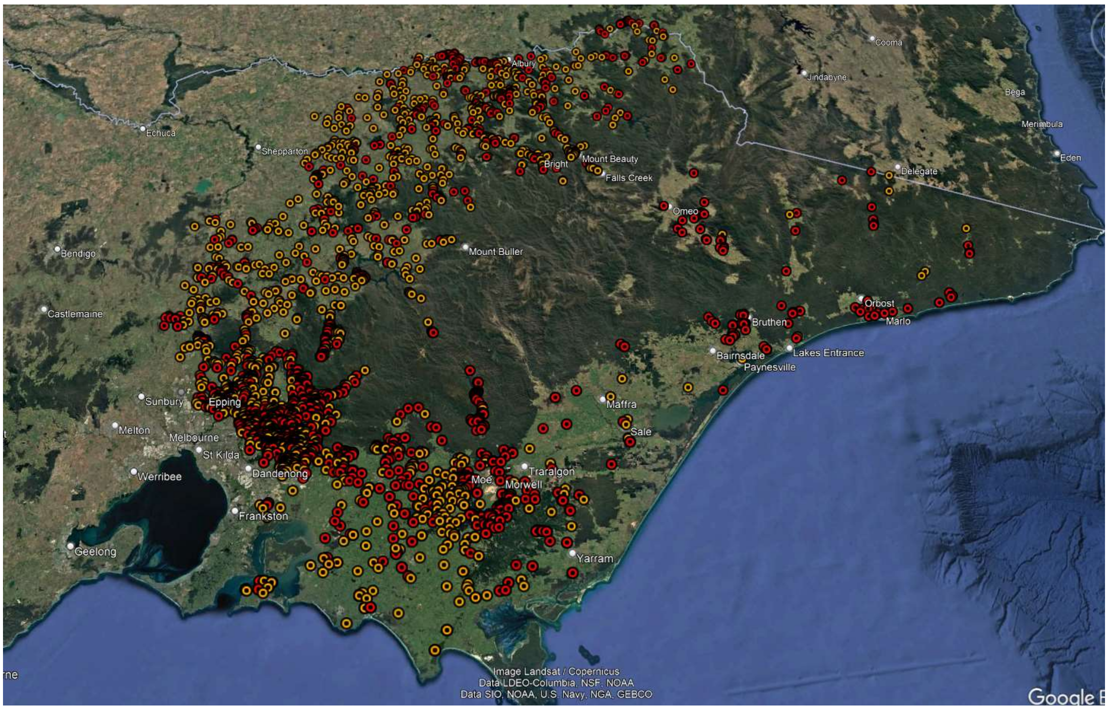
Table
of contents

1. Executive summary

AusNet is a regulated Victorian Distribution Network Service Provider (DNSP) that supplies electrical distribution services to more than 800,000 customers. Our electricity distribution network covers eastern rural Victoria and the fringe of the northern and eastern Melbourne metropolitan area.

We have estimated that approximately 30% of out vegetation-related outages are due to hazard trees, where the value of the unserved energy due to hazard trees is approximately $17m p.a. As such, we have proposed an expansion of our existing hazard tree program at $3m p.a., where we have estimated that it would reduce the value of unserved energy by approximately $8m p.a. This is approx. 45% reduction in the value of expected unserved energy. The Net Present Value (NPV) of the hazard tree program is $22m over an assessment period of 5 years.

Figure 1 Currently known hazard tree locations



Source: AusNet.

2. Background

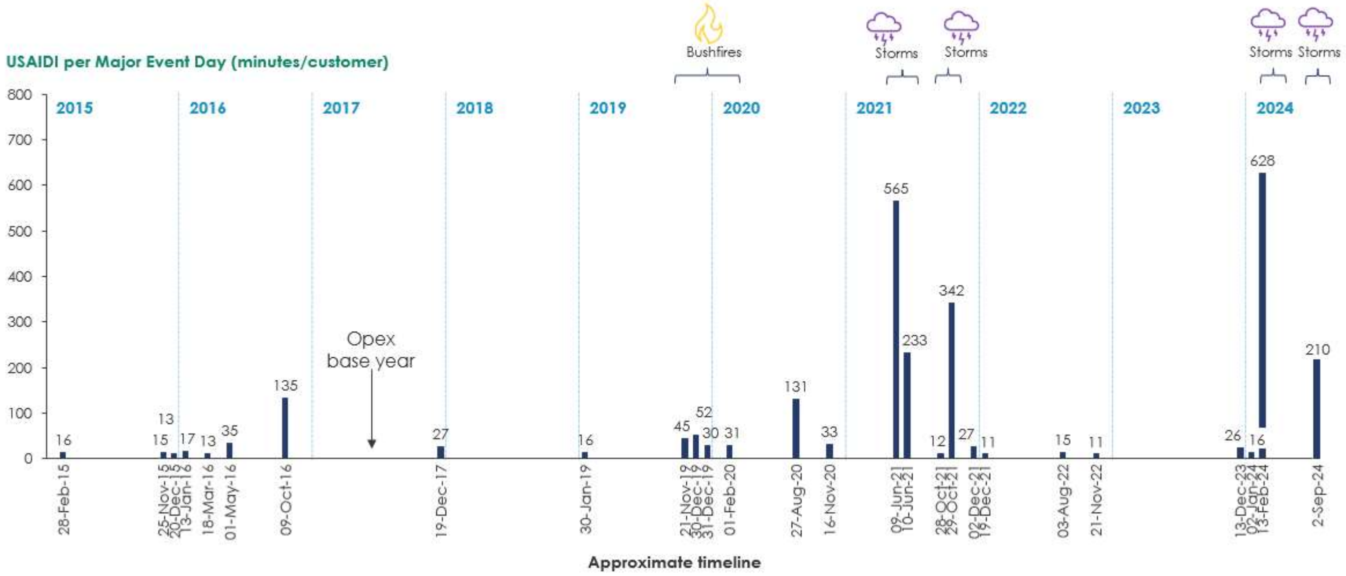
2.1. Weather impacts

Our network is particularly susceptible to storm caused outages because of our network's elevation and vegetation characteristics. Over the past 5 years, we have experienced 4 major storms and 1 bushfire that are the largest on record (see Figure 2).

- **2019/20 bushfires**: The "Black Summer" bushfires caused widespread devastation across regional areas and in total, 1,000km of AusNet's powerlines were affected resulting in 60,000 of our customers being off supply. Over 1.5 million hectares were burnt in the fires and more than 300 homes were destroyed. This was the first time the Victorian Government declared a state of disaster.
- **June 2021 storms**: On 9 June 2021, major storms caused widespread damage across Victoria. Parts of Victoria recorded more than 280 mm of rain and experienced wind gusts of more than 100 km per hour. Three days after the event, 68,000 customers remained off supply, while more than 9,000 customers remained without supply a week later. At the time, it was the largest storm on record. In total, fourteen 66kV powerlines were taken out of service, fifty-eight 22kV powerlines reported faults and 10 zone substations went black in AusNet's distribution area. This resulted in 249,000 customers being off supply.
- **October 2021 storms**: On 29 October 2021 (within months of the June 21 storm) another storm event created widespread devastation. Damaging winds (e.g., 146 km/h at Wilsons Promontory) rain and hail hit Western Victoria, the southwest and Metro Melbourne. As a result, nearly 530,000 customers across Victoria were off supply at peak. Three days after the event, approximately 24,000 customers remained off supply, with over 2,500 customers still without supply after one week.
- **February 2024 storms**: On February 13, 2024, Victoria experienced a catastrophic storm event that damaged 12,000 km of powerlines and poles across the state's electricity distribution businesses, causing widespread power outages. Six 500kV transmission towers collapsed and AEMO instructed load-shedding of approximately 92,000 customers, state-wide. The February 2024 storm is the largest that AusNet has experienced, resulting in more than 297,000[1] of our customers being off supply.
- **September 2024 storms**: On 1 September 2024 (less than seven months after the February 2024 storms), a severe storm caused widespread damage across Victoria, affecting many of the same customers as the February 2024 storm (approximately 87k customers were affected by both February and September 2024 storms).

[1] Other sources reference 255k customers which is the coincident peak customers off supply.

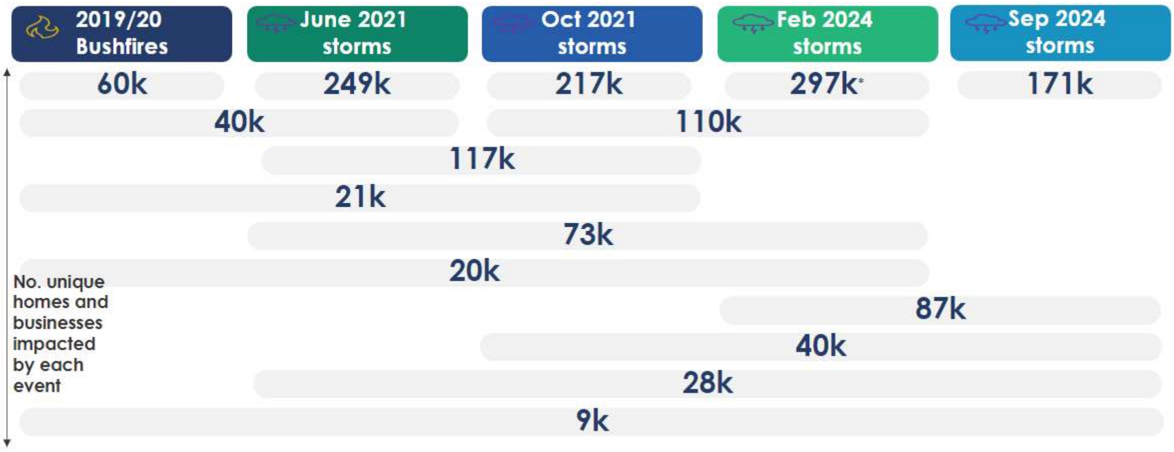
Figure 2 USAIDI per Major Event Day from 2015 to 2024 (minutes / customer)



Source: AusNet.

Figure 3 shows that 28,000 homes and businesses were impacted by all four major storms, and 9,000 customers were impacted by all five events.

Figure 3: Summary of the number of AusNet's customers affected by the five natural disasters since 2019



Source: AusNet.

2.2. Hazard trees

Hazard trees are trees with some sort of structural defect outside of the regulated clearance zone that are at risk of failing and causing a power outage. Effective hazard tree management is made up of identification and assessment, and risk abatement work (known as treatment), which is either pruning or removal.

While not all tree failures can be predicted, many tree related electricity faults can potentially be avoided by identifying trees likely to fail and then implementing mitigation measures to eliminate or reduce the hazard as far as reasonably practicable.

Due to the volume of hazardous trees outside the clearance space that can impact the network, and to reduce network and customer interruptions, we propose to expand our hazard tree program by an additional C-I-C cuts per year. The cost of the hazard tree expansion program has been estimated at $15 million over 2026-31, or $3 million per year.

2.2.1. Identification and assessment

AusNet has an existing hazard tree program that includes three potential means of identification, as follows:

1. A member of the community alerts AusNet to the presence of a potential hazardous tree that they have observed. These locations are issued to an internal AusNet arborist who conduct a detailed assessment and decide whether they fit the hazard tree criteria or not.
2. Vegetation Assessors are qualified to assess for vegetation clearance around electrical infrastructure but are not qualified to assess hazard trees. While conducting annual clearance space assessments, they can identify trees that they suspect may pose a threat to the electrical assets. This is known as a Level 1 assessment, and these are flagged as Trees of Interest and are subjected to a follow up inspection from an internal AusNet arborist who conducts a more detailed Level 2 Assessment. If during the Level 2 assessment, the arborist determines the Trees of Interest fit the criteria for a hazard tree, they are approved to move into the Hazard Tree program for action. Based on the results of the detailed inspection, Trees of Interest can be:
    a. accepted as hazardous and are issued to a contractor for either pruning or removal, *or*
    b. flagged for ongoing monitoring, *or*
    c. rejected entirely, meaning no further action is taken.
3. A dedicated Level 2 hazard tree inspection is undertaken by an internal AusNet arborist (qualified to assess hazard trees) along a targeted feeder, section of feeder, or other geographically delineating factor such as an area of high fire consequence risk.

AusNet maintain a hazard tree register that rates each hazard tree according to the likelihood of failure as determined by the inspecting arborist. The rating system is based on the level of visible structural defects, the proximity to electrical infrastructure, history of failure(s) and the foreseeable local conditions, (see next table).

Table 1 Hazard tree rating system

HAZARD RATING	LIKELIHOOD OF FAILURE	DESCRIPTION
1	Unlikely	The tree or parts are not likely to fail during severe weather conditions
2	Improbable	The tree or parts are not likely to fail during normal weather conditions and may not fail in severe weather conditions.
3	Possible	The tree or tree parts exhibit moderate structural damage and/or structural defects and have a moderate risk of failure. At the current time of assessment, the defects do not meet the threshold for failure.
4	Probable	The tree exhibits signs which indicate that it is probable that the tree or sections of the tree may impact electrical assets under normal weather conditions. Corrective action should be taken as soon as it is practicable.
5	Imminent	Failure of the tree has started or is most likely to occur in the near future. The tree has deteriorated to the point that it is unable to withstand load bearing forces. These trees pose an immediate risk to AusNet Services assets and require urgent action.

Source: AusNet

2.2.2. Treatment (pruning or removal)

AusNet have engaged highly experienced Delivery Partners to conduct the physical vegetation management work. Once approved, the work is completed in accordance with the recommendations and work instruction provided by the inspecting arborist. From a contractual perspective, payment for hazard tree services is based on the trunk diameter of the tree requiring treatment and whether the requirements are for pruning or removal. The trunk diameter is recorded, and unit rates are applied to all categories of trunk diameter, except the largest trees which require an approved quote. The following table lists the various categories and payment terms for each category of tree.

Table 2 Tree category and costs

TREE CATEGORY	DESCRIPTION	PAYMENT TERMS
Category A	Means Vegetation with a Diameter of a Tree up to 150mm.	C-I-C
Category B	Means Vegetation with a Diameter of a Tree between 151mm and 299mm.	C-I-C
Category C	Means Vegetation with a Diameter of a Tree between 300mm and 599mm.	C-I-C
Category D	Means Vegetation with a Diameter of a Tree between 600mm and 899mm.	C-I-C
Category E	Means Vegetation with a Diameter of a Tree greater than 900mm.	C-I-C

Source: AusNet.

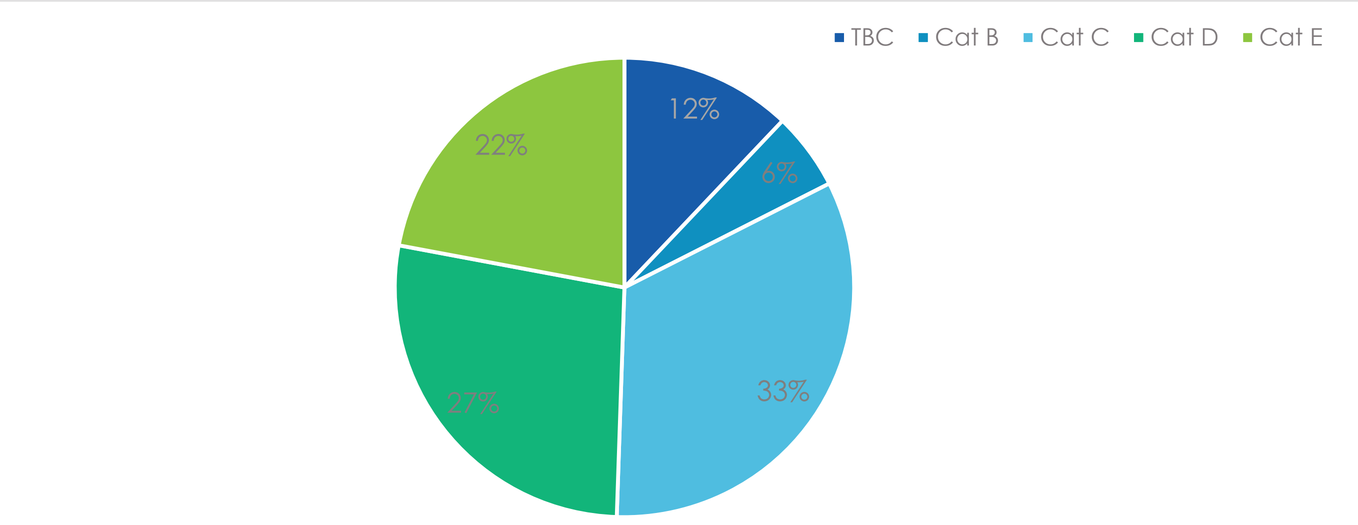
Trees with unit rate pricing allow for accurate volume and financial forecasting. Whereas Category E tree costs can vary significantly depending on:

- Complexity, e.g. high levels of decay/defect, extremely large, physical obstructions such as buildings, etc.
- Location, e.g. very remote with long travel distances, full or partial road closures, electrical outages, etc.
- Resource requirements, e.g. cranes, excavators, forestry harvesting machinery, tub grinders etc.

For these reasons, Category E trees can range from C-I-C. It is often the larger, older trees that present with more significant defects and advanced levels of decay. They also have a higher consequence of failure due to extreme physical forces involved and subsequently, the damage they cause to electrical infrastructure, and therefore repair and restoration times.

Figure 4 below shows the percentage of trees per category of existing hazard trees currently in AusNet's register, where "TBC" are trees that have not yet been assessed and measured by an AusNet Arborist. This chart shows that 22% of trees are category E with a diameter greater than 900mm which means costs are unknown as tree specific quotes are required. The chart also shows that 12% are TBC (have not yet been assessed and measured by an AusNet Arborist).

Figure 4 Existing hazard trees by size category



Source: AusNet.

Figure 5 Photo of a hazardous tree and tree failure – Thompson Dam Rd, Baw Baw, Victoria

Source: AusNet.

3. Regulatory framework

In the state of Victoria, utility related vegetation management is regulated by the *Electricity Safety (Electric Line Clearance) Regulations 2020* (**Regulation**), which are administered by the state's Energy regulator, Energy Safe Victoria. This Regulation includes Schedule 1 - Code of Practice for Electric Line Clearance (**Code**).

This regulation provides AusNet with the unhindered ability to maintain the minimum clearance space (MCS) between vegetation and its overhead electricity network. Maintaining the MCS is crucial to the safe and reliability operation of an electricity network but is only part of the methodology in which electricity distribution companies keep their network and communities safe.

Trees or tree limbs that are situation outside the MCS can fail and come into contact with powerline assets causing electrical faults. The risks associated with electrical faults include:

- a loss of electrical supply (an essential service that powers communication services [including emergency services communications], schools, hospitals, aged care facilities, shopping precincts and life support customers).
- damage to infrastructure – depending on the severity can be particularly disruptive to the community and damage can often take considerable time and resources to repair.
- damage to customers appliances and internal wiring.
- personal injury to people in the vicinity of the electrical fault, *and*
- the potential to ignite flammable materials that can result in a significant fire/bushfire event.

Like many major electricity companies, AusNet have established an extensive hazardous tree program to mitigate the risks that hazardous trees pose to the safe and reliable supply of electricity to the communities we serve.

Regarding hazardous trees, Part 2, Division 1, Clause 9 of the Code states:

Responsible person may cut or remove hazard tree

1. *This clause applies to a responsible person referred to in section 84, 84C or 84D of the Act.*
2. *The responsible person may cut or remove a tree for which the person has clearance responsibilities if a suitably qualified arborist has—*
    a. *assessed the tree having regard to foreseeable local conditions; and*
    b. *advised the responsible person that the tree, or any part of the tree, is likely to fall onto or otherwise come into contact with an electric line.*
3. *For the purposes of this clause it is irrelevant that the tree is not within, and is not likely to grow into, the minimum clearance space for an electric line span.*

The Code defines a suitably qualified arborist (qualified to conduct Level 2 inspections) as follows:

suitably qualified arborist *means an arborist who has—*

a. *as a minimum, the qualification of National Certificate III in Arboriculture including the "Perform a ground-based tree defect evaluation" unit of competency, or an equivalent qualification; and*
b. *at least 3 years of field experience in assessing trees;*

In addition to the Regulation, the State Government requires that all Victorian planning schemes contain state standard particular provisions that require a planning permit to remove, destroy or lop native vegetation. These planning scheme provisions also include exemptions from requiring a planning permit to remove native vegetation for certain uses, activities or development, including to maintain the safe and efficient function of a Minor Utility Installation in accordance with written agreement of the Secretary to the Department of Environment, Land, Water and Planning (AusNet has the aforementioned written agreement).

These exemptions are contained in and apply to the following clauses of the Victorian Planning Scheme:

• Clause 52.16 (Native Vegetation Precinct Plan)

• Clause 52.17 (Native Vegetation)

The State Government have developed guidance material for the purpose of assisting with interpretation of the exemptions. Refer to *Utility installations exemption – procedure for the removal, destruction or lopping of native Vegetation* for further information. However, the ability to operate without the requirement for planning permits for the purpose of maintaining utility installations is restricted to the "*minimum extent necessary*", which is intended to avoid unnecessary or destructive vegetation clearing.

- Native vegetation that is to be removed, destroyed or lopped to the minimum extent necessary:
  - to maintain the safe and efficient function of a Minor utility installation; or
  - by or on behalf of a utility service provider to maintain or construct a Utility installation in accordance with written agreement of the Secretary to the Department of Environment, Land, Water and Planning (as constituted under Part 2 of the *Conservation, Forests and Lands Act 1987*).

When read holistically, the combination of the requirements in the Regulation and the State Planning Scheme only allows AusNet to undertake what has been deemed necessary by a suitably qualified arborist engaged by AusNet to undertake tree inspections for the purpose of preventing trees, or parts of trees, from coming into contact or otherwise interfering with its electrical assets.

4. Community Expectations

There are large volumes of research that have concluded that trees have significant widespread benefits to people and the environment. In addition to obvious benefits such as shade and habitat for fauna and flora, less obvious benefits include improved air quality, visual amenity, carbon sequestration and overall improved psychological and physical wellbeing of people.

AusNet aim to strike a balance between the environmental and amenity value of trees to customers and the community without compromising our objectives of maintaining network safety and supply reliability. Careful consideration must be given to balancing safety, economic factors, viability, aesthetics and the environment to arrive at the "socially optimal" level of vegetation management, and the greatest level of benefit for Victorians.

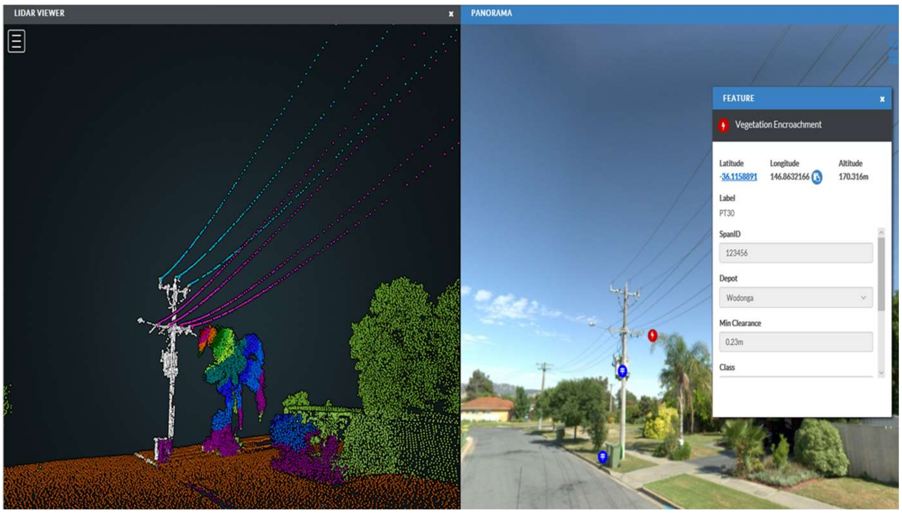
Cutting trees unnecessarily is an inappropriate use of available resources and certainly not in accordance with expectations from the community or any level of government. In addition to the regulatory framework, AusNet must maintain its social licence by operating in an environmentally friendly manner, with utmost sympathy and respect to the fauna and flora inhabiting its operating area.

5. LiDAR and emerging technology

AusNet has embarked on a program to survey its network using LiDAR which is a remote sensing technique that measures distances and creates precise three-dimensional maps of the environment using laser light. LiDAR sensors emit many laser pulses per second and record the distances to multiple points on objects or surfaces within the field of view. This results in a dense collection of data points that generate accurate and precise three-dimensional representations (point cloud) of the target and surroundings by estimating the distance travelled by each laser beam. The attributes of the point cloud can be classified to identify structures, vegetation, buildings, roads, conductors and so on. This data is then processed using algorithms which identify clusters, or groups of points that form an object or feature. Once classified, additional algorithms are developed to automate measuring determined distances between point cloud objects such as conductors and structures or vegetation. This provides survey grade measurement, and an example LiDAR output is shown in Figure 6.

There is an ever-growing body of research and development into the use cases for LiDAR in vegetation management, including the identification of potentially hazardous trees. By comparing year-on-year point cloud data, algorithms are being developed to detect gradual tree movements, such as progressive leans. AusNet intends to investigate this further with the view of adding this identification technology to our assessment methods. This is likely to identify additional hazardous trees, that may otherwise not be detectable during a typical Level 2 hazard tree inspection.

Figure 6: Example LiDAR representation of distribution network assets and surrounds



Source: AusNet.

6. Identified need

We have more hazard trees and Trees of Interest on our network than we are able to cut, and this problem is only increasing as we grapple to understand the longer-term effects of climate change. For example, the recent El Nina weather patterns which are associated with record rainfall has promoted very rapid growth of trees near our network. Sustained above average rainfall can reduce the stability of the ground, destabilising root systems and causing entire trees to overturn.

Anecdotally, AusNet have been observing an increased incidence of larger, mature, veteran trees declining at a faster rate than before. Whereas younger, more virile trees, appear to be adapting better to the changing climatic conditions. It is anticipated that this trend will continue, resulting in the gradual increase of average costs per tree.

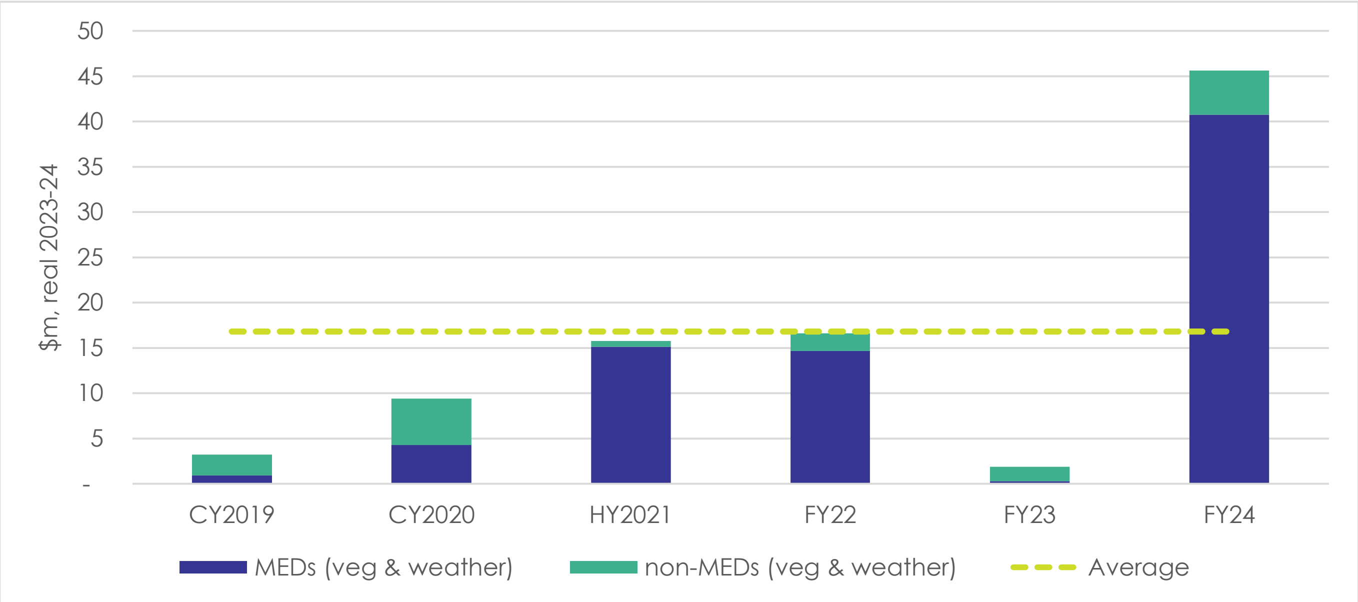
Extreme weather events are becoming more frequent and more intense which is causing more trees and branches to fall onto our powerlines. We estimate that approximately 30% of all our vegetation related outages are due to hazard trees.

We have estimated that the value of expected unserved energy due to hazard tree caused outages is approximately $17 million per year based on the following assumptions:

- Analysing our RIN data over 5.5 years, from 2019 to 2023-24 (inclusive)
- Filtering SAIDI for vegetation caused outages (see CA RIN, 6.3 Sustained Interruption, Reason for interruption column)
- Converting SAIDI to CMOS (multiply SAIDI by the number of customers in that year)
- Converting CMOS to hours (divide CMOS by 60)
- Converting hours to unserved energy (multiply hours by an assumed energy consumption rate of 0.71kWh per hour)
- Converting unserved energy to a value of unserved energy (multiply unserved energy by a weighted average VCR of $40 per kWh)
- Converting value of unserved energy (caused by vegetation) to one specific to hazard trees (multiply value of unserved energy by 30% i.e., we have assumed that 30% of all vegetation caused outages are due to hazard trees)

That is, due to outages caused by hazard trees, customers have been unable to consume electricity, where the value of the unserved energy is equivalent to $17m per annum. This amount is expected to increase over the coming years as extreme weather events become more frequent and larger in size.

Figure 7 Value of unserved energy due to hazard tree caused outages



Source: AusNet

7. Program

We want to actively reduce the amount of hazard tree caused outages. Hazard tree outages can be managed a few different ways e.g., undergrounding the network to avoid the outage, insulating conductors which would eliminate the impact of small branches falling across powerlines (but not if the tree pulls down the entire line) or cutting hazard trees back to a point it is no longer a risk. Each type of solution addresses a different type of hazard tree issue, at different effectiveness levels and at different costs.

We are proposing to expand our hazard tree program to address C-I-C more trees per year over the 2026-31 regulatory period at a cost of $3m p.a.

7.1. Benefits of the program

C-I-C

7.2. Resource allocation

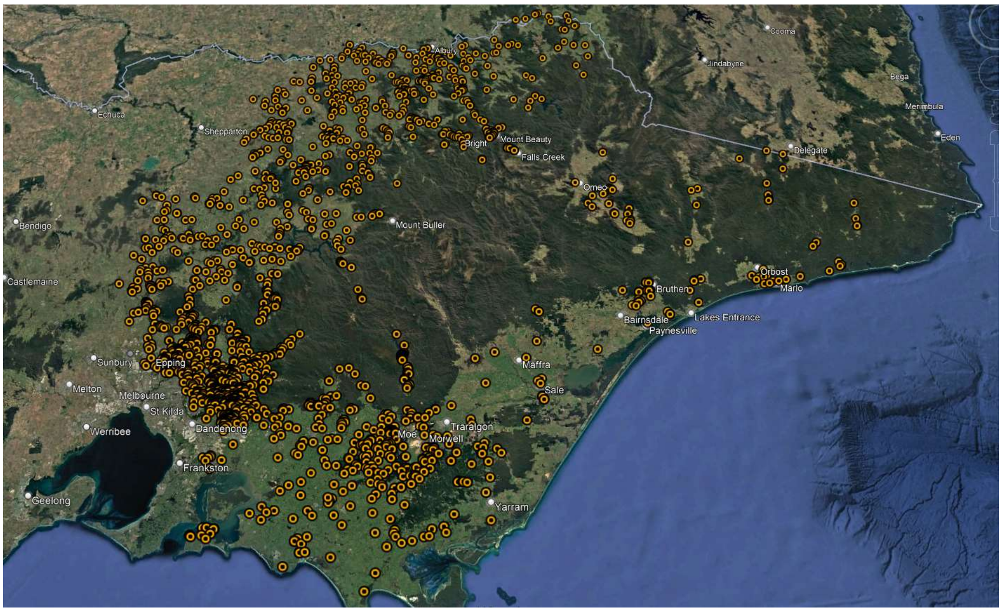
Hazardous tree management is primarily driven by the principals of risk management, which requires targeting the areas or issues of highest risk or concern with consideration of the consequences of tree related electrical faults. The additional hazard tree funding would be directed to bolster the existing program, fundamentally allowing AusNet to target a greater number of hazardous trees based on current methodology and emerging technology.

AusNet's hazard tree risk management methodology encompasses a multi-tiered approach to resource allocation intended to provide the best overall outcomes with our finite amount of resources. In addition to the Level 1 tree assessment conducted annual by Vegetation Assessors (see Section 2.2.1 Identification and assessment), AusNet have a formal Level 2 hazard tree assessment program that is conducted by suitably qualified arborists.

Priorities and drivers that are used to direct Level 2 assessments (and subsequent hazard tree treatment work) are dynamic and are adjusted as required. The following dot points outline some of the key drivers/priorities that are used to direct Level 2 hazard tree assessment:

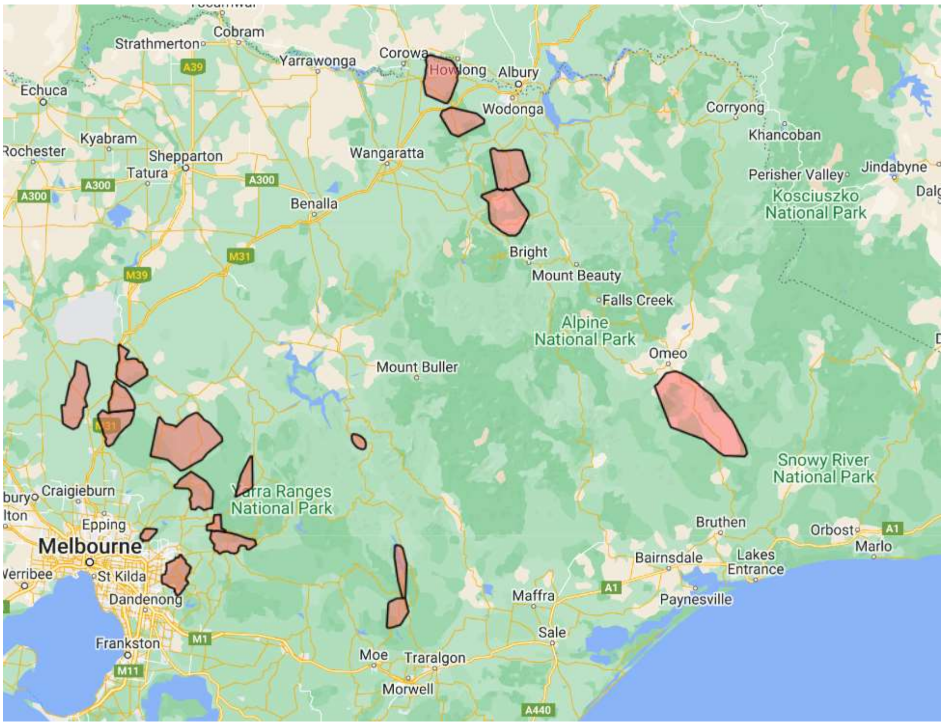
- Level 2 inspections conducted on all Trees of Interest that were identified by Vegetation Assessors during their Level 1 assessment. Figure 8 shows current Tree of Interest Locations.
- Radial 66kV feeders are targeted on an annual basis, as faults on these feeders are generally particularly disruptive to large amounts of customers as there are no backup supply routes (single contingency).
- Ring-fed/interconnected 66kV feeders are targeted on a biennial basis. These typically supply large numbers of customers, but electrical faults are generally less disruptive due to the availability of backup contingency for electrical supply.
- 22kV feeders in areas of highest bushfire consequence (Codified areas) are targeted on a three-yearly rotation. See Figure 9, where the shaded polygons are the locations of Codified areas determined by the modelling conducted following the Royal Commission into the 2009 Black Saturday bushfires.

Figure 8 Currently known Trees of Interest requiring arboricultural inspections



Source: AusNet.

Figure 9 Locations of Codified Areas (highest bushfire risk consequence)



Source: AusNet.

7.3. Economic analysis

Based on an operating expenditure amount of $3 million p.a. and benefits of $8 million p.a., we have calculated the Net Present Value to be $22m. Table 3 outlines the key economic assumptions.

Table 3: Key assumptions for the central scenario

	Value	Comments
WACC	5.56%	Average of 4.11% and AEMO's IASR central discount rate of 7%
Evaluation period	5 years	
Value of Customer Reliability	$40 per kWh	Weighted average VCR based on residential, commercial, industrial and farming loads.

Source: AusNet analysis

Table 4: NPV results ($m, 2023-24 dollars)

	FY27	FY28	FY29	FY30	FY31	Total over 5 years
Opex	3.0	2.8	2.7	2.6	2.4	13.5
Benefits	7.8	7.4	7.0	6.6	6.3	35.1
NPV	21.6					

Source: AusNet analysis

7.4. Balanced response

We have developed a Resilience Strategy (provided as supporting documentation to our Regulatory Proposal) that outlines our resilience strategy and balanced response to improving resilience outcomes for our customers. See our Resilience Strategy for more information.

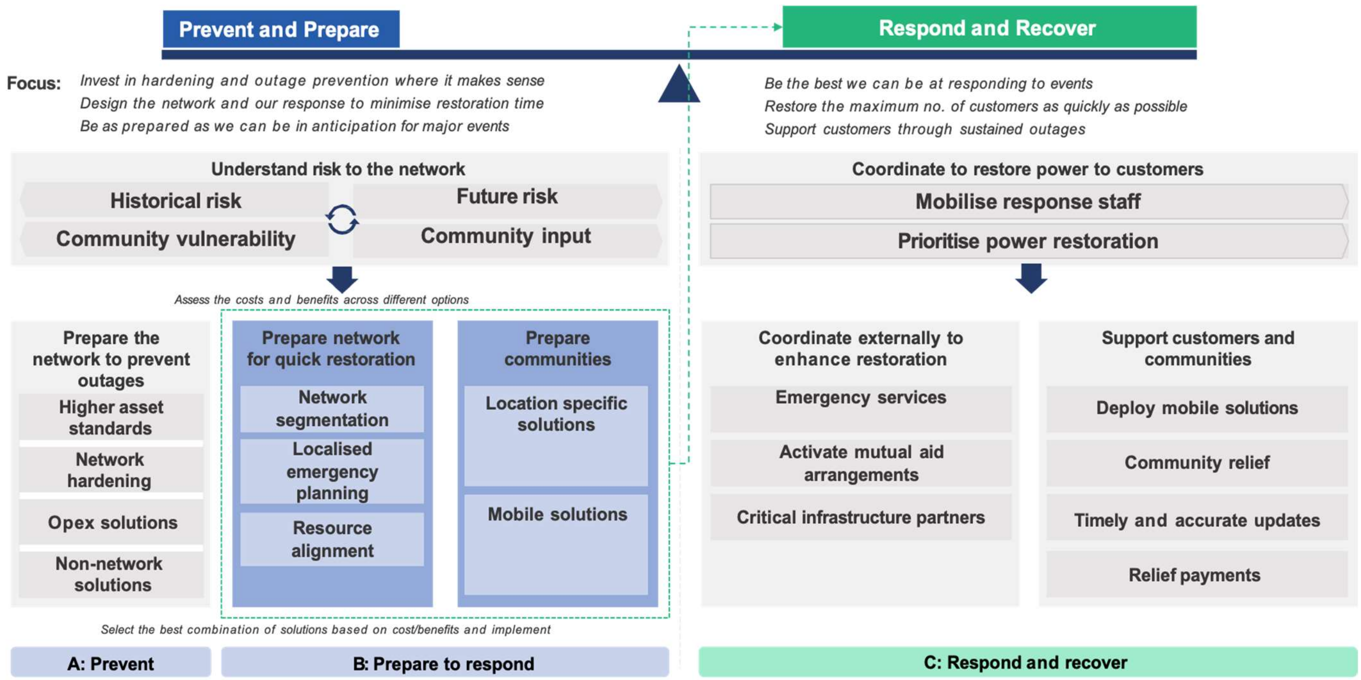
The balanced response framework is illustrated in Figure 10 below, which shows how potential resilience expenditure needs to be balanced between 'prevent and prepare' and 'respond and recover' initiatives in a coordinated manner to deliver the best outcome for customers. Both approaches are essential because it is not possible to prevent all outages and therefore fully displace the need for response and recovery and conversely, allow for unrestricted growth in outages and divert all resources to response and recovery.

The figure below shows the interaction between 'prevent and prepare' and 'respond and recover' where some of the key considerations into the right balance are:

- Where network or non-network solutions are economically sound (NPV positive) to address high risk areas (based on historical and future risks) then network or non-network solutions should take priority over the respond and recover approach.
- Network hardening solutions should be implemented where it is economic (NPV positive) to do so. Some non-network solutions (e.g., backup power for community hubs) are important supplementary measures and not mutually exclusive.
- SAPS are relatively expensive and therefore only expected to be most cost effective to install at the time when the existing service line is due for replacement. It is also most cost effective in rural and remote areas where the alternative (e.g. augmentation) is very expensive. This means we should be analysing NMI level data to identify customers being served by aging assets, with high susceptibility to outages, in rural and remote areas with high vulnerability.

- The risk of outages will always exist, so we should always have a suite of mobile generators and emergency vehicles that can be rapidly deployed. The right level of mobile generators and emergency vehicles should be informed by our historical experience and forecast need.
- Our existing hazard tree program is prioritised to target the highest risk hazard trees first. While expanding the hazard tree program would allow a larger scope of works, including commencing work on trees that are lower in priority, yet nevertheless important to address to avoid tree falls onto powerlines, this would be limited by amenity concerns. Our Revenue Proposal forecast reflects our best forecast at this stage.

Figure 10 Balancing initiatives to improve network resilience



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